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Editor's Note

RENU TOMAR
(Editor-in-Chief)

DEAR READERS,

WaterAge is pleased to have finished its first year of service and to be the voice of the water and wastewater sector. We are thankful to all our authors and advertiser who have supported us and contributed to our magazine. We at WaterAge believe that without the support from all the brands that have advertised us and the contributors who have contributed their insightful articles as well as our subscribers are our assets. It is just a year and we have a long way to go so we look forward to the same support and bits of advice to grow further and celebrate more such anniversaries.

In this special anniversary edition of WaterAge, we have asked industry experts to contribute articles on the themes whichever they think are the important topics that need to be discussed and need the most attention.

This first year's anniversary is also very special for all the team members of WaterAge who have trusted us and made it possible to make the first year a great success. Dear Team, Let's together create unforgettable moments by giving it more significance!

Join us on WaterAge magazine and exciting new adventure and continue to support us. Your suggestions and feedback are always welcome. To submit your feedback, your interest incontributing articles, case studies, etc., write to the editor: editor@waterage.in.

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The State Bank of India intends to issue green bonds to raise USD 500 million

The largest lender in the nation, State Bank of India (SBI), intends to issue green bonds to raise about USD 500 million for the purpose of financing environmentally friendly projects. The Government of India generated close to USD 1 billion through its first sovereign green bond programme at the same time as this proposal, or roughly Rs 8,000 crore.

Early this month, the 100 percent government–owned Export–Import Bank of India raised $1 billion through the sale of 10–year sustainability bonds. In 2023, it was the first Indian issuer to enter the markets for issuances of dollar– and sustainability–backed bonds.

Senior SBI executives stated that the bank is looking to issue green bonds to raise a small amount of money. It has a more introductory tone.

Despite being little, it might be close to $500 million.

While the bank is testing the waters, pricing and market circumstances will determine the actual issue.

According to SBI executives, the bank has a pipeline of projects in sectors like renewable energy for the use of funds acquired through green bonds.

Five basis points (bps) less than the five–year sovereign yield, the Reserve Bank of India auctioned the government's five–year green bonds for Rs 4,000 crore at a coupon rate of 7.1%. Another Rs 4,000 crore was raised through the sale of 10–year notes for 7.29 percent, which is 6 basis points less than equivalent government securities. The money will go toward environmentally friendly initiatives such as modest hydropower, wind, and solar projects as well as other public–sector initiatives.

Clean transportation, coping with climate change, sustainable water and wastewater management, energy efficiency, and green buildings are a few of the fields it could support initiatives in.

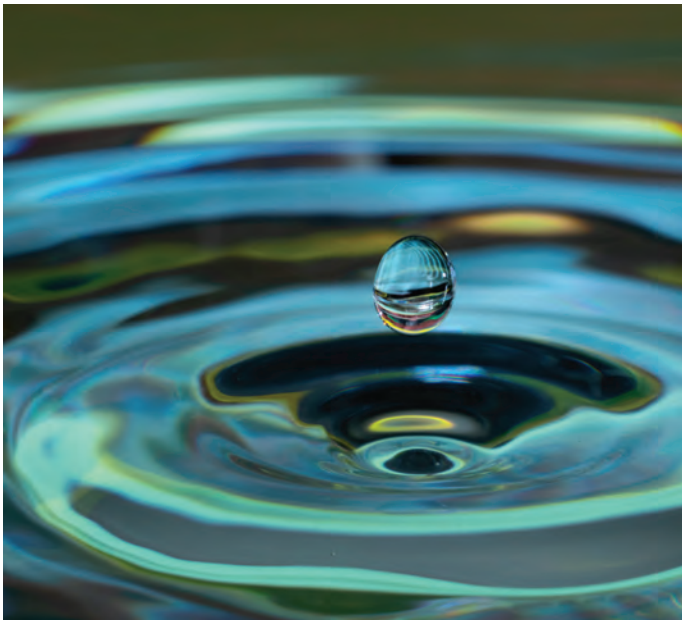
Rigo Water Filtration bags award for best safe drinking water initiative 2022–23 by Indian Social Impact

Leading water filtration business Rigo recently won the Best Safe Drinking Water Initiative of the Year 2022–2023 category of the coveted Indian Social Impact Award. Rigo, which was founded by Anil Guptha (Anil Nagabhushan), won the Indian CSR Awards on January 21, 2023, in Delhi. Sarthak Dutta, CSR Executive of Rigo, who has played a key role in advancing Rigo's activities for clean drinking water, accepted the award.

With the goal of addressing one of the most urgent concerns of our time, access to clean drinking water, Rigo was established in 2012. Despite the fact that having access to safe drinking water is a fundamental human right, millions of people around the world still lack it.

In India, where more than 600 million people lack access to clean drinking water and many more are in danger of waterborne illnesses, the issue is particularly urgent.

Rigo's team was thanked by the spokespersons: "We would like to take this opportunity to thank each and every person and organisation that has supported and believed in our goal. We couldn't have done it without the assistance of our workers, partners, and clients. We are appreciative of the chance to improve the lives of so many people, and we look forward to carrying on with our work in the years to come."



Tamil Nadu's Pillur–III drinking water project to be commissioned in May

The Pillur–III drinking water project, which would contribute 178 million litres of water per day (MLD) to the newly added areas of the city corporation, is anticipated to be finished by the Tamil Nadu Water Supplies and Drainage Board (TWAD) by May of this year.

Together, TWAD managing director V Dakshinamoorthy and city corporation commissioner M Prathap evaluated the project work being done in the district's various locations.

The 779.86–crore project, according to a representative of the corporation's engineering division, was approved in May 2018.

Following that, the construction work started in March 2021. The project's pumping station, which includes a reservoir, is situated close to Samayapuram EB Barrage–I downstream of Pillur dam (upstream of Murgaiyan Parisal Thurai in Bhavani).

To deliver water from the reservoir to the city, the project requires constructing a pipeline that is approximately 90.76 kilometres long. The project also includes a water treatment facility and a massive tunnel to transport the water across Kattanmalai. The official, who wished to remain unnamed, claimed that 91% of the water treatment plant's construction had been finished. "March is the anticipated completion date for the remaining tasks. Since 98% of the work has already been completed, the tunnel should be finished next month.

Of the 90.76km, he said TWAD had finished laying the pipeline for 37km. "The delay in securing property for laying the pipeline is impeding the

progress of the job, even though the other work is underway."

The official claims that the project calls for the purchase of 121 acres of private land. "In a few spots, land lots have not yet been purchased. In order to expeditiously complete the project, the district administration is currently in the process of purchasing the remaining land.

L&T receives praise from around the world at the 2022 Infrastructure & Going Digital Awards

Larsen & Toubro's Water & Effluent Treatment (WET) Business garnered recognition on a worldwide scale at the 2022 Infrastructure & Going Digital Awards, held in London for their water and wastewater project in Karnataka. The coveted yearly prize honours infrastructure initiatives that make use of cutting–edge digital technology.

In the "water and wastewater" category of the awards, which were judged by an 11–member independent jury panel and administered by the Nasdaq–listed Bentley Systems, a global infrastructure engineering software company, L&T's project for the Nadaprabhu Kempegowda Layout Township in Bengaluru advanced to the finals. The project will instal a recycled water network, collect sewage, and distribute potable water to the NPKL Township neighbourhood of Bengaluru.

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With the use of digital technology, the project team increased engineering productivity by up to 25% and reduced engineering manhours by 50% by using standardized digital models. Utilizing digital solutions allowed the team to finish the engineering work in a project–record six months and save 80% of the engineering manhours required for sewer and water networks alone.

On receiving the award, Mr. K Asok Kumar, Executive Vice President & Head, Water & Effluent Treatment, stated that "L&T's journey of digital transformation began about three to four years ago, and we have been adopting various digital solutions to improve productivity, reduce wastage, cut costs, shorten the execution time, and enhance our overall operational efficiency."

The jury panel that determined the best projects in each of the 12 prize categories judged the WET project since it placed in the top three. From 180 organizations in 47 nations, 300 nominations for the awards were received.

The WET division of L&T is a market leader in building all types of essential water infrastructure, including water treatment facilities, lift irrigation projects, desalination plants, industrial water supply and treatment facilities for recycling and re–use, wastewater treatment and network, sludge management, and uninterrupted, optimized water supply with leak detection.

India's rural households now have access to tap water connections in 11 million households

Over 11 crore rural families in India now have access to a tap water connection as the country marks its 74th Republic Day. India has reported "Har Ghar Jal" in 123 districts and more than 1.53 lakh villages, which indicates that every home has access to safe drinking water from a faucet. States/UTs have worked tirelessly to provide tap water to every rural home despite a number of setbacks in prior years. On August 15, 2019, Prime Minister Shri Narendra Modi unveiled the Jal Jeevan Mission, which aims to link every rural home to the water system by 2024.

Only 3.23 Crore (16.72%) of rural homes with a population of 19.35 Crore had access to tap water at the time the Mission was launched in 2019. Over 11 Crore (56.84%) rural families have access to a tap water supply as of today, just three years after the life–changing mission.

The achievement of 11 Crore Tap Water Connections under the Jal Jeevan Mission was lauded by the Prime Minister, Shri Narendra Modi. Shri Modi also thanked everyone who has benefited from the project and praised the people who were working hard to make the Mission a success on the ground.

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ACHIEVING UNIVERSAL WATER ACCESS IN INDIA

Dr. S K Sarkar
Distinguished Fellow &
Senior Director, TERI

Dr. S K Sarkar is Distinguished Fellow and Senior Director at TERI. He heads the Natural Resources and Climate Programme and is currently associated with TERI since September 2014. He is a Doctorate in Economics (1991) from the State University of New York, Stony Brook, New York. Dr Sarkar is an IAS officer (retired). He is a former Secretary to the GoI in the Ministry of Water Resources. He was also Secretary, of the Department of Personnel and Training, Govt. of India (2013–14). He served other Ministries including Finance Ministry in the Government of India and worked in various capacities with the Government of West Bengal. He worked as a Member Secretary of the West Bengal Pollution Control Board under the State Environment Department during 2003–05 and formulated policies on plastic waste management. He also worked as a consultant with the Asian Development Bank and with the World Bank/PPIAF (Public Private Infrastructure Advisory Facility).

Introduction

Water resources are critical for life, and are also essential for ecology and economic development. There are wide spatial and temporal variations in the distribution of water. India's per capita water availability has touched the benchmark for water stress and is likely to become water scarce by 2050 if the business–as–usual scenario is not changed.

The Sustainable Development Goals (SDGs) as framed by United Nations, are a follow–up of the steps undertaken earlier under the Millennium Development Goals (MDGs), which are to be achieved by all countries including India. SDG 6.1 mandates universal and equitable access to safe and affordable drinking water for all people by 2030. As of 1st April 2019, out of 191 million rural households in India, only 32 million rural households had tap water connections. The Indian government's latest programme is to achieve the tap water connection with a supply of 55 litres per day per household by 2024, much well before the SDG 6.1 fulfilment timeline (2030). In addition, during the budget 2021–22 formulation, the government had envisaged giving also water tap connections to 28.6 million urban households covering 4378 urban local bodies.

The available water resources in India are to the tune of 1123 billion cubic meters (bcm). Out of this, 690 bcm of water resources contribute to surface water, and the remaining contributes

to groundwater. India's storage capacity is very low compared to the available resources. The live storage capacity of dams in India is about 258 bcm. The reservoirs are also unequally distributed in India as 70% of reservoir capacity is limited to Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra and Odisha. Because of the low storage capacity in dams, there is high pressure on the utilisation of groundwater resources.

The water quality, both surface water and groundwater, is unsatisfactory. Water contamination is also high. For example, because of untreated effluents emitted by industries, water gets polluted. In the urban sector, only 37% of the municipal waste generated is treated while only 62% of the industrial effluent is treated in India. There are many water–contaminated districts in India affecting millions of people.

Due to high population growth, high economic growth, rapid urbanisation and new programmes in the industrial sector, there is an increasing demand for water. As per an estimate by NITI Aayog (2019), India's water demand will be twice the available supply of water. An analysis of water demand shows that the agriculture sector is the highest–consuming water sector in India followed by industries and domestic sectors. In the agriculture sector which consumes about 80% of water use, there is low water use efficiency. Thus, any increase in water use efficiency in the agriculture sector will save water which could be able to meet the industrial and domestic demand through proper reallocation.

Government's Initiatives in Water Sector

Indian Constitution says that water is a State subject, and the Centre's role is limited in the regulation and development of interstate rivers (Entry 56 of the Constitution). The Constitution also mandates for devolution of powers to local bodies from the states. Such devolution of power is not complete in India. However, Central government has framed policies and formulated programmes at the national level which are being implemented in the States the in water and sanitation sectors. Important policies and programmes formulated in the water sector are the National Water Policy 2012, the National Water Mission of India 2008, the Draft Water Framework of India 2016, the Model Ground Water Bill 2016, the Atal Bhujal Scheme, Har Ghar Jal Programme 2019, the Dam Safety Act 2021, etc.

In order to give access to water to people in India, the Central Government in association with State Governments undertook various programmes in the past. For example,

accelerated rural water supply 2009–12 was supposed to provide every rural person with adequate water for drinking, cooking and other domestic needs on a sustainable basis; the National Rural Drinking Water programme 2013 also focussed on giving 50% of the rural population access to 55 litres of water by 2017. But these programmes did not achieve their goals due to different reasons.

Realising that India has to achieve SDG 6 by 2030 and given an understanding that water resources are essential in economic development, the Prime Minister of India launched a unique programme called "Har Ghar Jal" on August 15 2019. The aim of this programme is to provide functional households with a tap connection with 55 litres of water per day to every household by 2024. This programme aims at improving the lives of rural people and reducing the difficulties of women, especially girls by providing safe water within household premises. As per the latest JJM–Dashboard estimate (Jan 11, 2023), there are 192.4 million Rural, households in India; out of that 108.1 million households have been given rural tap water connection so far. There are some states such as Telangana, A&N Islands, Gujarat, D&NH & D&D, and Haryana which achieved 100% tap water connections to rural people and there are some states which achieved less than 50% of piped water access to rural households. They are Madhya Pradesh, Kerala, Rajasthan, Chhattisgarh, Jharkhand, Uttar Pradesh, West Bengal, Meghalaya, and Assam.

The salient features of Har Ghar Jal programmes (Ministry of Jal Shakti 2020) are:

- Gram Panchayat or user group should plan, implement, manage, operate and maintain their own water supply system
- Self Help Groups should be involved as implementation support agencies to enhance community capacity to implement the mission making Jal Jeevan Mission a people's movement
- Villagers should be skilled as masons, plumbers and electricians, etc. so as to ensure long–term maintenance of the water supply system
- To increase the sense of ownership among the community, the community should contribute 5% of the capital cost in cash/kind/ labour in villages of hilly and forest areas, and 10% of capital cost for other areas.
- The Gram Panchayat / Pani Samiti should be provided 10% of the village infrastructure cost as a performance incentive after the completion of the scheme and the successful demonstration of O&M.
- Setting up of water quality testing laboratory at State, district and

block levels to monitor the quality of water supply

- 5%, preferably women, in every village to be trained to check the quality of water supply using simple ready–to–use test kits.

Issues and Challenges

The Governments are fully committed to meeting the target of the tap water connection to all rural households by 2024. Various initiatives have been undertaken in consultation with the states and both jointly are performing in a coordinated manner to achieve the Jal Jeevan Mission's goals.

There are some challenges which need to be addressed during the progress of the Mission goals. First, human–induced climate change is now a reality. The IPCC (Intergovernmental Panel on Climate Change) Report 2018 talks about global warming by 1.5°C or 2°C over the pre–industrial level, depending on the steps undertaken by various countries. The impact of climate change on the hydrological cycle is well known. There is an increased frequency of flooding and India is the second most flooded country in the world. A large part of India (68%) is prone to drought. The situation has also worsened due to heavy groundwater extraction and poor water management. Due to climate change, surface water variability is going to occur all the time. Therefore, water security in the rural sector is a big concern. There is a need to replenish groundwater and recharge groundwater for water sustainability in the rural sector. Fortunately, the Atal Bhujal Scheme of the Central Govt. is a step in the right direction. This should be implemented in all the districts in India as immediately as possible.

The "Har Ghar Jal" programme needs enhanced cooperation and partnership among stakeholders. Water is a State subject except for the regulation and development of inter–State rivers where the Centre's role has been given by the Indian Constitution. The water access programme is implemented at the grassroots level where panchayat and local bodies are involved. The partnership among the grassroots communities and policymakers is a must and their cooperation is essential in water management at the lowest level. This is missing in many States.

Concluding Remarks

In consultation with the State Governments, the Central Government has undertaken steps to introduce various changes including systemic changes while implementing the Har Ghar Jal Programme in rural areas. Women in rural areas have been brought in a big way to have their say in the implementation of the programme. Skill formation for implementing the programme has been introduced in a big way. Data collection for giving the latest achievement of the programme has been introduced with the use of the JJM Dashboard. Some technological changes are being envisaged for the implementation of the programme.

All the states should undertake steps for achieving the universal water access goals before the SDG timeline (2030). This will be a unique opportunity to showcase India's one of the biggest exercises in the water sector in recent history, which is quite complex and laborious.

REFORMING INDIA'S WATER MANAGEMENT

Dharmendra Pratap Singh
Sr. VP & Head Infrastructure Solutions, Voltas Limited

India is a water–stressed country, with over 1 billion people relying on rivers, lakes, and underground aquifers for their daily water needs. The per capita availability of water has declined at an alarming rate of 1816 m3 in 2001 to 1545 m3 in 2015 in India. The gap between the demand and supply of water is increasing year on year and is expected to widen further in the coming years. However, the country's water resources are under threat due to a range of factors, including overuse, pollution growth, rapid urbanization, industrialization, and climate change. To ensure that India's water supply is sustainable in the long term, the country's water management practices need an eco–friendly and rapid transformation. One of the major issues facing India's water management system is the lack of effective

particularly those in the manufacturing and agriculture sectors, have been able to extract large amounts of water from rivers, lakes, and underground aquifers without any regard for the long–term sustainability of these resources. This has led to widespread water shortages, particularly in areas where the water demand is high, such as urban centres and industrial zones. To address this issue, the government of India needs to reinforce established regulatory agencies like NGT /CREP /CPCB, etc. for water usage norms, pollution abatement, and recycling. This could also include imposing fines or other penalties for those who exceed these limits.

Another key reform needed in India's water management system is the improvement of

CS water treatment plant at Nabadiganta

Dharmendra Pratap Singh took over as the Head of Infrastructure Solutions and Senior Vice President at Voltas Limited in January 2019. Under his leadership, the company has strategically increased its focus on Government funded projects emphasizing inclusive growth. Prior to Voltas, he has been associated with Repono Warehousing Private Limited for two years as a Managing Partner. He has also been a Chief Executive Officer at Eway Consultancy LLP.

Namami Gange

prone to drought, and to mitigate the impact of these droughts, water must be stored and distributed effectively. This could be achieved through the construction of new reservoirs, desilting of existing water bodies, and the expansion of existing ones through disaster management techniques to avoid cyclone flooding and water flow to the sea.

A water treatment industry is load driven while a water distribution system is demand driven. Despite the variability, the system outputs have to be satisfactory. Economic demands encourage the use of the application of ICA – Instrumentation, Controls and Automation to make maximum use of plant capacities. The final goal of protecting the environmental resources necessitates an integrated view of several independent systems and ICA is a decisive Technology.

Every day we are surpassing the technology of yesterday and creating new standards of technological advancements only to be replaced by newer options. The world is going digital and systems are being upgraded to become error proof and independent of human involvement with a great emphasis on automation. The Government of India and private companies need to invest in technological innovation that can help reduce water consumption through

Water management and treatment project at Uttar Pradesh Jal Nigam (UPJN)

Water management and treatment project at Uttar Pradesh Jal Nigam (UPJN)

effective monitoring and improving efficiency of water use. With the adoption of water–saving technologies in the agriculture sector like the drip irrigation systems or micro irrigation we can reduce water loss through evaporation and minimise water usage for irrigation.

Contemporary technologies including Membrane Bioreactors (MBR), Ultra Filtration (UF) and Reverse Osmosis (RO), Zero Liquid Discharge (ZLD) enables handling of the entire spectrum of wastewater management for effective reuse within the Industry. Traditional wastewater treatment methods, such as activated sludge systems (ASP) are often inefficient and produce a high volume of sludge that is difficult and not economical to dispose of. In contrast, advanced treatment technologies like SBR –Sequential Bio reactor, IFAS can significantly reduce the sludge generation, producing high–quality treated water that can be safely reused in the Industry and Housing society for non–potable applications.

One important factor to consider in the reform of India's wastewater treatment system is the need for community involvement and education. Many communities in India do not have a proper understanding of the importance of wastewater treatment and Conservation, and as a result, they may be resistant to the construction of new treatment facilities or the implementation of new regulations. By working to educate communities through CSR Initiatives, the importance of wastewater treatment /recycle and the benefits it can bring, companies can help to build support for reforms in this area.

Increasing use of desalination is something that needs to be looked at more closely as it has got a long coastal line. Desalination involves the

Water management and treatment project at Uttar Pradesh Jal Nigam (UPJN)

Water management and treatment project at Uttar Pradesh Jal Nigam (UPJN)

removal of salt and other minerals from seawater, making it safe for human consumption. Disposal of Reject water into sea is affecting the Marine line and Biodiversity. Several different technologies are used include reverse osmosis and thermal distillation. These technologies can be expensive to implement, highly energy intensive, but they offer a reliable source of fresh water in areas where water scarcity is a significant problem.

In addition to these technologies, there are also several innovative materials being developed for use in water treatment and recovery. For example, researchers are developing advanced membranes that are more efficient at removing contaminants from water, as well as materials that can be used to filter out micro–pollutants and pathogens. These materials have the potential to significantly improve the efficiency and effectiveness of water treatment and recovery processes, making them more sustainable and cost–effective.

In conclusion, improving wastewater treatment /Recycle in India coupled with equitable distribution of water available across the length & Breadth of the country is essential for ensuring the sustainability of the country's water resources. Further Linking of Rivers, River Rejuvenation Projects promoted by Central govt and establishing centralized treatment facilities, and implementing stricter regulations / standards, Water Industry can improve serving the emerging needs of spectrum of users. At the same time, it is important to engage communities in this process and educate them about the importance of wastewater treatment, to build support for these reforms.

Overall, the efficient use of water resources, adoption of advanced technologies with innovative materials shall improve the sustainability and efficiency of water management in India.

By investing in Time, Resources and Research and Development, Companies and governments can help to ensure that water resources are managed in a way that is sustainable, reliable, and cost–effective over a long horizon period for future generations.

Water management and treatment project at Uttar Pradesh Jal Nigam (UPJN)

CHALLENGES & INNOVATIONS IN WATER UTILITY MANAGEMENT: A REAL–LIFE EXAMPLE FROM DELHI

Abhay Kumar Yadav

Abhay Kumar Yadav is a seasoned professional with 9.5 years of experience in the Water supply, Water treatment & Wastewater Treatment projects. He has a proven track record of successfully planning, coordinating and executing large–scale water & wastewater projects across various cities in North India.

Abstract

This story highlights the challenges faced by water utilities in India, specifically the issue of high levels of non–revenue water and the need for solutions to address this problem. The story is based on the author's and his team's personal experience while implementing a 24x7 water supply project in the village of Adchini, located in New Delhi. Through their investigations, the team made an unexpected discovery of a 150mm C.I. pipeline in the village which had good pressure and safe water supply, providing a solution to the water supply problem in the village. The story illustrates the importance of proper investigation and management of water utilities and the need for innovation and adaptation to address the challenges faced by water utilities in India.

Introduction

The "Global Risks Report 2022" published by the World Economic Forum has highlighted "Exploitation and Mismanagement of Water" as the seventh–most severe risk to the world on a global scale over the next 10 years. India, which is home to 18% of the global human population but only 4% of global freshwater resources, is facing a growing demand for water as its population and economic activities increase, whereas the source is finite.

The per capita annual freshwater availability in India has come down by 70% as compared to the 1951 levels, and it is likely to further go down to 1300 cubic meters in 2025. The widening demand–supply gap is further compounded by other challenges, such as low storage capacity, inconsistent rainfall due to climate change, poor recharge, and depletion of groundwater. Therefore, the accessibility of water supply is mostly dependent on the piped water supply to households, which are managed by water utilities. Various national schemes like JJM, AMRUT 2.0, etc. are brought in tandem to fill the water supply gap in rural and urban areas.

Many water utilities in India are facing the issue of high levels of non–revenue water, but they are not making progress in reducing it due to insufficient capacity, lack of incentives, poor financial capacity, and the efforts required for detecting and repairing leakages. Additionally, shortage of water, aging infrastructure, rising operational costs, non–revenue water mismanagement, unreliable data, inadequate investment for O&M of water networks, and financial gaps are some of the existing challenges faced by most of the private companies in the water utility business. Also, a study by the World Bank reported that the unceasingly growing burden of changing demographic needs of the communities and the constant need to adapt and innovate to improve customer satisfaction is a common challenge encountered by water utilities.

A water utility can make use of a variety of strategies and plans to implement solutions to the issues faced at a local level. Sometimes, the solution is simple, but the right technology and approach are needed to find it. One such incident happened with me and my team during the implementation of the 24x7 water supply project under the command area of Malviya Nagar UGR (Underground Reservoir) located in New Delhi. The project was started in 2013 with the aim of providing continuous

Figure 1.1 Photo showing a 100 mm DI pipeline bored for installing pressure logger.

water supply to almost 35000 households he 14 square kilometers of the area. The scope of work included the replacement of the old pipeline network and providing new house service connections to all the households, including the O&M (Operations & Maintenance) for the next 12 years. Awarded by the Delhi Jal Board, the revamped supply system will ensure improvement in both the quality and quantity of water supply and reduce risks of contamination and water losses.

The Investigation

Although my team was responsible for implementing a 24x7 water supply in the selected DMAs (District Metered Areas), we were assigned the case of a small village called "Adchini," located in our project area. For those who are unaware of villages in Delhi, unlike the rest of the country, Delhi does not live in its villages. This is largely due to the tremendous growth and expansion of the capital city, which consumed the rural areas. Now, these villages have emerged as urban villages but are still called as villages.

Back to the case, the residents had been facing an acute shortage of water for a long time. The project implementation company for which I was working was also responsible for the operation and maintenance of the entire command area, as well as laying new pipeline networks (under CAPEX). The company had recently taken over the project and was still in the process of understanding the pipeline networks in the area, conducting network investigations, installing flow meters and pressure transducers to record and collect data from the network on a real–time basis.

The supply of water in the village was intermittent and only provided twice a day for 3 hours in the morning and 3 hours in the evening. However, this was not enough to meet the demands of all the consumers of this area. One reason for this was the low pressure at the junction of the transmission mains and supply main, causing only the first street of the village to receive enough water. Another reason was the negative suction pressure caused by individual pumps installed by households in the village. Additionally, the high demand for water was due to the high population density resulting from a booming rental business in the area. The water shortage problem in the village became so severe that the residents began to protest and even blocked traffic frequently on the road "Sri Aurobindo Marg" during peak summer due to lack of sufficient water for their consumption.

As the trainee engineer in charge of investigating the issue, my task was to find the best and most cost–effective solution to the problem as a priority. As a recent college graduate, I was full of enthusiasm to learn and solve real–world problems and was similarly eager to tackle this issue. With a team of laborers, a pipeline network map of the area, a few pressure loggers, a pipe investigation camera, and an advanced pipe locator, I arrived at the village on the first day of being assigned this task. The moment we arrived; the residents of the village surrounded us to tell us about the problems they faced on a daily basis. My first job was to do a walkover survey of the whole area to understand the type of network laid and select locations to install the pressure data loggers. The residents of the village informed us that there was no or very little water in the pipeline beyond the 1st street and therefore, the residents of the whole inner part of the village had taken their house service connections from the pipeline at the junction of the first street itself.

The length of these house service connections could be as long as 200 feet in some cases! This made it clear that the residents were facing issues with low water pressure and inadequate supply. The lack of sufficient pressure in the main pipeline was causing these problems. As a result, I had to come up with a solution that would address this issue and provide a reliable water supply to the residents. This could be achieved by increasing the supply hours, increasing the pressure in the main pipeline, installing pressure boosters at key locations, or laying a new pipeline network in the inner part of the village. Additionally, I may also have to consider limiting the length of the house service connections to ensure the adequate water pressure is maintained throughout the village.

However, all of these solutions will require a significant amount of time and capital expenditure. In these cases, water utilities may

Figure 1.2 – The 150 mm C.I. pipeline connected with pipe locator cable.

choose to replace pipelines and house service connections, but this will not have a significant impact as the upstream pipeline capacity remains the same. Additionally, this will divert resources from other planned projects and result in delays and additional costs. Due to the severity of the situation, we did not have the luxury of waiting for months to solve this problem.

Therefore, I decided to initiate network investigation work and deployed manpower to excavate at 2 locations. Firstly, to verify the pipeline size, material, etc. secondly to install pressure loggers at these locations to record 24–hour pressure data. Once downloaded and processed, this data will help us understand the supply regime of the DMA, including the duration of supply during peak hours and after peak hours have ended. Although the locations of the pressure loggers were decided based on various factors, I chose to install one at the inlet of the DMA, one at the midpoint of the network, and one at the tail end. This arrangement is helpful in understanding the water supply network and also helps in pressure profiling of the whole DMA, from start to end.

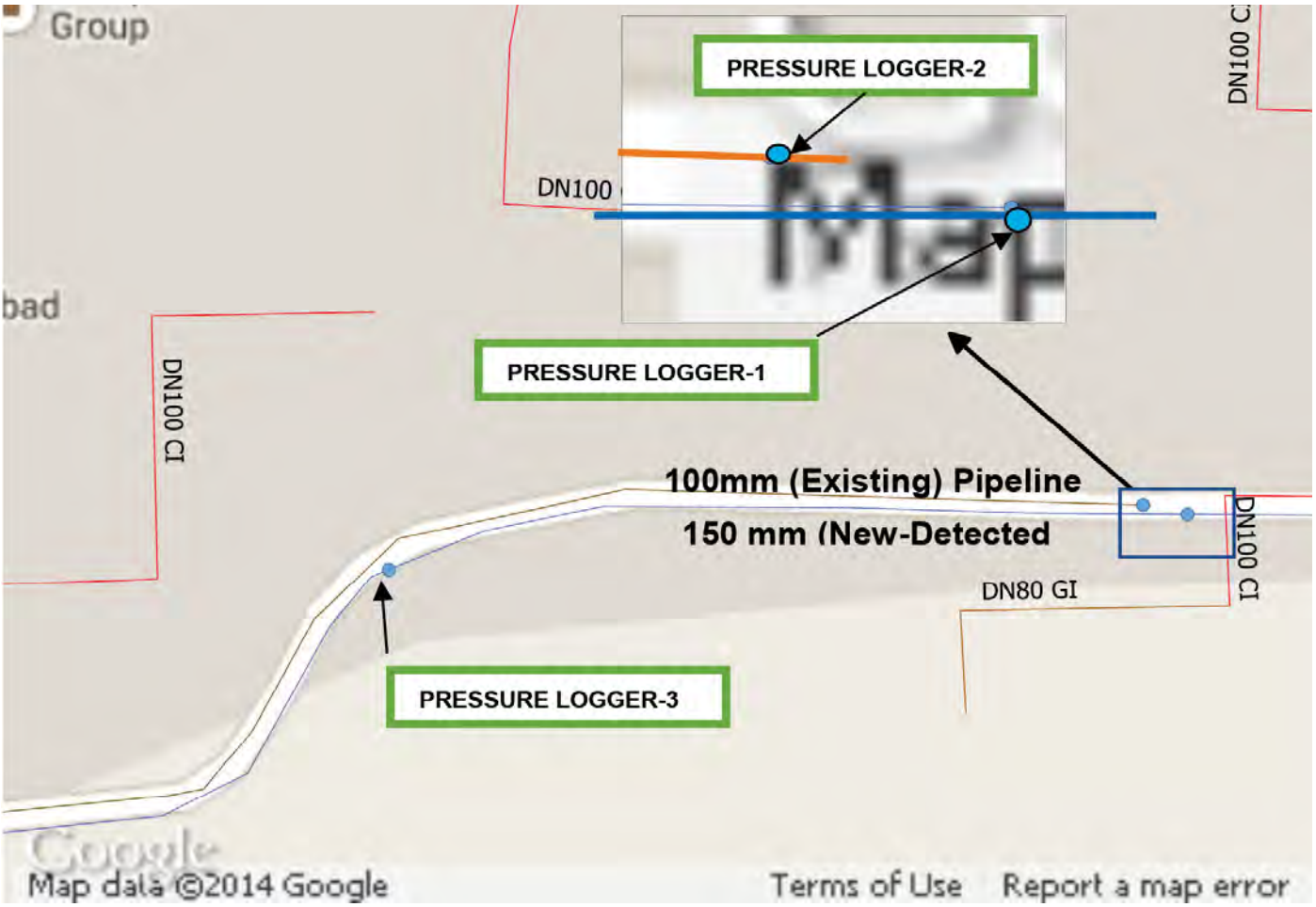

Figure 1.3 – GIS Map of the water supply network, the newly found 150 mm pipeline, and the locations of the pressure loggers installed for network investigation.

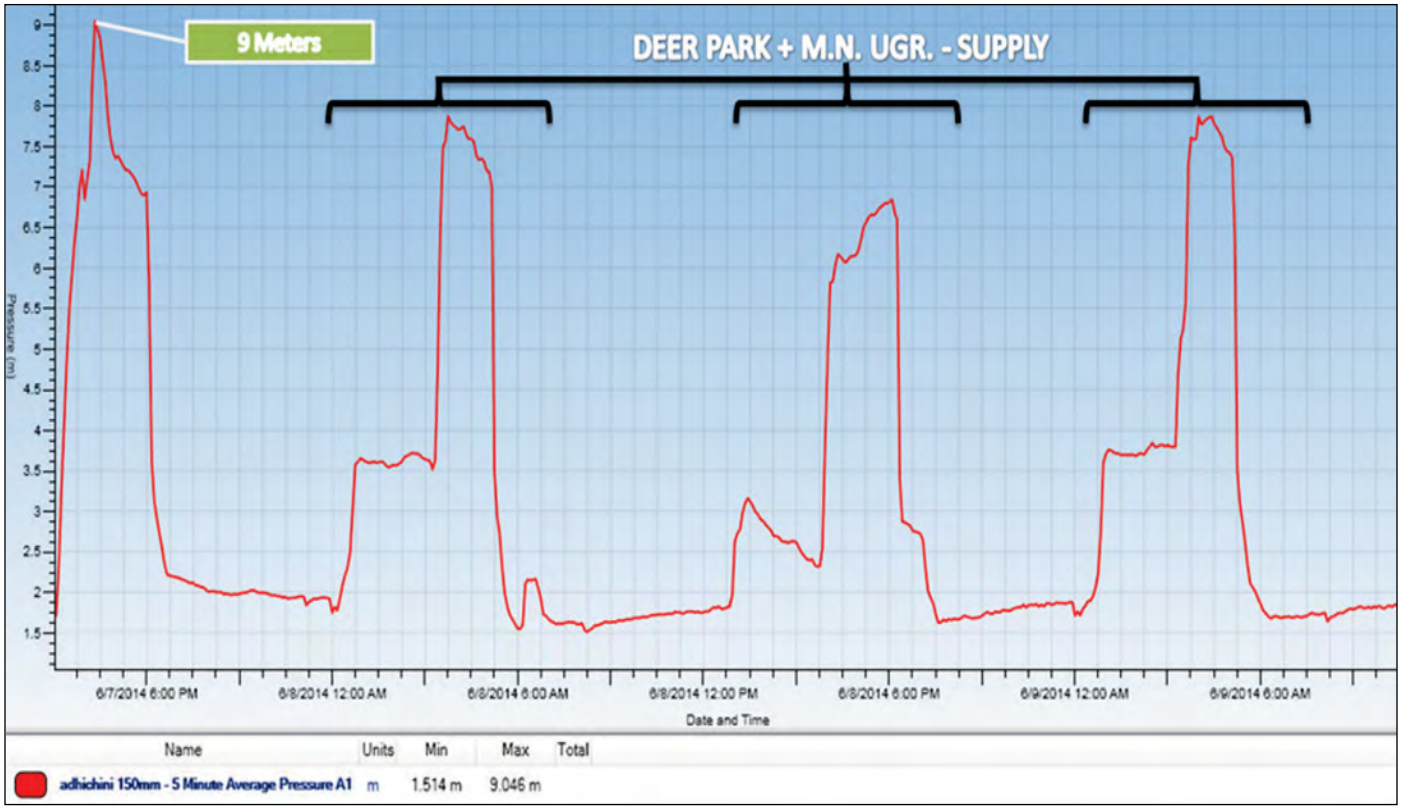

Figure 1.4 Pressure Profile of the 150 mm pipeline showing the supply hours and average pressure

So, we installed the pressure loggers at both locations and left them at the site under the supervision of local leaders and residents of the village. As water is a necessity of life, the local leaders and residents were willing to support and assist us in identifying the main cause of the problem that had persisted for many years. We were granted permission to excavate everywhere and anywhere and faced no resistance from the residents. In Delhi, conducting excavations can be challenging, and sometimes risky, as multiple agencies are responsible for providing various services and amenities to citizens. Each agency has its own jurisdiction, and it can be difficult to predict when a complaint may be filed, and work may be halted due to intervention from these agencies. A single phone call from RWA (Resident Welfare Association) could delay your work.

A potential solution to this problem would be to establish a new authority as the owner of all the utilities and services laid underground. This would make the work of all the water utilities much easier and save time and money.

Subsequently, test pits were made at various locations within the village to install data loggers and also to check the inner condition of the pipeline using an inspection camera. This kind of network investigation is important because the pipeline network, which was laid 1 or 2 decades ago, may have undergone changes. Government agencies may have laid new pipes or made modifications to the original network, but these changes are often not recorded or updated in records or maps. That is why, it is of utmost importance for water utilities to have a dedicated team of surveyors or to equip their site maintenance teams with the necessary tools to regularly update GIS–based maps through their hand–held devices/smartphones/tablets for any changes made to the pipeline network.

The Discovery

During the network investigation, the actual pipelines found under the ground were not consistent with the details on the drawings and maps of the area, which was not surprising. The existing 100 mm pipeline was connected and receiving water from Deer Park UGR, which was almost 1 meter above the main feeder line. However, in one of the test pits excavated by the team, we found a pipeline of 150 mm diameter which was only 2.3 meters apart from the existing 100 mm C.I. pipeline. This pipeline was not shown on the map or on any of the drawings, and no one was aware of its existence.

I was quite curious about this discovery and decided to trace the pipeline using an advanced pipe locator (RD–8000). We cleaned the pipeline and connected it to the frequency emitter, then started tracing the pipeline at the desired frequency level preset in the emitter.

On tracing, I discovered that the 150 mm pipeline was parallel and opposite to the 100 mm pipeline on the other side of the street. We also

made a few more test pits to confirm if the pipeline was connected to the 100 mm pipeline and to check if any residents had taken house service connections from this newly discovered pipeline. No connection was found between both the pipelines and in fact, no house service connections were found to be connected to the 150 mm pipeline. This led us to believe that the pipeline had not been commissioned or used and was just laid. Finally, we decided to install one pressure data logger on the newly discovered 150 mm pipeline to check whether it was connected to any of the pumping stations or not. If it was, we would have to investigate the source and timing of the supply.

The very next day, we downloaded the data recorded by the pressure data logger and to our surprise, we found that the newly discovered 150 mm pipeline had good pressure with more supply hours compared to the 100 mm pipeline. This was quite unexpected because the supply hours of the 150 mm pipeline were matching with those of two pumping stations. This indicated that the pipeline was connected to the transmission mains of both the Malviya Nagar and Deer Park pumping stations. Below is the pressure profiling is done after recording 24 hours of data:

Test Report

J.O. No. : FA/11062014–018
UID No. : 4571/O
Report No. : FL/FA/11062014–018
Report Date : 16/06/2014
Sample Receipt Date : 11/06/2014

Sample Particulars:

Nature of the Sample & No. of Samples : Treated Water (One Sample)
Brand Name, if any : None
Batch No.: & Manufacturing Date : None
Sample Quantity & Packaging : 1 Litre, Pet Bottle
Test Started on : 11/06/2014
Test Completed : 16/06/2014
Method of Sampling : SOP/B/D–1
Date of Sampling : 11/06/2014
Place of Sampling : Adhchini Village, Qutab Enclave, New Delhi–110017

Analysis Report

S. No.	Parameters	Test Results	Max. Limit as per IS–10500	Protocol
Chemical Analysis:				
1	Turbidity, NTU	0.109	1.0 Max.	IS:3025 (P–10)
2	pH Value	7.31	6.5 – 8.5	IS:3025 (P–11)
3	Residual free Chlorine, mg/L	0.1	0.2 Max.	IS:3025 (P–26)
Microbiological Analysis:				
1	Total Coliform, MPN per 100ml	<2	Shall not be detectable in any 100ml sample	IS:1622

Figure 1.5 Water Quality Test Report of the samples collected from the newly discovered pipeline

The newly discovered 150mm C.I. pipeline found in Adhchini unexpectedly had good and sufficient pressure to benefit the residents of the village. The graph clearly shows that the maximum pressure was 9 meters (almost 1 bar) and that the pipeline was receiving water from two sources: Deer Park and Malviya Nagar UGR. The same day, we called the quality control team to collect water samples from this pipeline to test the chemical and biological parameters. The test results confirmed that the water is potable and safe for drinking and other domestic consumption. Below are the results of the quality test report:

Conclusion

Finally, we decided to interconnect the existing 100 mm pipeline with the newly discovered 150 mm pipeline at various strategic locations to boost the supply of the whole area. The 100 mm pipeline is the distribution pipeline as all the house service connections are already connected with it and the 150 mm pipeline will act as a transmission main to feed it. The interlinking work was completed in the next 3 days. The pipeline had good pressure and was confirmed to be safe for drinking and domestic consumption through water quality tests. This certainly gave immediate relief to the residents of the village. Later on, many more works of improvement & rehabilitation of the whole pipeline network were carried out.

This incident highlights the importance of proper investigation and management of water utilities. Although we were fortunate to discover a pipeline of sufficient capacity already laid and connected to sources, this incident also emphasizes the need for innovation and adaptation to address the challenges faced by water utilities in India. We couldn't have traced or discovered this pipeline without following proper methodology, using the right technology, and analyzing data collected from the network. It also serves as a reminder that water utilities need to adopt a proactive approach to managing their network by regularly updating the changes made to the network and implementing new technologies to detect and repair leaks, in order to reduce non–revenue water.

This will not only improve water supply but also contribute to the sustainability of water resources.

Exploitation and mismanagement of water are a severe risks to the world and India is particularly vulnerable due to its limited freshwater resources and growing demand. Therefore, it is essential for water utilities to adopt effective strategies and solutions to address these challenges and ensure a reliable and safe water supply for all.

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WATER: CHALLENGES & PROSPECTS

Mohammed Abdul Rahman
CEO, Sahara Industry

Mohammed Abdul Rahman: The young entrepreneur with a marketing & finance degree is the CEO of Sahara Industry. He has successfully steered the company into a leading water and wastewater treatment solution provider in India. His technology–driven business approach supported by dynamic leadership has made his group companies grow efficiently with turnover crossing the scale of INR 1000 million.

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The water crisis is affecting nations across the globe and persistent droughts and floods have undeniably affected water security. By 2050, at least 5 billion people, over half of the world population of that time (9.7 billion in 2050) will face at least one month of water shortage, according to the United Nations reports on how climate change is affecting the world's water resources.

In India, over 600 million, nearly 43% of the total population is facing severe water scarcity currently that is going to escalate further unless drastic remedial measures are taken. A report by the World Wide Fund for Nature (WWF) projected that about 30 Indian cities would face 'grave water risk' by 2050 due to a sharp increase in population. The problems range from poor management of water sources, contaminated supplies, leaky distribution networks and vast volumes of untreated wastewater being poured into India's rivers. Almost 40 billion litres of generated wastewater is being disposed into India's rivers and ponds without any treatment per day. This figure will keep on growing as the population increases and wastewater treatment infrastructure is not adequate.

Booming Population

According to the United Nations' most recent population projections, India will replace China as the world's most populous country this year and will retain that title until 2100. As per the 2030 Water Resources Group, if we continue to consume water at the current rate, India will only have half the water it requires by 2030.

India's population currently hurtling at 1415

2000 LPH Fully Automatic RO Water Treatment Plant

Industrial Water Treatment Plant

million people is increasing at the pace of 1.2% annually since 2011, and is going to become 1515 million by 2030. With only 4% of the limited freshwater resources, water demand continues to outstrip supply. Freshwater sources are under heavy stress with increasing population and demands, people of India are facing a difficult challenge – the accessibility of fresh water.

Water Crisis

Several states in India are facing extreme water scarcity. Uttar Pradesh, the biggest state in India faced extreme drought and monsoon floods in different districts from July to September 2022. The water crisis not only affects the human population, but also put a negative impact on industrial production leading to economic losses. The agriculture and food industries got affected in Uttar Pradesh due to large–scale droughts that also destroyed sugarcane harvests.

Supporting almost 18% of the world's inhabitants in India is daunting enough, considering the limited availability of fresh water. A long period of unsustainable use, lack of regulation, resource crunch for development, mixing of wastewater with fresh water, and general neglect have led to people thirsting for clean drinking water. Niti Aayog, four years ago estimated that over 600 million people in the country are suffering from severe to extreme water scarcity in their report. The critical water situation in India can be linked to a myriad of causes, some of which are mentioned above. The concern is not limited to surface water only as it has moved from the surface to the ground. And it's there where India's freshwater is under the greatest stress.

India is the largest user of groundwater at roughly one–quarter of the global usage, surpassing China and the United States combined. With electricity subsidies to farmers, the aggressive pumping of groundwater has

> 30 Indian cities would face 'grave water risk' by 2050 due to the population increase.

Ultrapure Water Treatment Plant

resulted in the water table dropping up to 4 meters in some parts of the country.

The water crisis situation has grown to the point that regional disputes have risen over access to river water between several states. It is not limited to the country's interior only as water disputes take on a global scale in conflicts with Pakistan over the River Indus and River Sutlej in the west and north and with China to the east with the River Brahmaputra.

Growing Water Market

The per–capita income of Indians witnessed growth in the past decade and lifestyle changes together with increased awareness about the importance of safe drinking water have created a huge demand for clean drinking water. It not only made the bottled water industry flourish, but the demand for water treatment products, chemicals, and technology also received fast momentum.

> The water treatment market is growing on a healthy pace in India and is segmented on the basis of type, component, application, technology, industry and end user.

Rapid growth in population and urbanization, stringent water treatment regulations, the rising need for new water resources, the growing emphasis on water quality and public health, and the increasing prevalence of waterborne diseases are driving the growth of the water and wastewater treatment market.

The global water and wastewater treatment market is expected to reach a value of USD 956.48 billion (INR 7.75 trillion) by 2032, at a CAGR of 5.4% during the forecast period 2022–2032. According to a 2022 Frost & Sullivan's report, the Indian water treatment market is likely to reach USD 2.08 billion (INR 170.56 billion) by 2025 from USD 1.31 billion (INR 107.42 billion) in 2020, registering a growth rate of 9.7% CAGR.

The global water and wastewater treatment chemicals market is expected to reach USD 52.01 billion (INR 4,264 billion) by 2029 at a CAGR of 4.7% from 2022 to 2029. Whereas in India, the market size was valued at over USD 600 million (INR 49.2 billion) in 2020 and the market is projected to register a CAGR of over 9.5% in terms of revenue during the forecast period (2021–2026).

The Indian water and wastewater treatment (WWT) technology market was valued at over USD 2.10 billion (INR 173.82 billion) in 2021 and the market is projected to register a CAGR of greater than 8% during the forecast period (2022–2027).

The India water pumps market was valued at USD 1685 million (INR 138.17 billion) in 2021 and is forecasted to grow at a CAGR of 5.59% until 2027, owing to the increasing water infrastructure development

and construction of new human and commercial settlements.

The bottled water market in India is expected to reach USD 4.91 billion (INR 403.06 billion) by the end of 2023, expanding at a compound annual growth rate (CAGR) of 20.75% from 2018. In terms of volume, the market is likely to reach 35.53 billion litres by 2023, expanding at a CAGR of 18.25% from 2018 to 2023.

Outlook 2023

India is ranked as the sixth largest market for environmental technologies in the world, with subsector rankings of second for water & wastewater management, as per Frost & Sullivan report.

The Government of India has initiated several schemes for water supply and wastewater treatment in India, such as Jal Jeevan Mission (JJM), Atal Mission for Rejuvenation and Urban Transformation (AMRUT), National Mission for Clean Ganga (NMCG), Atal Bhujal Yojana, and Community Drinking Water Schemes along with many others are continuing and will contribute to the growth of the Indian water and wastewater market. The Jal Jeevan Mission earmarked a budget of INR 700 billion for the year 2023–24 for states to increase household water connection coverage which was just 18.33% in 2019 to 100% by 2024. This ambitious project with a total outlay of INR 6.47 trillion for rural and urban areas is creating huge opportunities for suppliers of water meters, water quality monitoring systems, water management–related IT systems, tertiary treatment technology, and water–related engineering, procurement, and construction companies.

Sahara Industry being the leading water treatment solution provider in India is hopeful that the union budget for 2023–24 will help in speeding up the execution of various ongoing water supply and wastewater treatment projects as the deadline to complete several schemes are coming closer.

There will be immense opportunities in the industrial sector as well. The power, food and beverage, chemicals, pharmaceuticals, refineries, and textiles industries prefer advanced treatment technological systems such as reverse osmosis membranes for treating to generate ultra–pure water for their production facilities. These water treatment plants are gradually shifting from chemical treatment and demineralization plants to membrane technology. The concept of wastewater recycling and zero discharge systems is becoming more widely accepted as new technologies such as sequencing batch reactor (SBR) and membrane bioreactor (MBR) based treatment is gaining momentum and wide acceptance.

> Rapidly diminishing freshwater resources and growing wastewater complexities will drive the demand for water and wastewater treatment technologies in India.

FRP Pressure Vessels

Being market–oriented with modern systems and processes, Sahara Industry has been following a client–centric approach to provide specific and requirement–based high–quality treatment systems with excellent service standards. The technical expertise and modern manufacturing facilities combined with a broad understanding of the water sector in India have enabled it to offer the best integrated and strategic approach to industrial and municipal water and wastewater treatment. The Company provides multi–disciplinary water and wastewater treatment and engineering services and delivers ideal solutions based on the experience of implementing hundreds of plants and projects with an integrated project approach.

In a legacy of about two decades, it has contributed immensely by making water safe for drinking, industrial and institutional purposes. The ISO 9001:2015–certified company has executed water and wastewater projects in the length and breadth of India as well as in several other countries. The professional approach with well–qualified teams has helped it to achieve the rare feat of being an indigenous creator of advanced water and wastewater treatment solutions confirming world standards.

TECHNOLOGY SUPPORT FOR SAFE & CLEAN WATER

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

Mohammed Naser Azeez is the first generation entrepreneur, avid innovator, and risk taker who established the acclaimed Aquality Water Solutions Pvt. Ltd. with the idea to provide technologically advanced water treatment solutions to domestic, institutional, and industrial clients. With an ardent interest in clean drinking water facilities, he contributed immensely to improving people's lives with commitment, technological innovations, and quality excellence.

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Clean, safe, and accessible water is the lifeblood of people, processes, and products. India and other developing countries are facing the prospect of severe water and food shortages unless rapid and effective measures are taken to address the water scarcity challenges. Even if all available freshwater resources in India can be utilized, on the whole, it would still find itself below the water scarcity level.

Water infrastructure continues to age, people, industries, and agriculture are faced with challenges surrounding the reliability, resiliency, and quality of this most precious resource. The proven solution could be digital technology that can ensure long–term resilience, security as well as environmental protection.

Water Security

Water security plays an important role in a country's inclusive growth, sustainable economic progress, human and social well–

Solar Power Portable Water Treatment System

Solar Powered Water Filtration System

being, resilience to water–related disasters, and a healthy environment. The need for water security has become even more crucial due to the COVID pandemic because access to water, sanitation, and hygiene offered the primary line of defense against the spread of COVID and other diseases.

However, India is continued to suffer from limited access to this vital resource and far too many people, over 600 million across the country is facing acute water scarcity. Not only fresh water becoming scarce, several parts of the country has been inundated by water from natural disasters – floods and hurricanes that has ravaged human settlements and economy.

Ensuring water security and equal access for poor and vulnerable groups has been challenging for the government and water utilities. There is a ray of hope, with adoption of technology, national water security has been improving across Asia and the Pacific region since water security was first quantified in 2013 along the following five key dimensions:

- Rural household water security (water and sanitation)
- Economic water security (water to sustainably satisfy economic growth)
- Urban water security (water and sanitation and flood management)
- Environmental water security (catchment and aquatic health and environmental governance)
- Water–related disaster security (resilience against droughts, floods, and storms).

Despite making progress, India's water security initiatives still facing challenges due to the growing population, faster urbanization, and slow pace of rural development along with vulnerability to weather and climate events, and environmental pressures.

Innovation for Sustainability

Innovation and sustainability are intrinsically linked to each other. The water industry which has been lagging behind other industrial sectors in adopting new technologies has started realizing the importance. In the water sector, this relationship is particularly important. The circular nature of the water cycle, the commitment to bring efficiency in water supply, distribution, and operation, and progressive digital transformation for implementing sustainable solutions will successfully address the present and future challenges of water.

Large scale water innovation is needed for a secure and sustainable world.

Solar Powered Water Filtration System

The water sector cannot afford to remain ignorant of digital transformation and the concrete benefits they entail, from greater efficiency in water (both in drinking water supply and wastewater management) and energy management at all levels. It is also concerning to water resource management while improving service quality and consumer satisfaction. The added benefits include the reduction in carbon footprint and sustainability of processes.

There are two approaches to address this digital transformation process: top–down and bottom–up. The first one, the top–down approach would be to implement it across the value chain in a planned way in all areas of water cycle with proper and long–term objectives and goals. Along the way, digitalisation and process transformation will take place with the implementation of technology.

The bottom–up approach follows when digitalisation arises from the need to solve a specific problem or improve results in a particular area of work such as minimising network losses, facilitating asset management, improving pump operations, reducing treatment cost, enhancing energy efficiency in a particular operation, detecting abnormalities automatically or making the operation and maintenance of a treatment plant more efficient. This approach has advantage of being more agile in its implementation and oriented toward clear objectives, achieving tangible results in a time–bound manner.

> Aquality considers innovation as an integral part of our business, from design of water treatment system to its operation and maintenance.

To solve specific challenges in each area of the water cycle – source, supply, sanitation, water resources, recycling, reuse and irrigation requires dedicated modules that can operate independently. Digital technology can also integrate diverse information from different data sources like that of sensors, data loggers, GIS, SCADA, CMMS, etc. in a single layer system in which all the modules or other applications can be connected, ensuring universal interface for seamless operation and management.

Digital solutions, powered by artificial intelligence and digital twins, are helping water utilities to solve their most pressing challenges: minimizing water and revenue losses, reducing capital spend to lower costs of producing potable water, decreasing the impact of climate events, bringing down the costs of safely reclaiming wastewater, and reducing carbon emissions associated with water and wastewater

Solar Powered Water Filtration System

management. Sophisticated machine learning tools together with connected sensors better represent the vast water infrastructure by automatically calibrating to match historical data. Coupled with the right expertise, advanced digital technology can improve network visibility, performance and compliance, and deliver significant cost savings.

When digital technology is coupled with advanced data science like hydroinformatics, robust engineering, optimally functioning infrastructure and water system expertise, it empowers water utilities to meet their water supply needs reliably, affordably and sustainably. The holistic approach enables utilities to seamlessly integrate digital technology in their ecosystem thus delivering enhanced visibility and predictive capabilities that substantially support with improved capital and operational decision–making.

Benefits of Digital Technology

Water scarcity and growing contamination with ever–increasing demand have compelled water utilities across the globe to rely heavily on digital technologies to improve their asset and service standards to meet their municipal and industrial water needs. The digital technology intervention can deliver several benefits at different levels:

Better Control: When combined with decision support systems and water expertise, the digital intervention has the potential to deliver autonomous, optimized control, automated operation, pinpoint issues that help freeing up operators to focus on other tasks.

Recommendations: In sophisticated applications, the digital technology generates multiple scenarios and provides operational recommendations to achieve set KPIs. The operator then chooses a course of action based on these recommendations.

Scenarios: The digital technology is capable of processing various and diverse variables to predict an outcome. But it still requires water engineers and plant operators to manually optimize the asset, process, or system to be able to get the correct predictions.

Visibility: Digital technology shows operators what is happening within an asset, process, or system at any given time. This application relies on the operator to take action based on the visibility of current operations.

Cost Optimization: It helps in lowering capital investment and operational cost by using past data and automatically calibrating to better represent the infrastructure, enabling continuous, real–time optimization and highly accurate predictions to improve the efficiency and resilience of an asset, process, or system.

Delivering Insights: The digital technology uses connected devices to form the interrelationship of assets to calculate how an underperforming pump impact a drinking water network and devise a strategy needed to compensate in the short term to enable optimization.

> Aquality has developed innovative solutions to make clean drinking water available to people inhabited in unreachable areas.

Aquality Contributed to Innovation

Aquality's business strategy is based on sustainability and environmental consciousness. It conceives innovation as an integral part, from product and system designs to its operation and maintenance. Its development agenda ensures sustainable water and wastewater treatment solutions positively impact the planet's resources. The strategic innovation in the main areas of industrial water treatment, wastewater treatment, reuse, and drinking water treatment is comprised of lines such as energy efficiency and use of renewable energy, resource recovery, economy of services and digital innovation. Aquality research team analyse the emerging global trends related to water security and environment safety using technology tools to identify innovation in the water sector.

Aquality has been working on innovative solutions to make clean drinking water available to people settlements and other establishments including the security forces inhabited in unreachable and forest/desert areas in India, Middle Eastern and African countries. The pioneering solution of Solar Powered Water Filtration System is installed at several places in India in its initial stage before going global that has immensely helped common citizens and security forces with safe and clean drinking water facilities.

The solar powered water filter has high speed filtration unit to purify water from practically any source. The treatment system uses innovative high purification techniques to make water absolutely clean separating all kind of **containments** producing high grade water suitable for drinking at any place without the requirements of conventional electricity. The system is also suited for areas with non–existent or erratic and unreliable power supply especially in rural habitats in most developing nations. The system aims to build a sustainable alternative to ensure the removal of existing and emerging contaminants in water and make it pure and safe for consumption.

Way Forward

The digitalization strategy in water utilities with existing challenges and technological maturity must consider the smartest way to leverage prevailing resources and data ensuring that the decisions taken follow the roadmap towards the set goal, even if it is long–term.

The digital transformation in water utilities can start from one point or several points together considering the requirement for doing so. But in all cases, there must be a correct assessment or audit of the existing state and a final goal to be achieved while following the appropriate roadmap to realize the desired results.

WATER RECOVERY FROM FOG

Ashish Chauhan
Process Engineer
T.EN (Technip Energies)

Water is an essential resource for every living being on earth. So humans are trying every possible aspect from where fresh water can be extracted. In present days we mostly depend on river water, monsoon rain & groundwater. So some other alternatives also developed like the Desalination of seawater, Zero liquid discharges in industries but these are energy–intensive processes. This article has focused on how fresh water can be recovered from humidified air by using different techniques, in ancient times, how we used to recover water from the air, and the present challenges we are facing in it. It is estimated that in India, 12.5 billion liters can be effectively collected through fog capturing [5].

Ancient Time of use of Fog collector/ catcher

Fog or dew collection is an ancient practice. Archaeologists have found evidence in Israel of low circular walls that were built around plants and vines to collect moisture from condensation. In South America's Atacama Desert and in Egypt, piles of stones were arranged so that condensation could trickle down the inside walls where it was collected and then stored.

Principal Working

Fog Catcher works on the simple principle of science. Water vapor present in the air is first struck on the mesh/net & condenses where

Ashish Chauhan is Operation & Process Engineer with around more than 7 years of industrial experience in industries like DCM Shri Ram Ltd., Grasim Industries Ltd & Lords Chloro Alkali Ltd. He is presently working as a Process Engineer and is involved in Green Hydrogen Upcoming Projects in India, working on different types of Electrolysers used in the generation of green H2 working on its engineering & design aspects at Technip Energies Ltd., Noida, Uttar Pradesh.

the phase changes into liquid & collected on the collector. The smaller the mesh better will the separation. As per the data the collection of 6–22 liter of water per square m2 of mesh [1]. As the Nets/Mesh design up to a wind speed of 120 km per hr[1].

Main Applications[2]:

fog collectors can provide water meeting World Health Organization drinking water standards to rural communities and groups of homes; this water is inexpensive to produce and can be delivered to the homes by gravity flow fog collectors can provide water for the reforestation of ridge lines and the upper parts of mountains where it is impractical to import water from conventional sources; the fog water can be delivered to drip irrigation systems by gravity flow and the resulting forests, if properly situated, can become self–sustaining by directly collecting fog water. (Schemenauer 2008).

Advantages [2]:

- Passive collection system requiring no energy input to operate
- Cheap and easy to maintain and repair
- Water quality is generally good in non–industrial areas, though pH can often be low
- Modular system that can grow in line with demand or available funds
- Quick and simple design and construction. Installation requires little time or skill
- Low capital investment and other costs compared to conventional sources of potable water in mountainous and arid areas

Disadvantages [2]

- Technology requires very specific climatologic and topographic conditions. Yield is difficult to predict so a thorough pilot project is required in every case
- Yield is very sensitive to changes in climate conditions and so a backup supply is required
- Fog collection is unlikely to be of regional or national importance as a water supply. Emphasis is on the local level which requires full community participation
- If the collectors are not close to the point of use then the cost of the pipeline can make the system uneconomic and hydraulically difficult
- Vulnerability to vandalism
- Good access to the site is required for installation, maintenance, and monitoring.

Scope in the Indian Continent

Countries like India, Nepal Pakistan also have the scope to use this technique at places where water availability is deficient like Leh & Ladhak where availability of fresh water is limited to a certain area. It is estimated that in India 12.5 billion liters can effectively collect through fog capturing [5]. In recent days, one of the research published by the researcher of IIT Mandi where the team has studied the mechanism by which Bermuda grass harvests water from fog.

Some Startup Working on Same Project [3],[4].

CloudFisher: A German company: The CloudFisher was developed by the German

Water Foundation. The steel frames and net holders were tested by the Foundation on Mount Boutmezguida in Morocco for a period of 18 months. Together with researchers from the Technical University of Munich, the Foundation tested different synthetic and stainless steel fabrics regarding their water yield. Depending on the region and the season, between 36 and 126 liters per day and module (net surface: 9 m2) could be collected. In Morocco, peak values of over 600 liters per day have been measured.

FogQuest: A Canadian company: FogQuest is a non–profit, registered Canadian charity dedicated to planning and implementing water projects for rural communities in developing countries. We utilize innovative fog collectors as well as effective rainfall collectors to make optimum use of natural atmospheric sources of water

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4. Data obtained from – http://www.fogquest.org/
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NI–THE WATER SAVIOUR: A PATENTED IOT SOLUTION MAKING INDIAN WATER INFRASTRUCTURE SMART

Chinnayya Math
CEO & Co–Founder, Nimble Vision

Chinnayya Math is an engineer with graduation in Electronics and Communication and Masters in Embedded Systems. He comes from North Karnataka, a region with limited natural resources. He grew up in a remote village and he relates to the water crisis in rural and urban India. Chinnayya's career started in 2002 with Indian Govt DRDO. He has 20–year experience in hardware and software design, development, integration, and validation. He was associated with CISCO and BOSCH in his career. He joined Nimble Vision as a full–time CEO in 2019 onwards and his contribution to the team has helped to build a platform to address and various use cases of water and sewage automation.

Introduction

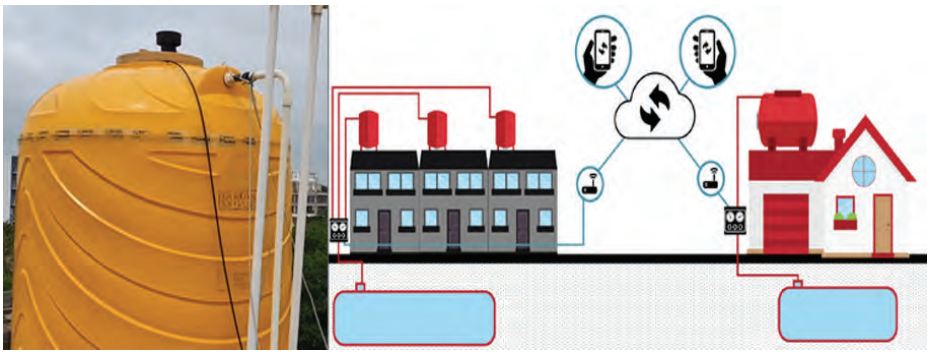
Nimble Vision is a Bangalore–based start–up in smart water & sewage management using IoT, AI, and ML. Nimble Vision is founded by Vaishali Math and Chinnayya Math, together they bring management and technical expertise. Founders come from North Karnataka and relate to water scarcity from childhood. The journey of Nimble Vision started with its own water usage problem and hefty water bills. To understand their water consumption behavior team Nimble Vision came up with the idea of Ni–The Water Saviour. A smart IoT solution that acts as a conventional water level controller, water meter, and quality monitor. The uniqueness of this solution is providing water consumption details on an hourly basis without using a water meter. This technology has been patented and will bring awareness and behavioural change in society to build a smart and sustainable society.

Background

Asian, African, and South American water infrastructure are unique and different from European and American water infrastructure. We have plastic and cement tanks that form the core of domestic, industrial, and public water distribution. The tanks store the water and supply water to all the needs of the building. The water is pumped to these tanks by using a conventional water level controller. This float sensor–based water level controller technology is nearly 50 years old. We at Nimble Vision understood the importance of the conventional water level controller and the need to improvise it.

Ni–The Water Saviour addresses the above UN SDGs

Technology



A plastic overhead tank with the sensor mounted on the top of the tank. The sensor does not

touch the water. The sensor is wired to an IoT device mounted near the motor starter. The IoT device is Wi–Fi & 4G based, and connects to Wi–Fi gateway/ Cellular network. The IoT device monitors the sensors and controls the motor and pushes the data to the Nimble Vision cloud. Cloud–based AI computes all the analytics. This solution also works for cement tanks. Makes all the overhead, and underground tanks smart.

Ni–The Water Saviour is a patented technology that makes each plastic overhead tank smart and very cost–effective. It brings the below analytics on mobile and web dashboards.

- Live Water Level: It provides info about the amount of water available every 10 mins, controls motor operation maintains the water level.
- Daily Consumption Details: It provides hourly water usage for the current day. This helps to understand activity–based water consumption details. This helps to find water leakages.
- Past Consumption Details: It provides past water consumption details day–wise.

Ni–The Water Saviour detailed offerings

Ni–The Water Saviour is a complete solution for individual customers, apartments, industries, and Govt. It brings relevant actionable insights to all the stakeholders. It brings water quality, consumption, and leakage along with centralized tracking for B2B clients. Complaints and Service ticket management integrated. The government can monitor live pincode/city–based water consumption details.

Traction

B2G: Nimble Vision is associated with Jal Jeevan Mission and Amrut 2. It is the official partner of Bangalore Water Supply & Sewage Board under Amrut 2. Helping BWSSB to reduce the non–revenue water and monthly expenses.

B2B& B2C: The customers are from Bangalore, Chennai, Hyderabad, Delhi, and Kalaburagi.

International clients from Indonesia and UAE. Discussions are in progress with African countries.

Future Improvements Planned

Vision & 5G–based industrial automation is in progress.

Live Tank details Hourly consumption details Day wise consumption details

Awards and Recognitions:

- BCIC's Inclusive Innovation Award under Women lead Social Impact Category June 2018
- NITI Aayog – Pune Smart City, Hackathon 2018 Award for Smart Water Management – October 2018
- Renesys GR Lychee Design Award December 2018
- Karnataka Govt elevate award 2019
- BWSSB award for water conservation 2020
- 5G – In Top 100 of 5G Hackathon 2020
- BWSSB Jal Rushi Award – 2020
- Smart City Expo Best Start–up Award –2021
- Qualcomm India Design 2nd Runner–up award –2022
- DoT Grant Winner 5G & Vision –2022

Meeting with Prime Minister Modi Ji

Modi Ji interacted with Chinnayya Math at India Mobile Congress and appreciated the innovation and suggested to improve it for rural India.

Vaishali Math: Founder, BSc, BEd. 8 years Management experience. Current responsibilities include team management.

Chinnayya Math: Co–founder, BE, MS. 20 years IT experience (Hardware, Software design, development, validation) Ex– DRDO, NDS, CISCO and BOSCH. Current responsibilities include overall architecture, design, development, and support.

Interview with
SACHIN MAURYA

Interview by
Virender Kumar

INNOVATIVE PRODUCT WILL HAVE HUGE IMPACT ON WATER INDUSTRY IN 2025

Innovation, sustainable technology will change the market demand soon...

Sachin Maurya is Business Head of **NEERWAY PROJECTS PRIVATE LIMITED**. He is a master's in business administration from Dr. A.P.J. Abdul Kalam Technical University with entrepreneurial skills and 14 years of field experience. He has good industrial and institutional network for business implementation all over India.

www.neerway.com

Q. Please tell us about yourself and your family.

A. I am Techno commercial person. I did my MBA from Dr. A.P.J. Abdul Kalam Technical University Uttar Pradesh, Lucknow in 2008. My wife has done MSc in botany. We live in Ghaziabad and are blessed with a son who is studying in a class–3.

Q. How and when did you enter the water industry?

A. I started my working career journey with Ion Exchange India Pvt Ltd, Delhi, back in 2008.

Q. What was your 'first job profile'? Please share its experience and learning with us?

A. My decision to be associated with the water industry was predefined after my management since day one. I entered the market young and since then have put in a lot of effort into understanding the market, technologies and business protocols.

Q. What has been 'your craziest or most amazing experience' in the water industry till now?

A. It is my privilege to say that I am associated to the water segment. Even though this industry is a little unorganized but I feel there is tremendous potential for good professionals. I have cracked some massive deals for giants in India and Overseas. One such very inspiring project was for Qatar petroleum for installing a Disc filtration system.

Q. Please describe your company in your words. What is your own vision to take it forward?

A. I am proud to say, NEERWAY is a professional company. We are a process driven company, unlike many others in India. Our company always provides opportunity to young, talented, hardworking, and visionary people by encouraging them to reach many heights. The credit for this goes to our founder and team members for their full support since its inception.

Q. What are key points you think will be most important for a sustainable growth of Indian Water Industry by 2025?

A. Water is essential for sustaining life. The pollution of Indian rives has become critical, approx. 35–40% wastewater generated in India is treated, the rest untreated water is simply allowed to flow into river. One such critical focus area for us In India is and has been the cleaning of the Ganga basin. With several such bodies of water in the country, waste water treatment as a project has tremendous growth potential. Under "Namami Gange" program billion of rupees has been pledged by government over next five years to clean up the Ganga. Similarly, under the JJM program, each state government is running water treatment projects at the micro level.

Q. What will be the biggest obstacles you think Indian Water Industry will need to face by 2025? And how can they be used as opportunities?

A. As per my view, Drainage system and water recirculation for Zero liquid discharge would be targeting point.

Q. You have seen the Water Industry grow closely. How much impact you think online marketing and social media will have on business by 2025?

A. Indian marketing is moved towards 'Digital' program and there is no doubt this will have a huge impact in times to come.

Q. Please name 'three technologies' which you think will lead the change in water sector by 2025?

A. I believe that in Pre–filtration Glass Media, Disc Filtration technology and Sludge dewatering system will lead the change.

Q. Which will the "Best STARTUP Water Company" in India by 2025" in your opinion?

A. NEERWAY would be best companies based on performance, and industries demands.

Q. One final question: What is 'the best advice' you have ever received?

A. "Don't compromise in quality and don't run for each client" is guru mantra for delta growth of industries.

Q. What is your fastest moving products in Market?

- Disc filter (Automatic & Manual) & Screen filter (Manual/Semi–Automatic/ Automatic)
- Dosing pump (0–6/0–10/0–12/0–20/0–50/0–100)
- Rotary Drum Screen filter
- Glass Media
- Activated carbon Media (Coal based/ Coconut based)
- Iron removal Media (DMI65/Mz10/MNO_2/ anthracite)
- Agitator (Gear type)
- Sludge dry bag system (5KLD–2 MLD)
- Piezometer
- Electromagnetic flow meter(1''–16'')
- SS housing (Cartridge) (5m3/hr–200 m^3/hr)

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Radhakrishna Pillai

Favorite movie...
Corporate, Guru, Baazaar, Big bull, Raees

Favorite holiday destination…
Home town with family

BUDGET 2023–24 WATER SECTOR NEEDS ATTENTION

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

Water is the harbinger of the economic and social growth of a country. India has such a large human and livestock population is facing a difficult challenge in making provisions for clean drinking water for human, commercial, and agricultural needs.

The water industry in India was expecting that the Finance Minister will focus on water and wastewater infrastructure development with some new initiatives and good financial allocation given the situation of water stress and increasing water source pollution in the country. There needs to be a focussed approach to making water available for people, industries, and agriculture so that our efforts toward creating a robust economy will not be hampered.

We at Aquality Water Solutions Pvt. Ltd. welcome the increased allocation for Jal Jeevan Mission projects to the tune of INR 70,000 Crore, an increase of over 16.6% from the last year's allocation. There is still a huge task of making provision of tap water facilities created for 83 million (43% of total) rural households in the country within the remaining period of just over one year as per the Mission's timeline. The development under this mission has so far been successful in making drinking water delivery to an additional 78.3 million rural households since its launch in August 2019. The progress so far has been effective in making clean drinking water provisions for 110.6 million (57% of the total households) in the country. The increased investment will certainly help in making better progress on the mission which is being monitored at the highest level.

I have witnessed the severe water stress situations in Karnataka and am happy that the union government has considered it and allocated big amount of INR 5,300 Crore to develop Upper Bhadra Project to provide sustainable micro irrigation and filling up of surface tanks for drinking water for the people in the drought–prone central region of Karnataka.

Launching the Pradhan Mantri PVTG Development Mission for improving socio–economic conditions of the particularly vulnerable tribal groups (PVTGs) by providing clean drinking water and sanitation, health, etc. An allocation of INR 15,000 Crore for a period of three years will support the creation of livelihood facilities for the vast tribal population in India.

We are expecting that the Finance Minister will subsequently allocate more resources towards the development of water and wastewater infrastructure while increasing stimulus for technological intervention in water management as both these will be important aspects towards better water sustainability.

WATER CHALLENGES & UNION BUDGET 2023

Abdul Rahman Mohammed
CEO, Sahara Industry

The Hon'ble Finance Minister, Smt. Nirmala Sitharaman while presenting the union budget for 2023–24, has announced a few new schemes that will also support water sector growth. Although the budget is silent on several key aspects of the water sector like wastewater treatment and building sewage treatment and reuse systems as the increasing challenges of water contamination due to the unrestricted release of both municipal and industrial wastewater into rivers, ponds, and other water bodies across the country. Also adopting modern technology for the management of water and wastewater, recycling and reclamation, and huge volumes of potable water lost in distribution lines should have been considered.

Over the past few years, the government has been taking various initiatives, especially the rural water supply schemes under the ambitious Jal Jeevan Mission (JJM), which started in August 2019 after the Hon'ble Prime Minister announced it in his Independence Day address. We have seen the development of rural water infrastructure in the country and for the current fiscal; the FM has announced a budget increase for JJM projects to Rs.70,000 Crore against last year's allocation of Rs,60,000 Crore. This mission is indeed a game changer for rural households who are getting clean drinking water facilities at their homes. Since its launch, this rural water supply scheme is being implemented in a mission mode and it has already covered almost 57% of the total households (193.63 million), and the new allocation will expedite the projects undergoing to connect the remaining 43% of households.

Karnataka has been facing the difficult challenge of water scarcity for many years and the inter–state dispute on the water is not yet resolved. The Finance Minister has announced the central assistance of Rs. 5,300 Crore to Karnataka for augmenting water supply through the Upper Bhadra Project to provide sustainable micro irrigation and filling up of surface tanks for drinking water purposes. This is going to help in easing the water scarcity situation in the drought–prone central region of Karnataka.

The Aspirational Blocks Programme covering 500 blocks is launched for providing essential government services across multiple domains such as health, nutrition, education, agriculture, water resources, financial inclusion, skill development, and basic infrastructure. This will help in building and retrofitting water infrastructure for resource augmentation that will support making drinking water facilities available for the people.

Rs. 15,000 Crore allocation for three years to improve socio–economic conditions of the particularly vulnerable tribal groups (PVTGs) under the Pradhan Mantri PVTG Development Mission will also help in creating and improving clean drinking water and sanitation infrastructure in the tribal areas apart from other basic facilities like education, health, and road connectivity.

We are hopeful that all these projects and dedicated investment will help increase the market size of water and wastewater treatment equipment, membranes, chemicals, and other ancillaries.

UNION BUDGET 2023–24: WATER SECTOR

Tariq Siddiqui
Chief Strategist, TS Advisory Services

India is on the cusp of growth and following the trail for a $5 trillion economy in the next two years requires extraordinary planning and investment. Economic growth depends on social, physical, and commercial infrastructure development, and above all, the availability of clean water takes precedence in all.

The Union Finance Minister while presenting the Budget for 2023–24, has announced a few measures and schemes relevant to the water sector. The flagship scheme of Jal Jeevan Mission, which is to be concluded next year as per initial planning, has been given and enhanced budget of INR 70,000 Crore ($854 million), an increase of INR 10,000 Crore ($122 million) from the last year allocation. This scheme is transforming the rural water supply situation and in over three year's period since its launch, it has already added 78.3 million additional households with functional tap water connections. The task to connect the remaining 83 million rural households in a year's time seems very challenging, and we expect that the period of Jal Jeevan Mission needs to be increased to achieve the objective of providing direct water supply to every household in the country.

The Finance Minister also announced central assistance of INR 5,300 Crore ($64.6 million) to the drought–prone central region of Karnataka to be given to Upper Bhadra Project for creating infrastructure for sustainable micro irrigation and filling up of surface tanks for drinking water purposes. This investment will help easing of water scarcity challenges that Karnataka is facing for a long time.

Another scheme to improve socio–economic conditions of the particularly vulnerable tribal groups (PVTGs) under the Pradhan Mantri PVTG Development Mission will have an allocation of INR 15,000 Crore ($183.1 million) that will be made available to implement the mission in the next three years under the Development Action Plan for the scheduled tribes. Apart from building other basic facilities, clean drinking water and sanitation will also be part of the scheme, helping the poor tribal population to have access to clean drinking water and organized sanitation facilities.

However, the total budget allotment has been slashed across multiple sectors and schemes of the central government, there is no particular allocation announced for wastewater treatment and reuse facilities which were widely expected. There should have been a targeted plan and investment to reduce water distribution losses in India, which is a big challenge in water sustainability.

The technology adoption in the water sector is quite inadequate compared to other developing nations. India has the second largest population and widespread water stress and unsustainable water usage, we need to have a specific plan to invest in technological solutions for water management and wastewater recycling and reclamation projects, while making targeted efforts in reducing water consumption in agriculture and industrial production.

With water scarcity looming large over urban India and the big challenge of untreated wastewater being discharged into water sources, there has to be a concrete framework, robust planning and adequate financial support to tide over the challenges the water sector in India is facing and will face in coming years.

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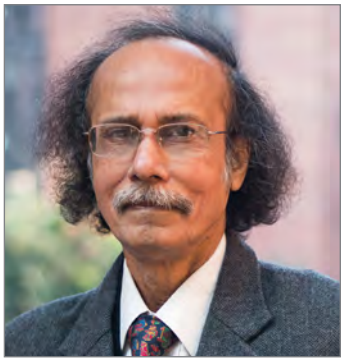
The past one year has seen a series of changes at the top, with water companies hoping to build on the expertise and cross–organizational experience of senior water professionals. A look at some of the recent moves in the global water sector…

Priyanka Sinha
Global Lead – Digital Programs, DuPont Water Solutions

Subhash Sethi
Chairman, SPML Infra Limited

Dharmendra Pratap Singh
Head of Infrastructure Solutions & Senior, Vice President, Voltas Ltd.

Chanchal Dasgupta
Application Marketing Manager, Borouge



Dr. Syamal Kumar Sarkar
Director – Division of Regulatory Studies and Governance, TERI

Anil Deshpande
Sr. General Manager – Project Sales (FAID), Mitsubishi Electric India Pvt. Ltd.

Mahesh Kothiyal
Senior Marketing Manager – Water Utilities, Xylem India

Siddharth Seshan
Scientific Researcher – Water Treatment & Resource Recovery, KWR Water Research Institute

Significant moves in the past year

Dirk Vriesa
Scientist, KWR Water Research Institute

Marcel Zandvoort
Researcher, Waternet

Alex van der Helm
Consultant – Water Technology & Innovation, Waternet

Johann Poinapen
Senior Researcher, KWR Water Research Institute

Arun Lakhani
Chairman & Managing Director, Vishvaraj Infrastructure Ltd.

Vinay Chataraju
Co–Founder & Head Business, Kritsnam Technologies Pvt. Ltd

Rajul Parikh
Co–Founder, Alfaa UV

Kobayashi Hiroaki
Chairperson & Managing Director, Toshiba Water Solutions Pvt. Ltd.

Dr. Mohit Sharma
Communication Specialist, NMCG

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

Anupam Pathak
Process Engineer – R&D, Thermax Ltd.

Mangesh Wange
CEO, Swades Foundation

Dipali Gandale
Technical Manager, Vipanan Analytical Technologies LLP

Sunil Dhole
Co–Founder & Director, Technorbital Advanced Materials Pvt. Ltd.

Himanshu Budhia
Director, GSE Filter Pvt Ltd

Yeshwant Kulkarni
Founder & Managing Director, Green Water–Revolution Pvt Ltd.

Pinaki Bhadury
Advisor and Consultant, Solutions Lead – Industrial, Chistats Solutions Pvt. Ltd.

Vikram Karunakaram
Managing Director, DeltaPure Water India Ltd

Amarjit Panigrahi
CEO, Aquadax South Asia Pvt Ltd

Uday Thakkar
Director Sales – APAC, NSF International

Col. Bhaskar Tatwawadi
Director, Double Shotz Pte. Ltd

Sandip Patil
Project Manager, Leading Water Treatment Company

Dr. Ashish K Sahu
Marketing Manager, Cambi

Bhagyashree Rath
Environmental Manager, Greenvironment Innovation & Marketing India

Significant moves in the past year

Vaishali J Patkar
Director, Climate Collective Pune Environmental Foundation (CCPE Foundation)

Sudhir Kumar Arora
Retired Chief Engineer–HAG, Military Engineer Services

Smita Singhal
Director & Founder, Absolute Water Pvt Ltd

Sachin Maurya
Business Head, Neerway Projects Pvt Ltd

Dr. Anil Kumar Mishra
Bacteriologist – Delhi Jal Board, Govt. of NCT Delhi

Yasaswini
Head of Content, WEGoT Utility Solutions

Ashutosh Paswan
Founder, Asutos Inc

Huzefa Rangwala
Process Manager, Hoganas India Pvt Ltd.

Pratima Pandey
YouTube Content Creator

Javier Suárez
Technical Service Manager Singapore, DuPont Water Solutions

Sameer Choudhary
Automation Expert, Orange City Water 24x7

Chamkaur Singh
Infrastructure Planning & Development of Smart Cities

Yogesh V. Kondawar
Co–Founder & Director, IoTronics System Pvt ltd

Deven KK Chheda
Founder, Arion Techsol Pvt Ltd.

Santosh Hegde
Head – Sales, Bosonwhitewater

Anil Nagabhushan
Founder & CEO, RIGO

Dr. Raj Kumar Satankar
Associate Professor
Department of Mechanical Engineering – Poornima College of Engineering

Mandarr Kkamthe
Senior Product Manager–Water, Asian Contec Ltd. (Stanlay)

Dr. VC Goyal
Head
Research Management & Outreach Division, National Institute of Hydrology Roorkee

Mohanish Jaju
Co–Founder, BrewAndBuzz Global

Rucha Vinayak Vaidya
Senior Research Fellow, Administrative Staff College of India (ASCI)

Sayan Mondal
Research Associate (ASCI), Lead Innovations, Wash Innovation Hub

Professor V Srinivas Chary
CEO, Wash Innovation Hub, Centre Director, CEUG&ID

Dr. Prasanna Jogdeo
Co–Founder, Lemnion Green Solutions Pvt. Ltd

Significant moves in the past year

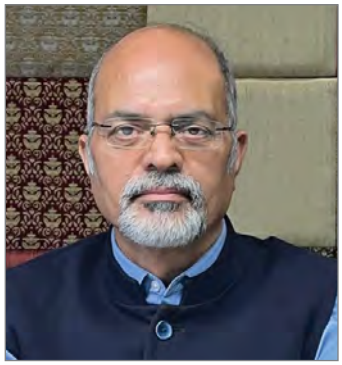
Sanjay Bahl
Founder, Superweld Eco–Solutions

Dr. Sarika Kulkarni
Chief Executive Director, Raah Foundation

Siddharth K. Desai
Jt. Managing Director, Kishor Pumps Pvt. Ltd.

Omkar Sathe
Partner, CPC Analytics

Vipul Chavda
Co–founder, Cleantech Water



Devendra Singh Dhapola
Consultant, WASH

K V Vinayaka
M.Tech in Environmental Engineering

Shilpi Chakraborty
Junior Research Specialist
(Water & Environment), National Institute of Urban Affairs (NIUA)

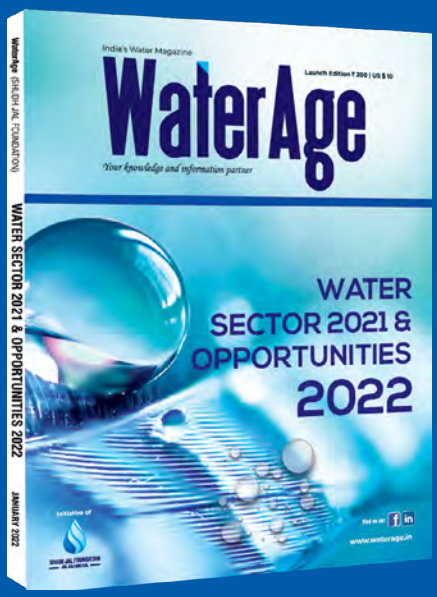
Tariq Siddiqui
Chief Strategist, TS Advisory Services

Anisha Dey
SLWM Specialist, Water Sanitation & Hygiene Institute (WASH Institute)

Hiroaki Kobayashi
Chairperson and Managing Director, Toshiba Water Solutions Pvt. Ltd.

Abdul Rahman Mohammed
CEO, Sahara Industry

January 2022



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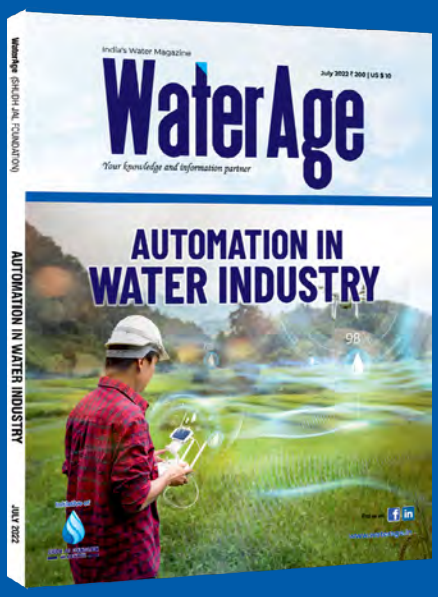

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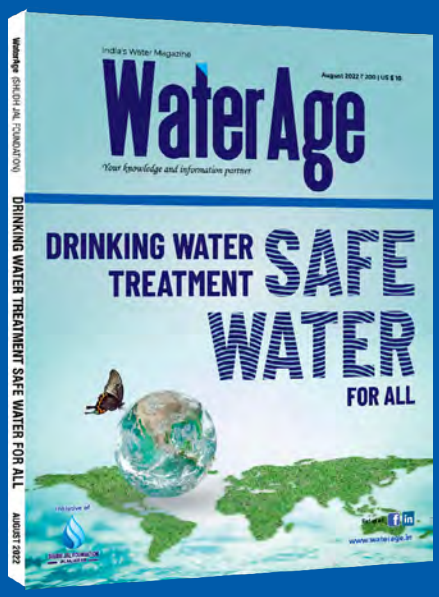

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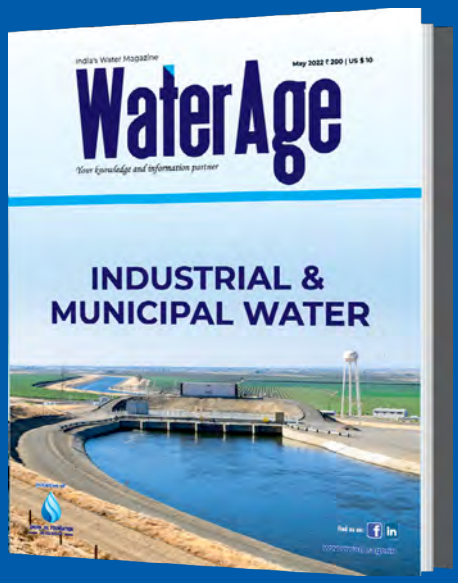

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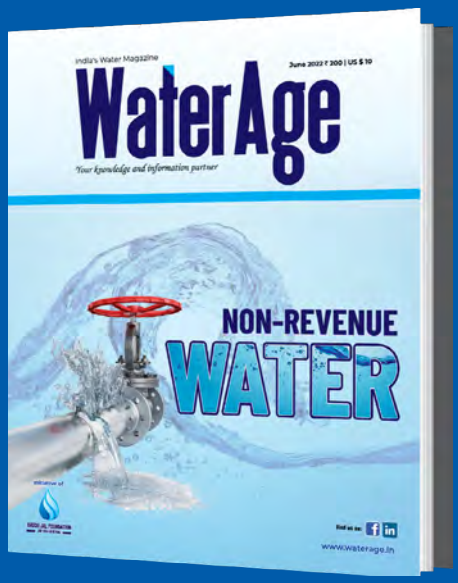
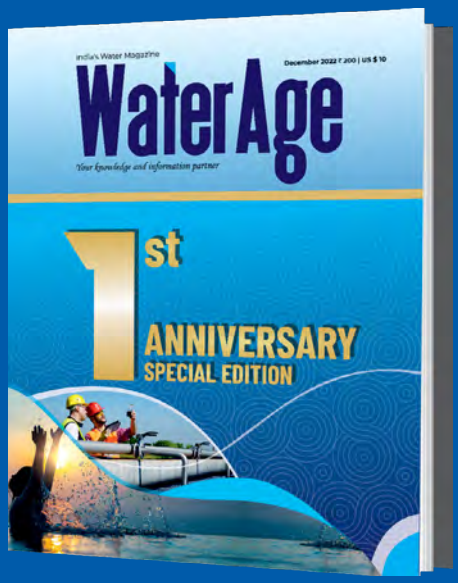


October 2022

November 2022

December 2022



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Convergence India Expo 2023
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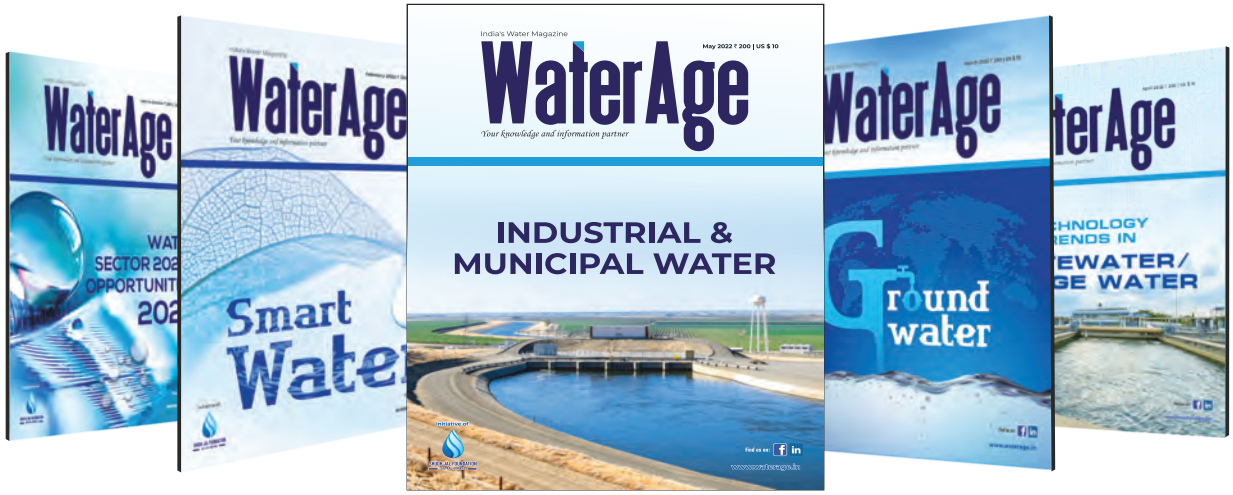

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Requirement:
Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66365814, Location–Mahishbathani Sinking of Submersib.

Tender Detail:
Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66365814, Location–Mahishbathani Sinking of Submersib #*. Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66365814, Location–Mahishbathani Sinking of Submersib

EMD: INR 5,000
Tender Estimated Cost: INR 245,217
Closing Date: 03/02/2023
Location: Malda – West Bengal – India
Contact Details: District Magistrate Maldallsdo – Sadarllbdo – Old Malda mahishbathani pincode 732141

Buyer/Seller: District Magistrate

Ref. Number: 56807930
Tender Number: 2023_DMM_449663_1

Requirement:
Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296764, Location–Khaihata(P) Sinking submarseble pump

Tender Detail:
Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296764, Location–Khaihata(P) Sinking submarseble pump #*. Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296764, Location–Khaihata(P) Sinking submarseble pump

EMD: INR 5,000
Tender Estimated Cost: INR 245,217
Closing Date: 03/02/2023

Location: Malda – West Bengal – India
Contact Details: District Magistrate Maldallsdo – Sadarllbdo – Old Malda khaihatta pincode 732141

Buyer/Seller: Haryana State Industrial Development Corporation Limited

Ref. Number: 56015747
Tender Number: 2022_HBC_250399_1

Requirement:
Development of infrastructure facilities i.e., road network, water supply, system, waste water collection system, re–circulation system of treated wastewater, storm water drainage system, electrification and street lighting, and all other works conti

Tender Estimated Cost: 7,764,411,993
Closing Date: 20/02/2023
Location: Gurgaon – Haryana – India

Contact Details:
Haryana Board Corporationllhsiidcllkharkhod allindustrial Area saidpur

Buyer/Seller: District Magistrate

Ref. Number: 56799277
Tender Number: 2023_DMM_449468_1

Requirement:
Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296408, Location–Jhangra CT Construction of CC drain from Ra

Tender Detail:
Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296408, Location–Jhangra CT Const of CC drain from Ra #*. Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296408, Location–Jhangra CT Const of CC drain from Ra

EMD: INR 7,000
Tender Estimated Cost: INR 341,954
Closing Date: 03/02/2023
Location: Malda – West Bengal – India
Contact Details: District Magistrate Maldallsdo – Sadarllbdo – Old Malda Jhanjra pincode 732141

Buyer/Seller: District Magistrate

Ref. Number: 56784682
Tender Number: 2023_DMM_449529_1

Requirement:
Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296604, Location–Jhangra CT Sinking of Submersible pu

Tender Detail:
Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296604, Location–Jhangra CT Sinking of Submersible pu #*. Construction of Drainage for transportation of wastewater from a group of villages to a common treatment unit under Old Malda Panchayat Samity, Malda out of XV F.C.–2021–2022 Fund. Activity Code 66296604, Location–Jhangra CT Sinking of Submersible pu

EMD: INR 5,000
Tender Estimated Cost: INR 245,217
Closing Date: 03/02/2023
Location: Malda – West Bengal – India
Contact Details: District Magistrate Maldallsdo – Sadarllbdo – Old Malda jhanjra pincode 732141

Company	Page No.	Telephone	E–mail	Website
Aadys Components Pvt. Ltd.	1	+91 11 4155 1444	sales@aadys.co.in	www.aadys.co.in
AKASH Blowers Pvt. Ltd.	7	+91–9999 56 4644	info@akashblowers.com	www.akashblowers.com
DUVERA	47	8595 149016, 8744 040406	sales@duverawater.com	www.duverawater.com
E–Procurement Technologies Ltd.	59	+91 93745 19764	sales@TenderTiger.com	www.TenderTiger.com
Indus Waterways	Back Cover Inside	91 172 5275055, 91 11 4552 4715	induswaterways@gmail.com	–
Jai Maa Associates	41	+91 98111 88819, +91 11 2568 2346	jaimaaassociatesdelhi@gmail.com, jaimaa98gmail.com, info@jaimaaassociates.in	–
NSF India	35	+91 124 4820100 +91 96500867583	india@nsf.org	www.nsf.org
Oasis WFS Private Limited	11	+91 99902 10500 +91 97164 65675 +91 91678 79747	mhaque@oasis.ie amit.gupta@oasis.ie dpsingh@oasis.ie	www.oasiswfs.in
Optimus Enviropro Pvt. Ltd.	1	+91 11 4155 1444	sales@optimusenviro.pro	www.optimusenviro.pro
Rysa Infratech Pvt. Ltd.	Back Cover	+91 11 4552 4715	info@rysainfratech.com	www.rysainfratech.com
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- Specification of mechanical and electrical equipment of sewage network STP & ETP.
- Preparation of drawing.
- Preparation of bill of quantities, detailed estimates BOQ and estimate based on MES SSR – 2020 and market analysis for Non-SSR items for sewage network STP & ETP.

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WATER

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