

India's Water Magazine

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## WATER SECTOR IN 2023 AND OPPORTUNITIES IN 2024

### INSIDE

Water Infrastructure: Revitalize for Sustainability

The Evolving Water Industry and the Future of Water on the Planet Earth

A Paradigm Shift: Rethinking Our Approach to Water, Earth's Vital Element

Enormous Future Opportunities Striking at the Doors of Water Sector

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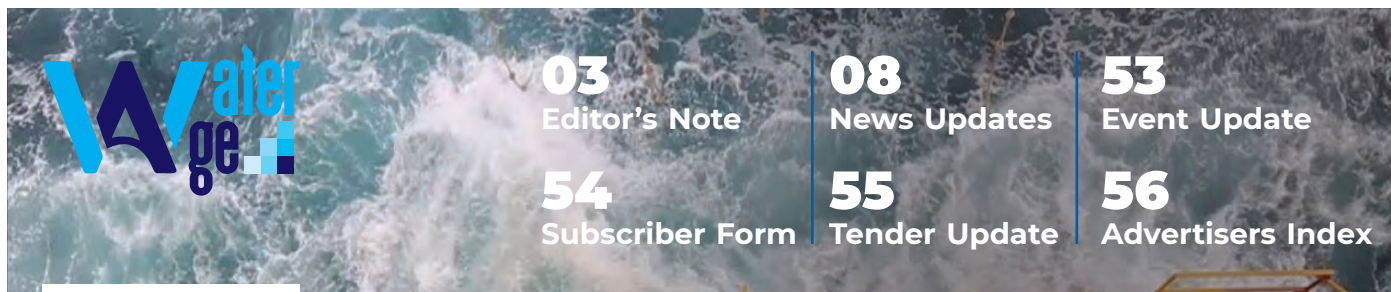
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**RENU TOMAR**  
*(Editor-in-Chief)*

**DEAR READERS,**

Human existence on planet Earth has been a possibility because of the presence of the most crucial element - Water. Just like other vital aspects supporting life on the planet, water is undeniably one of the most essential life supporting elements on the planet. However, with the course of time incessant technological innovations by humans, constant increase in the population, rapid urbanization, severe climate change, increased customer demands, and emerging digital technologies have been constantly affecting the water and its sources. Moreover, water industry of the present time is severely affected and will be affected in the future years as well. This is because water businesses of the recent times face a number of difficulties, including population expansion in metropolitan areas, water supply risk, climate change, and even ageing infrastructure across the globe. In order to meet the rising demand, the water businesses should evaluate as how it must address energy costs, environmental risk, emergency response actions, regulatory change, community relations, and infrastructure security.

With affective measures taken towards addressing such complicated set of issues, there are possibilities of turning obstacles into opportunities for water enterprises, populace, and also for the environment. For instance, improvising the maintenance of water and wastewater infrastructure with the reliability of the monitoring and control systems is important in addressing numerous water issues. Additionally, this will help in providing a stable as well as reliable supply of water in the future to necessitate new technologies and the systems enabled for real-time monitoring of water resources. Even the adoption of Internet of Things (IoT) that refers to the advancement of numerous internet-connected devices, undeniably opens doors of unimagined possibilities for the water industry as well.



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## NITI weighs discontinuing key water report launched 5 years ago

The report, published by NITI Aayog, was prepared in association with three ministries — Water Resources, Drinking Water & Sanitation, and Rural Development.



**New Delhi | Updated: November 6, 2023: by Harikishan Sharma – Latest edition says water scarcity a ‘national problem’.**

Niti Aayog, the government’s think tank, is learnt to have marked the reports on states progress on water management for 2018–19 and 2019–20 for “internal use” after having publicly released the previous editions.

Called the ‘Composite Water Management Index’ report, the first edition launched five years ago in June 2018 brought India’s water challenges into spotlight and ranked states in terms of efficacy based on 28 parameters. The first edition provided data for 2015–16 and 2016–17, and the second edition launched in August 2019 was for 2017–18.

The report, published by NITI Aayog, was prepared in association with three ministries — Water Resources, Drinking Water & Sanitation, and Rural Development.

In May this year, the NITI Aayog wrote to the Union Ministry of Jal Shakti, seeking the government’s perspective on the “use and applicability” of the Index and whether the CWMI should continue. There has been no response from the Ministry, even as the third and fourth editions are awaiting release, sources said.

When contacted, a Niti Aayog spokesperson said there was an idea to club the report for 2018–19 and 2019–20 with that of the next two years (2020–21 and 2021–22). It was also felt that the coverage should be extended to districts. Finally, on the continuation of CWMI itself, there was a view that other channels also need to be explored to undertake the task of indexing rather than bank only on CWMI, the spokesperson said.

The latest report, a copy of which has been seen by The Indian Express, maps the performance of states for 2018–19 and 2019–20, and points out that water scarcity is a “national problem”. The average annual per

capita water availability is expected to reduce to 1,486 cubic meters per person per year by 2021 from 1,545 cubic meters per person per year in 2011, according to the Jal Shakti Ministry.

As per the annual water availability norms, the availability value of less than 1,700 cubic meter/person/year indicates water shortage. Water availability below 1,000 cubic metre/capita/year is considered as “scarcity”.

According to the report for 2019–20, Gujarat tops the list “with continuous improvements year on year and is closely followed by Rajasthan, Andhra Pradesh and Madhya Pradesh” in terms of performance.

“It is encouraging to see that Rajasthan jumped nine positions upward from 2017–18 to FY 2019–20,” the latest unreleased report states. Goa, it said, has slipped from the fourth position in 2017–18 to tenth position in 2019–20. Punjab too has seen a drop in its rank during this period.

Responding to questions from The Indian Express, a NITI Aayog spokesperson said work on the third and fourth rounds of the index was started in 2022, and attributed the delay to unavailability of updated data due to the Covid–19 pandemic. Niti Aayog also “ideated” whether the third and fourth rounds should be clubbed with fifth and sixth rounds meant to cover years 2021–22 and 2022–23.

“NITI Aayog also commenced the work for 3rd & 4th rounds of CWMI in 2022. However, due to Covid–19, updated 2022 data was not available. In consultation with both the Ministry of Jal Shakti and State Water Resource Departments, it was ideated that (i) a combined report of CWMI rounds 3.0, 4.0, 5.0 and 6.0 should be released; and (ii) coverage of data should be extended to districts level,” the statement reads.

“One view regarding the continuation of CWMI was that other channels also need to be explored to undertake the task of indexing rather than only on CWMI. Views of the Departments have been sought in this regard,” the statement said.

The consultation mentioned in the spokesperson’s response took place on December 12, 2022, two months after the combined report of the third and fourth rounds of the Index were ready. The meeting was chaired by NITI Aayog member Ramesh Chand and officers of the Jal Shakti Ministry where it was indeed “ideated” whether a combined report of CWMI rounds 3.0, 4.0, 5.0 and 6.0 should be released together.

However, five months later, the Niti Aayog sent letters to Department of Water Resources, River Development and Ganga Rejuvenation and the Department of Drinking Water and Sanitation, both of which come under the Jal Shakti Ministry, saying that the Member (economist Ramesh Chand and NITI Aayog member) is of the view that “other channels need to be explored to undertake the task of indexing rather than relying only on CWMI and that the CWMI is not widely used or applied in Planning, Decision making, Policy Formulation or Research by public or private



stakeholders concerned with water sector.”

“It has also been directed to obtain the views of Departments under the Ministry of Jal Shakti before deciding on the continuation of CWMI,” said the NITI Aayog communication sent to the Ministry on May 12, 2023.

“It is therefore kindly requested to share your views on use, applicability, and whether the CWMI is to be continued anymore,” said the communication, issued with the “approval of competent authority” in NITI Aayog

Emails soliciting comments of Jal Shakti Ministry and Rural Development Ministry did not elicit a response.

In June 2018, the Niti Aayog said the CWMI report was meant to foster “a culture of evidence and data-backed policy-decisions for efficient management of water resources” and also bring about competitive and cooperative federalism among states.

In October, the United Nations University – Institute for Environment and Human Security (UNU-EHS), had warned that India is close to reaching its groundwater risk tipping point. Environmental tipping points are critical thresholds in the Earth’s systems, beyond which abrupt and often irreversible changes occur. © The Indian Express Pvt Ltd

### Countdown to the UN 2023 Water Conference: sustainable water management in India

**Government of Netherlands | 21-03-2023:** In the Netherlands, the water authorities ensure that we can keep our feet dry, have enough drinking water and don’t experience water shortages in dry periods. This water management also inspires other countries, including India. Dutch ambassador to India Marten van den Berg explains how the Netherlands and India are working together on better water management.



Ambassador Marten van den Berg.

With almost 20% of the world’s population but less than 5% of the global water supply, good water management is critical in India. ‘India is a huge country, almost a continent in itself,’ says ambassador Marten van den

Berg. ‘That’s why choices about water are mainly made by the states and municipalities. They don’t really have water boards here, but local government representatives are also democratically elected, of course.’

Local governments are facing a major challenge, says the ambassador. ‘Due to heavy rainfall, some states are being hit by flooding, while others are having to deal with serious water shortages. What’s more, water is often not managed efficiently, many rivers are heavily polluted and access to water is not always evenly distributed.’

#### Better water management

Climate change is threatening to exacerbate these challenges even further. So there is an urgent need for better water management, Marten van den Berg observes: ‘It’s very important to think about how you organise things. Take groundwater pumping: in many states this is virtually free because electricity is heavily subsidised. This means that many farms are using an unnecessary amount of water and groundwater levels are falling dramatically.’



Image: ©Dutch Embassy New Delhi

The King and Queen visited a water treatment project during a state visit in 2019.

#### Close cooperation

The Netherlands and India work together closely on water. In 2021, the two countries signed a strategic partnership to further strengthen this cooperation. ‘Our cooperation benefits both of our countries,’ says the ambassador, ‘We share our knowledge and experience in India, but also take the lessons learned and techniques developed back to the Netherlands with us.’

#### Water reservoirs

A good example of this cooperation can be found in the state of Kerala. ‘Following severe flooding the authorities there asked the Netherlands for advice,’ Marten van den Berg explains. ‘A Dutch team worked together with local authorities to see how they could reduce the risk of flooding.’

In southern India too, Dutch companies have joined forces with local authorities to make urban areas more resilient to flooding, drought



and pollution. By restoring water reservoirs, for example, 'In the city of Chennai it rains heavily for six weeks a year, creating a temporary water surplus. However, water shortages soon occur again. Storing water in reservoirs would help make water available for longer.'



Image: ©Stijn Jaspers

## River Ganges

The Netherlands is also involved in a national programme to clean up the River Ganges. The Ganges, which flows through India and Bangladesh, is one of the world's most polluted rivers. 'The pollutants come from household, garden and kitchen waste, as well as industrial waste from businesses,' says the ambassador. The Netherlands and India have set up a joint research programme to look at how the water in the Ganges can be treated in an organic way, using aquatic plants.

## Shared responsibility

Tackling the sources of pollution together with local people and businesses is also very important, according to the ambassador. 'Effective water management is something you have to do together. We discuss how to prevent pollution with residents, businesses, NGOs and religious leaders. By involving people in the choices that are made, they are also more likely to feel responsible.'

Marten van den Berg cites water management in slum areas as an example: 'Suppose you're going to restore reservoirs. How do you make sure they're not going to be used as rubbish dumps? Can residents and shopkeepers make agreements on this, so that waste is collected weekly, for example?'

## UN 2023 Water Conference

Inclusive water management is one of the themes of the UN 2023 Water Conference in New York. Marten van den Berg hopes that the conference will also discuss the connection between water management and sustainable development. 'We need to ensure that everyone has access to clean drinking water and sanitation. And at the same time we need to show people how to use water in a sustainable way.'

The conference, the UN's first on water in nearly 50 years, aims to put the importance of water higher on the global agenda. Read more about the conference themes here.

## Shocking revelation by environment minister: 16 rivers in Karnataka polluted

Root of the problem lies in discharge of waste from 30 cities and towns directly into these rivers, minister notes



By M Raghuram—Published: Thursday 14 December 2023:

## Photo by – M Raghuram

A query by Melukote MLA Darshan Puttannaya during the winter session of the Karnataka legislature shed light on a pressing environmental concern plaguing the southern state – the unchecked influx of sewage from industrial and residential areas into the river basins.

The MLA sought insights into the government's awareness of this issue and the measures in place to mitigate the adverse impacts on water quality and public health.

In response to the probing question, the state's forest and environment minister Eshwara Khandre provided a stark reality check. A disconcerting number of major rivers in Karnataka, including Arkavati, Lakshmana Tirtha, Tungabhadra, Bhadra, Tunga, Kaveri, Kabini, Kagina, Krishna, Shinsha, Bhima and Netravati had already found their names on the dreaded list of polluted water bodies.

The gravity of the situation became evident when Khandre revealed that the concentration of biochemical oxygen demand (BOD) in River Arkavati had soared to more than 30 milligrammes per litre, making it the most polluted river in the state.

The issue extended its tentacles to other vital rivers as well. Tungabhadra, Bhadra, and Shinsha rivers, grappling with BOD concentrations of 6–10 mg per litre were also distressingly contaminated.

Although the remaining eight rivers had relatively lower BOD levels in the 3–6 mg per litre range, the overall picture painted a sombre image of Karnataka's water resources.

The root of the problem, as identified by Khandre, lay in the discharge of waste from 30 cities and towns directly into these rivers. The sheer volume of sewage entering the water bodies necessitated urgent action. In response, the government set the wheels in motion to establish 24 Sewage Treatment Plants (STP) strategically placed to purify the



contaminated water. These STPs aimed to tackle the pollution at its source, preventing further degradation of the rivers.

To hold local authorities accountable, the state pollution control board took a stern stance. Khandre disclosed that criminal cases had been registered against 10 municipal councils and municipalities for their failure to take the necessary action to ensure water purification.

This move underscored the government's commitment to enforcing environmental regulations and ensuring that responsible parties were held liable for their contributions to the pollution crisis.

While the STPs offered a glimmer of hope, the challenge ahead remained colossal. The fight against river pollution in Karnataka demanded a comprehensive and collaborative approach. Beyond the immediate measures, there was an urgent need for sustained public awareness, community involvement and stricter enforcement of environmental laws to address the root causes of pollution.

In conclusion, the discourse during the winter session in Belagavi brought to the forefront the harsh reality of river pollution in Karnataka. The contamination of major rivers and the subsequent impact on water quality and public health underscored the need for swift and decisive action.

As the government grappled with the task of mitigating the crisis, the responsibility also lies with the citizens to actively participate in conservation efforts and promote sustainable practises to safeguard the state's invaluable water resources.

“The water quality of 30 rivers in Karnataka was monitored at 107 locations during the years 2019 and 2021, out of which 41 locations on 17 rivers were found to be non-compliant with the prescribed water quality criteria with respect to BOD,” according to the CPCB report.

The maximum number of polluted river stretches are in Maharashtra (55), followed by Madhya Pradesh (19), Bihar and Kerala (18 each), and Karnataka and Uttar Pradesh (17 each).

Even though the report on water quality is dated, it continues to instill fear among the public due to persistent concerns regarding water quality, according to a senior official from the Karnataka State Pollution Control Board (KSPCB).

Recognising that improvements won't happen overnight, KSPCB is actively working to assess the ground situation by collecting samples from various locations. The water quality in some areas, the officials observed, has deteriorated over the past five years.

The urgency of the situation has prompted KSPCB to emphasise the imperative for municipalities and panchayats to actively engage in the establishment of robust underground drainage systems and STPs.

Samples are not limited to the identified 17 rivers but extend to surrounding water bodies, reflecting a comprehensive approach to understanding the extent of the problem.

The official highlighted the significance of ongoing National Green Tribunal cases related to polluted rivers and water bodies, indicating the gravity of the environmental challenges faced by the state.

Acknowledging the dire state of water bodies, especially in Bengaluru, the official admitted that the water quality of lakes across the state is notably poor. The Central Pollution Control Board report categorises most rivers in Karnataka under categories 4 and 5, indicating their suitability for wildlife and fisheries propagation, irrigation, industrial cooling and controlled waste disposal.

The report places the Arkavathi river water along Hessarghatta to Kanakapura, Dakshina Pinakini along Mugalur, and Then Pennai along Kodiyalam under Category 1. This classification signifies that these waters can be used as a source of drinking water without conventional treatment, albeit after disinfection.

### Why water reserves in southern India are fast depleting in 2023?

October over southern peninsular India remained the sixth driest in 123 years. The collective reservoir stocks have already fallen below 50 per cent in November. Why has this happened and what could the impact be?



**November 17, 2023 by Anjali Marar, Bengaluru:** An earlier photo of the Mettur Dam in Tamil Nadu. It is only filled upto 27 percent of its full capacity this year. An earlier photo of the Mettur Dam in Tamil Nadu. It is only filled upto 27 percent of its full capacity this year. (Photo via Wikimedia Commons)

Water levels in the reservoirs of India's southern states are set to fall further in the next few months, leading to concerns amid the stocks already being at a low this year.

According to a recent report from the Central Water Commission (CWC), water levels in these states' reservoirs are low compared to last year and compared to other regions of the country in 2023. Here is what the



situation looks like at present, what the outlook is and how low water levels in reservoirs could impact the region.

### What are the currently available stocks in the dams?

The CWC monitors 42 reservoirs located in the southern states: Andhra Pradesh, Telangana, Karnataka, Kerala and Tamil Nadu. Their collective storage capacity is 53.334 Billion Cubic Metre (BCM).

There has been a sharp drop, observed over the past two months, in the already low water reserves. In September 2023, the water stocks stood at 25.609 BCM (48 per cent of the total storage capacity), which then dropped to 24.575 BCM (46 per cent of the total storage capacity).

According to the latest CWC report issued in the third week of November, this stock has dropped further to 23.617 BCM (44 per cent of the total capacity). Last year around this time, the collective water reserves were 87 per cent of the total storage capacity of these states.

State	Reservoir stocks (% of total storage capacity)
Andhra Pradesh	-51
Karnataka	-38
Kerala	-16
Telangana	+33
Latest reservoir stocks. (Source: CWC)	

During normal monsoon years over the country, the available water reserves in southern India touch 91 per cent of the total storage capacity. Even though the country as a whole recorded normal rainfall in 2023 (820mm, 94 per cent of the Long Period Average), the monsoon over the south peninsular was not appreciable.

Reservoir	Reservoir stock (%)	
	2023	2022
Srisaillam	29	79
Nagarjuna Sagar	14	96
Somasila	42	98
Yeleru	30	81
Kandaluru	10	76
Donkarayi	70	56
Krishnaraja Sagar	37	95
Tungabhadra	21	86

Bhadra	44	95
Linganamakki	43	82
Narayanpur	47	36
Malaprabha	46	97
Hemavathy	37	88
Mani dam	35	66
Almatti	54	100
Tattihalla	04	3
Malampuzha	49	96
Idukki	53	80
Lower Bhawani	47	100
Mettur	27	100
Aliyar	18	98
Sholayar	35	100
(Source: CWC)		

### Why are the stocks low?

There was a vast inter-seasonal rainfall variability recorded during the southwest monsoon this year. Rainfall records by the India Meteorological Department (IMD) showed that the south peninsular India received normal or above rainfall only during the July 26–August 3 period during the four-month season.

The season, thus, ended with seeing large-scale rainfall deficits – June (-45 per cent), July (45 per cent), August (-60 per cent) and September (49 per cent), which cumulatively ended with 8 per cent below normal, which was quantitatively 659mm.

October over southern peninsular India remained the sixth driest in 123 years. The rainfall recorded was 58.7mm against a normal of 148.2mm. Normally during October, most of southern India receives rainfall, contributed by the retreating southwest monsoon and the incoming northeast monsoon.

However, cyclone Hamoon's development in the Bay of Bengal during the onset phase of the northeast monsoon dampened the rainfall activity, particularly over Tamil Nadu and coastal Andhra Pradesh, the IMD officials had said.

As a result, the collective rainfall deficiency in south peninsular India slipped to 60 per cent. The recorded rainfall during October was Andhra Pradesh and Yanam (-90 per cent), Rayalaseema (-90 per cent), Tamil



Nadu, Karaikal and Puducherry (–43 per cent), and Kerala (1 per cent).

Barring a handful, all other districts of Andhra Pradesh and Rayalaseema remained highly rain–deficient and nearly dry last month.

District	Rainfall deficiency (in per cent)
Ariyalur, Chengalputtu	–77
Cuddalore, Madurai	–76
Chennai	–73
Kalakuruchi	–71
Dharmapuri	–60
Kanchipuram, Nagapattinam	–57
Ramanathapuram, Pudukottai	–41
Mahe	–55
Dindigul, Erode	–35
Wayanad	–34
Idduki	–27
Kannur	–23
Thrissur	–19
Kasargod, Kozhikode	–17

Madurai	–11
Palakkad	–16
Malappuram	–7
Most rain–deficient districts in southern peninsular India during October 2023. (Source: IMD)	

#### What areas need urgent attention?

The shrinking of water reserves is not an encouraging development.

The immediate impact could be felt on irrigated farming, particularly the high water–intensive paddy cultivation which is largely undertaken in Andhra Pradesh and Tamil Nadu.

Besides, during the unfolding months, the impact will spiral over to the availability of drinking water.

While Karnataka has begun declaring drought–hit talukas, other states may soon follow suit. With new state governments to be sworn in in Andhra Pradesh and Telangana, it would be a challenge to tackle the agri–crisis triggered by water shortage.



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## Nearly a billion children globally exposed to extremely high water stress: UNICEF report

Released days ahead of COP28, the report sees global event as a critical opportunity to finally put children on the climate change agenda

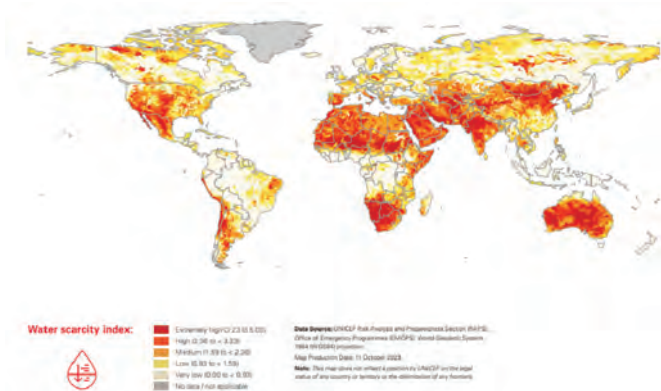


**By Zumbish – Published: Thursday 16 November 2023:** About half of the world’s children (953 million) were exposed to high or extremely high water stress in 2022, according to a new UNICEF report.

The situation is set to become more severe due to climate change, the authors of the report warned, stressing on the need to have children at the center of global response.

In 2022, 739 million children worldwide were exposed to high or extremely high water scarcity and 436 million children lived in areas with high or extremely high water vulnerability, according to the UNICEF report released ahead of the 28th Conference of Parties (COP28) to the United Nations Framework Convention on Climate Change to begin in Dubai on November 30.

### Water scarcity index, 2022



"COP28 cannot be business as usual. We cannot keep going down the same path. Let's ensure that COP28 becomes a turning point in finally putting children at the centre in our shared fight against climate change,"

UNICEF Executive Director Catherine Russell said.

The report also captured how the various climate and environmental shocks driven by climate change are impacting the lives of children. Building on the Children's Climate Risk Index (CCRI) released in 2021, the authors found that 559 million children are currently exposed to high heatwave frequency. This can impact all the 2.02 billion children globally by 2050, the new report added. Around 470 million children, as of 2022, faced high or extremely high drought risk, the report noted.

- Killer childhood diseases are spreading more because of environmental degradation and climate change.**
- Children are more likely to suffer from air pollution than adults.**
- Infants and young children are less able to regulate their body temperature and more prone to dehydration, making them more vulnerable during extreme heatwaves.**
- Child malnutrition is worsened by crop failures and rising food prices, which is exacerbated by higher temperatures and increased rainfall linked to climate change.**
- 40 million children are having their education disrupted every year because of disasters exacerbated by climate change, and this number continues to increase.**
- Extreme heat is associated with an increase in mental health problems including post-traumatic stress disorder and depression in children and adolescents.**

The 2021 report findings had predicted that nearly all children would be exposed to at least one major climate and environmental hazard, shock or stress. Whereas, this report underlined that by 2022 a large number of children were already living in areas of high or extremely high water vulnerability, characterized by low or very low levels of drinking water service combined with high or very high risk of water stress. These risks were compounded by interannual variability, seasonal variability, groundwater decline and drought.

UNICEF also described how the health of children is affected by extreme weather events like floods that are linked with climate change.

Floods compromise safe water supply, damage sanitation facilities and occur in areas grappling with open defecation issues, leading to contamination of water. This can make way for outbreaks of diseases like diarrhoea, the report stated.

"Child malnutrition is worsened by crop failures and rising food prices, exacerbated by higher temperatures and increased rainfall linked to climate change," the authors noted.





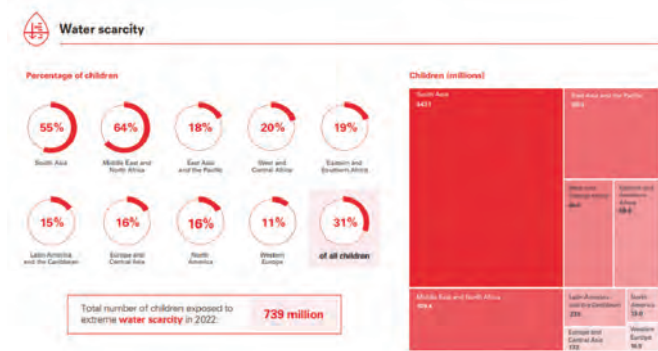
The report further asserted that confronting the planetary crisis for children requires a global movement of partnership.

This year, UNICEF is launching the Sustainability and Climate Action Plan, which commit to galvanising efforts to fill global gaps to protect the most vulnerable children, it stated in the document.

**Putting children on climate change agenda**

Mentioning that it sees COP28 as a critical opportunity to finally put children on the climate change agenda, UNICEF called for embedding children and intergenerational equity in the Global Stocktake.

Global Stocktake is a process for countries and stakeholders to see where they are collectively making progress towards meeting the goals of the Paris Climate Change Agreement and where they are not.



Through the document, it also pitched for inclusion of children and climate–resilient essential services within the final decision on the Global Goal on Adaptation (GGA).

GGA collective commitment under Article 7.1 of the Paris Agreement is aimed at “enhancing” (the world’s) adaptive capacity, strengthening resilience, and reducing vulnerability to climate change.

Ahead of COP28, the child rights body also called for making the Loss and Damage Fund and funding arrangements child–responsive. These, it hinted, could be made a reality with child rights embedded in the fund’s governance and decision–making process.

The fund is aimed to provide financial assistance to countries most vulnerable and impacted by the effects of climate change and was a highlight at COP27.

**Risk of glacial lake outburst floods in ‘Third Pole’ increasing: Study**

Warming temperatures and altered rainfall patterns have caused more than 10,000 glaciers in the region to retreat over the past three decades, facilitating the formation of thousands of glacial lakes, the researchers said.



**By: PTI New Delhi | December 18, 2023:** When triggered by events like glacier collapse, snow avalanches, landslides, or the collapse of natural dams, glacial lakes can release vast volumes of water swiftly, leading to destructive GLOFs. (File)

There has been an increase in the occurrence of glacial lake outburst floods (GLOFs) from an average of 1.5 events annually during 1981–1990 to 2.7 during 2011–2020 in the Third Pole region, a study has found.

The Third Pole, which spans the Tibetan Plateau and the surrounding Himalayas, Hindu Kush, and Tianshan Mountain ranges, is extremely vulnerable to the effects of climate change, the researchers said.

The expansion of glacial lakes and the appearance of new ones will likely lead to an increase in the number of GLOFs per year in the future, underscoring the need for developing better analytical methods and datasets to stay one step ahead of potential disasters, they said.

Also Read | Northern India contributes to shrinking of glaciers in Third Pole, claims study.

The findings, published in the journal Nature Communications, are concerning for countries exposed to GLOFs in the region, especially China, Kazakhstan, Nepal, India, and Pakistan.

Warming temperatures and altered rainfall patterns have caused more than 10,000 glaciers in the region to retreat over the past three decades, facilitating the formation of thousands of glacial lakes, the researchers said.

Though they appear harmless, these water bodies have tremendous destructive potential, particularly due to their ability to cause GLOFs.

When triggered by events like glacier collapse, snow avalanches, landslides, or the collapse of natural dams, glacial lakes can release vast volumes of water swiftly, leading to destructive GLOFs.

A team led by researchers from the Chinese Academy of Sciences decided to carry out a more detailed analysis of GLOF risks in the Third Pole.



Also Read | Increase in snow cover shielding glaciers in Hindukush Karakoram ranges from shrinking: Climate Change Report

The study underscores the need for urgent action and regional cooperation for the economically disadvantaged and highly vulnerable regions in the Third Pole.

The researchers first obtained satellite images from the Sentinel-2A and Sentinel-2B missions between 2018 and 2022.

They then identified and classified all glacial lakes based on their position and topological characteristics in relation to their source glacier.

This updated inventory of glacial lakes, coupled with earlier datasets, enabled them to analyse the changes in this region over the past decades, revealing a worrisome continuous expansion of glacial lakes.

The researchers analyzed changes in GLOF activity by consolidating datasets of GLOF events in the Third Pole, tracing back as far as 1900.

Their findings, in contrast to previous studies, revealed a worrisome trend, indicating an increase in GLOF occurrences from an average of

1.5 events annually during 1981–1990 to 2.7 events during 2011–2020.

Finally, the team analyzed the susceptibility to GLOFs in 5,535 glacial lakes and identified 1,499 of those with a high potential for outburst floods.

The researchers also investigated the “potential disaster volume” based on GLOF simulations of these high-risk lakes.

“Approximately 55,808 buildings, 105 existing or planned hydropower projects, 194 square kilometre (km<sup>2</sup>) of farmland, 5,005 km of roads, and 4,038 bridges are threatened by the potential GLOFs,” said Associate Professor Weicai Wang from the Institute of Tibetan Plateau Research.

“Moreover, by utilizing regional population distribution data, we estimated that roughly 190,000 lives are directly exposed within the GLOF paths,” he explained.

Going ahead, this work will hopefully lead to better risk management strategies for GLOFs and foster cooperation between countries in the Third Pole, the researchers added.



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**Interview with  
ASHUTOSH  
VADANAGEKAR**  
Technical Director  
Amalgam Biotech

# SOLUTIONS FOR EFFECTIVE ETP TROUBLESHOOTING & INDUSTRIAL ODOUR CONTROL SOLUTIONS



**Q. We welcome, Amalgam Biotech, A Division of Amalgam Engineering Pune – on board for an interview. Our audiences & readers would like to know journey of organisation Amalgam**

It is our privilege to give interview for your renowned magazine. Amalgam Biotech is a manufacturer of Bacterial bioculture, Industrial odour control solutions & cleaning solutions. Company is working in field of wastewater sector since 2010. I am delighted to highlight success story to all our audiences.

**Q. Ok, now tell us something about products.... What are the products developed by the company?**

There is product range as a  
1. Bactaserve–bioculture, 2. Odoserve–odour control solution and 3. Nutriserve–process additives, 4. Cleanserve–industrial cleaning solutions and also, we are helping with customised products to our clients for their different different problems

**Q. What is Bactaserve?**

It is bioculture–specially formulated from naturally occurring non–pathogenic, non–Genetically Modified Organisms, blend of bacterias. Those helps in biodegradation of the content of wastewater & wastewater can be treated in an environment friendly way.

**Q. That's good. What are the applications of the Bactaserve?**

Bactaserve has to be added in aeration tank, MBR, SBR, MBBR tanks. It finds applications in industries like Sugar, Dairy, Pharma, Textile, Paper & Pulp. We have product for oil & grease degradation in food grade industries and hotels also. This product is available in powder as well as 1 Kg Bar. FOG SR Bar will work at aerobic & anaerobic condition. Also STP of residential areas, hotels, hospitals can use to treat wastewater naturally.

**Q. Is it environmentally safe to use ?**

Its eco–friendly as even it can be used in composting, pond cleaning, Lake bioremediation & in aquaculture also.

**Q. Definitely it will be more effective solution to many industrial problems. How about its availability?**

1 Kg standy pouches available & can be sent anywhere in India or abroad.

**Q. I believe there might be other players also in this space. So, How are you different than the others?**


Our bacterial strains are pre–acclimatized cultures highly concentrated, which are industry specific for eg. Our dairy culture contains lactose & fats degrading bacteria which have been acclimatized to dairy waste water. Similarly our




**Interview by  
Virender Kumar**

textile culture is acclimatized to dyes & pigments generated from denim, polyester, cotton, rayon industry. Also we have self-dissolving sachets for degrading kitchen waste, clogged drain pipes and also for flushing in toilets to degrade human fecal waste. It has a shelf life of 2 years.

**Q. Its very useful application to clean environment & solve the industrial problems. Also please elaborate other product– Odoserve & its application?**


 Odoserve is liquid, blend of essential oils, a plant–chemistry based organoleptic enzymatic proprietary compound, food grade surfactants & purified water, that removes the bad odour molecules completely. Odoserve converts unpleasant smell to non-odorous compounds.

**Q. Which type of odour its removing?**

 Odoserve is used to remove Ammonical, fecal, fishy, putrifying, rotten food, nicotine, garbage, strongest chemicals, public toilets any type of bad smell. It's nontoxic and safe to use. Its slightly citrus/floral/mint odorous form. It is bio degradable in nature. We have developed D–VOC Dry Vapor Odour

Control Technology. Foul Odour in Production areas/ Covered areas/ confined spaces requires Odour control which is Moisture free. Humidity cannot be increased in production areas which manufactures edibles, Pharmaceuticals, Nutraceutical, Meat, Fishes etc– DVOC is the answer. OdoServe of Amalgam Biotech can be Heat vaporised to generate Dry vapours which are then carried by air to de–odorize area.

**Q. It will be of great use. What is Nutriserve?**


 Nutriserve are having wide range of product utility. Oxy–Enhancer is a powder which quickly releases oxygen into the water stream. NutriServe BOD Enhancer is a formulation for artificially increasing the inherent BOD load in an organically starved waste water stream. Nutriserve Rapid oxidizer is formulation for decreasing malodour present in effluent, reduction in foul–fishy–fermented odour.

Nutriserve probac aerobic & anaerobic is mixture of micronutrients as per required condition. N & P Enhancer is fulfill the supplement need of Nitrogen & Phosphates.

**Q. Ok, What is a product cleanserve?**

**Bacteria are Good!!**

*They help in:*  
 COD / BOD Reduction– ETP  
 Fish Growth – Aqua culture  
 Soil Fertility – Agriculture

 Cleanserve are industrial cleaning solutions including natural –organic bio enzymatic product for multi surface cleaner, toilet cleaner, urinal bars & Odour control solutions etc etc. Research & Development in the products going on continuously for improving the performances & applications

**Q. Many products by Amalgam !! We**

**Lake Bioremediation**

**BactaServe Bioculture**

**Phenol Degradation Using BactaServe Aerobic**

**Ammoniacal Nitrogen Degradation Using BactaServe Nutrient Removal**

**Toluene Degradation Using BactaServe Aerobic**

**BactaServe Biotoilet**

**Facultative Bacteria for Wastewater Treatment**

**Anaerobic Degradation Using BactaServe Anaerobic**

**BactaServe FOG SR Bar**

**Slow Bacteria Release Bar**

**HGR - Hyper Oxygenation Reactor**



**will be happy, if you will share your contact details for our interested audience /readers**

 **www.amalgambiotech.com** is our website and also you can visit our office in Pune. Contact us for any requirement and we also provide site visit support, after sales technical support and troubleshooting. We have Technology tieups with KIIT for petrochemical waste degrading bacteria, CSIR–IHBT for cold region bacteria, BARC for rapid composting bacteria.


**Q. That's great ! We are happy to listen about your products & eco–friendly solutions to Industries. For this if you have bagged prestigious awards. Please highlight if any...**

-  Technical Director Amalgam : We are proud recipient of
- Aqua Foundation Excellence Award 2017
  - MCCIA Innovation & Entrepreneurship Award 2018
  - CII product innovation in waste & water
  - We are ISO certified company.


Also we are doing R & D and product improvisation. We have tested our products in renowned Laboratories with different studies and trials. Our

products are heavy metals free, pesticide residue free, antibiotic residue free as analysed by different govt Labs.


**Q. Amalgam team is very versalite...**

 We have chemical engineers, biotechnologists, biochemical experts, environmentalists, financials–marketing, Supply chain team and perfect administration for overall coordination !!!

**Q. Your reach and services are in India?**

 We are providing our services to PAN India and also to other countries like Colombia, Canada, Nigeria, Saudi Arabia, Bangladesh, Philippines, Malaysia, Kuwait, Qatar, etc. We are supplying products, helping in commissioning, troubleshooting, extending the technical support through product trials till resolving the problems.

**Q. It's a great work of organisation. Thank you for information. We would like to create more awareness about environment friendly product.**

 Thank you & I reciprocate the same. Thank you this prestigious magazine team for an interview opportunity !!



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### Subhash Sethi

Chairman, SPML Infra Limited

**Mr. Subhash Sethi** is the Chairman of SPML Infra Limited, a listed infrastructure development company in India. In the past four decades, he worked with a mission to create sustainable water infrastructure for providing drinking water facilities to people of the country. Under his dynamic leadership, his company established itself as a leading water management company and executed more than 650 projects making provision for clean drinking water facility for 50 million people. His nation building initiatives has been recognized with several prestigious awards.

# WATER INFRASTRUCTURE: REVITALIZE FOR SUSTAINABILITY

India, a nation with its rich historical and cultural heritage has been witnessing rapid economic growth in the last few decades. With a population of over 1435 million and growing urbanization, it is facing an increasingly critical challenge – managing its water resources effectively. The demand for clean water is surging, while challenges of water pollution are on the rise.

With its vast and diverse geographical landscape, India is facing significant challenges of depletion of water resources that further intensified by the impacts of climate change. These factors collectively strain India's water infrastructure. In recent years, there has been an increasing acknowledgment of the need for extensive water infrastructure development. This is crucial not only to secure the nation's water resources but also to foster economic growth and enhance the overall well-being of its citizens.

### Water Infrastructure Challenges

India's current water infrastructure faces numerous challenges, including aging and obsolete systems, inefficient water distribution, unequal access to water sources, and insufficient storage facilities. The country's diverse and unpredictable climate conditions present hidden challenges, leading to weather-related disasters such as severe floods and droughts that induce hydrological shocks. The varied geographical spread of India adds extra complexity to effective water resource management.



The issue further aggravates by unequal access to clean water, especially in rural areas. As the demand for water rises in agriculture, industry, and households, there is an urgent and growing need for modern, sustainable water infrastructure.

**Groundwater Depletion:** Groundwater is vital to human welfare and development, and

economic and social progress. As the demand for water continues to rise and existing resources face depletion, ensuring a reliable supply of quality water has emerged as a pressing concern in the country. Excessive reliance on groundwater for domestic, agricultural, and industrial needs has also led to the depletion of aquifers. The over-extraction of groundwater in India also raises

Public awareness campaigns are essential to educate and engage citizens about the importance of water conservation and empowering them to take ownership and responsibility for their water resources.



Gagreen Water Supply Scheme, Rajasthan

in many countries it is the principal source of water for drinking, irrigation and industries. With the world's largest population and extensive agricultural practices, India is the foremost consumer of freshwater globally and the largest user of groundwater. The country utilizes an estimated 230 cubic kilometers of groundwater annually, constituting over 25% of the world's total withdrawal. In India, more than 60% of irrigated agriculture and 85% of drinking water supplies depend on groundwater.

Approximately 65% of India's overall water demand is satisfied through groundwater sources, crucial in shaping the nation's

the long-term sustainability concerns.

**Losses in Water Distribution:** Water produced, treated, pumped, but lost in the water distribution system is a major challenge. This means the water produced by spending substantial resources are not used for the purpose and paid back, affecting economies of water utilities as well as putting pressure on fresh water resources. The problem is universal, but India, with such a large water network is losing almost 50% of produced water across cities distribution networks. In terms of quantity, this translates to a loss of 3.4 trillion litres of treated water annually. Outdated water distribution systems and leakages in pipelines results in significant water losses

The JJM was launched in 2019, envisages providing tap water connections to every household by 2024.



across Indian cities with varying quantities. Improving the efficiency of water supply network is essential to conserve this precious resource.

SPML Infra strongly focuses on strengthening the existing system with innovation and technology while dealing with water loss management. It has demonstrated the efficacy of strategic techniques and targeted efforts by successfully implementing a water loss project in Bengaluru. This initiative has resulted in a significant conservation of precious resources, saving a minimum of 55 million liters of potable water daily. Moreover, the water loss in the selected 43 DMAs has seen a substantial reduction from 53% to 18%, underscoring the positive impact of SPML Infra’s approach.

**Urbanization Strain:** Rapid urbanization has led to increased water demand in urban areas, putting severe stress on existing water infrastructure and supply systems. The past few decades, there has been a significant trend as people progressively migrated from rural to urban areas in pursuit of an enhanced standard of living and improved quality of life. Currently, more than 34% of the population resides in urban settlements, and this figure is projected to rise to 60% by 2050.



Raw Water Reservoir, Dhannasar, Rajasthan

The rapid growth of urban population, coupled with the expanding middle class has led to an increased demand for water. However, the inadequate and aging water infrastructure has exacerbated the strain on water supply systems.

Apart from the above, there are other challenges including agricultural water management, water pollution, inadequate wastewater treatment and lack of integrated water management practices. But ageing and dilapidated water infrastructure is at the root of them all.

Water sector in India is facing the dire need to address these challenges and revamping of infrastructure on priority for social, economic and environmental implications. It requires a comprehensive and multifaceted approach with following key strategies that can be employed to address water infrastructure conundrum.

**Modernizing Water Supply Systems:** Upgrade and modernize water supply infrastructure in urban and rural areas to effectively take the load of increasing demand, reduce water loss, and ensure a continuous, reliable water supply.

**Capacity Building:** Developing skills and knowledge through regular training of water infrastructure professionals to enable them to design, build, and maintain water systems effectively.

**Harnessing Technology:** Implementing smart water management technologies for efficient monitoring, data collection and distribution of resources that has the potential for enhanced operational resiliency.

**Investment in Modern Infrastructure:** Innovative financing mechanisms, such as public–private partnerships and bilateral funding can help mobilize resources to fund water infrastructure projects. It is essential to improve and upgrade water supply and distribution systems along with wastewater treatment and storm water management facilities and infrastructure. Investing in state–of–the–art technologies and modern infrastructure is pivotal for enhancing efficiency and minimizing losses for better water sustainability.

**Climate–Resilient Infrastructure:** Considering the impact of climate change, it is essential for India to design and build infrastructure that can withstand extreme weather events, such as floods, hurricanes and droughts. Climate–resilient infrastructure ensures long–term functionality and adaptability.

**Policy Reforms:** It is vital to establish and enforce policies that promote sustainable water management. Governments should enact and enforce policies that include regulations on groundwater extraction, water quality standards, and strict norms for water pollution as well as pricing guidelines. Clear and transparent policies and regulatory framework is essential for the development of water infrastructure.

**Promoting Water Conservation:** Public awareness campaigns are essential to educate and engage citizens about the importance of water



Water Treatment Plant, Rajasthan

conservation and empowering them to take ownership and responsibility for their water resources.

These strategies, if implemented with sincerity can work towards creating resilient, sustainable, and equitable water infrastructure systems in India that will be able to meet the current and future growing water needs for drinking and industrial production.

#### Government Initiatives:

In view of the challenges water sector is facing, Government of India has acknowledged the crucial role of water infrastructure and has undertaken various initiatives to tackle these challenges. In the past, water-related matters were handled by nearly nine different ministries. The present government has integrated the work of these various ministries and brought them under one Ministry of Jal Shakti. Hon'ble Prime Minister has also set a revolutionary goal of providing piped drinking water to all households both in urban and rural India under the ambitious Jal Jeevan Mission (JJM) with a huge outlay of Rs. 6.47 lakh crore. The JJM was launched in 2019, envisages providing tap water connections to every household by 2024. This ambitious project focuses on decentralized, demand-driven, and community-managed water supply systems. SPML Infra has emerged as a reliable partner for the Jal Jeevan Mission,

actively undertaking various water supply projects across several states in India. Through these initiatives, the company is contributing to the accessibility of clean drinking water facilities for rural households.

Urban areas have also seen a push for improved water infrastructure through initiatives like the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) and the Smart Cities Mission. These programs aim to enhance water supply, sewage management, and storm water drainage in urban centres.

During the period of 2019 to 2025, a total capital investment of Rs. 4 lac crore has been planned for the water sector under the National Infrastructure Pipeline. The government has also been laying emphasis on capacity building and infrastructure development through program such as Namami Gange and Swachh Bharat apart from AMRUT and Smart Cities. Along with water supply schemes, the government has also initiated a number of water resource management, wastewater treatment, irrigation and rain water harvesting programs with dedicated budgets to address water scarcity challenges and making water resilient and sustainable for our future. These initiatives will play a big role in economic and social development and realise the target of making India a 5 trillion-dollar economy.



**Ria Mukherjee**

**Ria Mukherjee** is a passionate writer with more than a decade of content writing experience on her association with different organizations. It's her inclination for environment and other nature concerning aspects that she has been finding great interest in developing content on water and its concerning factors. Currently, she is the Associate Editor of the 'WaterAge' magazine and supervising the content publication of this prestigious magazine.

# THE EVOLVING WATER INDUSTRY AND THE FUTURE OF WATER ON THE PLANET EARTH

Water, this magical living force embraces within the essence of life. However, in the global sustainability discussion of the present time, safe and sustainable access to its resource has become a central tenet given the absolute connection of water with climate, natural environment, and the human society. Considering the Nations World Water Development Report 2023, water scarcity will be affecting nearly half the urban population globally by 2050, which highlights the state of urgency in prior to address the emerging aspects of global water crisis. Thus, it becomes immensely imperative for the water industry to revolutionize its management in a way that can sustainably meet water needs and efficiently meet water needs of the future.

## Challenges of the Water Industry and the Future Opportunities

With the mounting world population, the need for water, food and energy is scaling. According to the United Nations, by the year 2030, there will be 1 billion people on the planet, thus the global demand for water could outstrip supply by 40 percent. In fact with the escalating need for water, the water companies and utilities face major operational challenges, such as –

### Water Scarcity

The crises of water scarcity is rising with every passing year in different parts of the world.

 [www.waterage.in](http://www.waterage.in)

In fact, it is the constant issue of the present time that have been affecting every continent and a fifth of the world population. In the areas facing drought, water transmission and desalination are the two most effective solutions. Thus, at the drought areas, doubling the capacity of the water transmission systems between the desalination plants and the water plant distribution network is one of the best

On the other hand, water and wastewater treatment plants are the critical infrastructures. Even when storms flood the coastal regions and rivers burst their banks, wastewater treatment plants remain operational 24\*7, despite the adverse conditions in that region. Thus, constructing the flood barrier system majorly helps in protecting the populace of the cities from the devastating effects of storm surges.

For assuring this, there is an emerging need for digital transformations to see the planned changes in the next few years.



solutions. This definitely helps in ensuring the reliable as well as cost-effective potable water production from desalinated seawater through provided automation, power and optimization solutions.

#### **Droughts and Floods –**

Every region of the world has been affected by droughts and floods and that represents one of the biggest challenges of the water industry. Often, water is available in some places, but not in other part of the nation. However, water transfer schemes resolve such water issues through piping water from areas of water abundance to the parts where it is much needed, to ease the effects of droughts.

– According to the World Bank, a water utility on an average face up to 25–30% of water loss in the network to leakages and other types of non-revenue water. Such losses cost huge money to the water companies, not only in lost revenues but also in terms of cost included in treating and pumping water that leaks into the ground. Introducing software-as-a-service solution at such places that uses advanced algorithms in detecting, alerting, managing and providing real-time insights into leaks, bursts and other water distribution network inefficiencies is immensely vital. The accurate leakage detection solution designed

Thus, this has led to the change in the practice and opening up new opportunities for the countries to recycle the cleaned or already treated wastewater.



### 5 Major Trends to Impact the Water Industry in the Next Decade

In the coming years, the Water industry may have to see a period of ample changes happening due to rapid urbanization, rising customer demands, severe climate changes, and constantly progressing digital technologies. Such incessant changes will bring set of complex challenges for the water companies or businesses and would require stringent measures in addressing the same in order to stay competitive in the industry.

Thus, the question is – Can such challenges may become opportunities for the businesses, its customers and to the environment as well? Well it's assumed to be yes. However, for better clarity on the same, here below are five scenarios and opportunities that are likely to lay an impact in the next decade on the Water Industry. These are –

#### Acting to extreme weather events and its effects –

Majorly climate change effects are related to water in some way or the other. The change in the climate affect the agricultural production, led to the rise in sea level, triggers wildfire cases, and invites situations of drought and flood. For example – more than half of the world's population residing within the area of 200km of the coast will be affected to a large extent by 20250 due to the sea level rise and extreme storm surges. Hard engineering structures like seawalls, levees and dikes can be constructed for protecting the coastal communities against such severe future flooding situations. Moreover, the use of sophisticated water modeling technologies can help in determining the situation of current vulnerabilities and propose effective solutions that can address such coastal challenges in a better way.

#### Protecting the Agricultural Production –

Considering the UN report, the world population is expected to reach more than nine billion people by the year 2050. Thus, to ensure there is enough food for everyone, the global food production may require to increase by around 70%. In this regards, there will be a requirement of more arable land for crop production that supports more effective and efficient irrigation. All this will be challenging the water resources and ecosystem. To address the issues sustainably, efficient irrigation management and techniques like flood warning system, erosion risk management, and precision farming systems can be used to effectively

for transmission systems identifies leaks to within 3% of the source in pipeline segments which might be hundreds of km in length. Moreover, installation of other water measurements products that can measure the water pressure, flow, temperature, level and other essential variables for leak detection can majorly help in reducing the non–revenue water issues.

#### Water Reuse –

Although wastewater after being treated are reused in many parts of the world, at some places its reuse for agriculture is prohibited for religious or cultural reasons. Thus, this has led to the change in the practice and opening up new opportunities for the countries to recycle the cleaned or already treated wastewater. However, to avoid religious or cultural constraints, there is the need for a separate distribution network to reclaim water that can be then used for irrigation, watering green reas and for other non–potable use of water.

#### Quality of the Water –

One of the biggest and constant issues have been the consistent quality of drinking water and wastewater. Installation of digital measuring meters and analysis solutions to measure the pressure, flow, level of the water and quality, including turbidity, pH, conductivity, ammonia and phosphate in water. This helps in getting the exact details of the water contaminants to take relevant measures of treating and cleaning it for further use.

#### Aging Infrastructure –

At locations where water and wastewater plants are unlikely to increase, rehabilitation should be done as a strategy in which automation system should be renewed in every 10 years or so, instrumentation should be conducted every 15 years, and electrical equipment every 20–50 years, depending on its type. Since, water and wastewater plants are very critical infrastructure, rehabilitation must be conducted during the plants are operational as shutting is never an advisable option.



optimize the rising agricultural production with minimum water usage.

### Supporting the Circular Economy with Water Re-use

Undeniably, traditional investment, design, planning and operation are linear in nature. On extraction of water is then checked for quality, used as intended to and further treated and discharged in a receiving water body. However, wastewater with its sludge discharged contains high amount of valuable resources like nitrogen, energy, phosphorus and other nutrient that are recovered and further reused in a circular economy in preserving threatened resources. Thus, on transitioning from a linear model to the circular one, there will be an emphasis in reducing water consumption and in achieving the goal of resource efficiency. In fact, achieving this objective may require the businesses to reconsider its traditional models of wastewater treatment.

### Customer-led Revolution

Digital technology in the present time has made consumers more empowered than ever. Thus, consumers these days expect more personalized services and products to optimize their work, improvise their life and attain their targeted goals. To meet such consumer expectations, businesses must deal tactfully to meet the expectations of empowered consumers. In this consumer-led situation, the Water Industry has been constantly challenged to examine how to co-create solutions for the customers. With this achievement there will be good opportunities to establish long-term customer relationship while solving challenges in the water domain.

### Intelligent & Smart Network Technologies

Smart water network solution establishment improvise the reliability of physical water infrastructure through water collection and on analyzing data more efficiently. The use of Internet of Things (IoT) devices with data analysis helps in managing infrastructures in a better way and reduce non-revenue water losses. Additionally, it also support important changes for the operation of water utilities and water companies. In fact, smart end-to-end water networks offer opportunities to the water business in improvising their productivity and efficiency while advancing their customer service.

### The Future of the Water Industry – Let's Know it Better!

In the present scenario, water industry has the responsibility of ensuring that future generations have access to clean drinking water proper sanitation. For assuring this, there is an emerging need for digital transformations to see the planned changes in the next few years.

To make intelligent use of water, one of the first vital steps is to monitor and ascertain every happening of the infrastructure and assets. Today, numerous leading utilities are applying technological solutions to the process they have been managing across the complete cycle of water from the basins to return it into the environment.

For last many years, it has been evident that how sensor technology, mathematical modeling and even decision making systems are playing revolutionary change and adaptation in the water industry. More and



more water utilities are interested in determining the best of such technologies and its future. It is also because it helps the water utilities to determine when to open the pump or when there is any sort of damage in the infrastructure that needs to be repaired. All thanks to the innovation.

The information systems concentrate all the vital data accumulated in the company over decades to further ensure that it has been maintained as and when required, even if the people in the organization change. Incorporation of such information systems guarantees its set up forever with its unmatched solutions.

In regards to the future of technologies, image processing is one of the tools designed for providing vital assistance in making decisions, for instance when it is about the evolution, the infrastructure and its state as well as the water sources. This can be executed after analyzing the infrared frequencies and color of the images been captured by the satellites, drones, radars or robots.

On the other hand, the other types of sensors analyses noise and pressure of water, which also play a vital role in the decision-making for the water utilities. With improved precision, especially in the case of analyzing the water pressure that will be providing with the data to run models and apply machine learning aspects and algorithms of artificial intelligence. However, these must always be accompanied by the businesses to guide the data experts to assure the right functioning of the process. In addition, image processing will help water utilities to make decisions regarding the development, infrastructure's current state and the water sources.

The future of the water industry will be full of incessant revolutionary developments among which one of the most important developments of the future in the water industry is likely to be the process of separating customer management, management of network and infrastructure, and ownership. In this regards, water utilities are preferring the implementation of market leading technology that connects them with



their customers. For instance, Blockchain will be used in the future to certify communications and transactions with the customers and even the contractors.

In addition, competitor water utilities will be offering the customers with new addition I services like as tools for efficient energy consumption and methods of selling their energy. In this regards, advancements will happen in rendering services in homes through the water world in which customers will be enabled to resolve their issues through technology.

Industries of the recent times are immensely concerned about their water footprint, and even society have commenced demand for a reduction in the environmental impact due to manufacturing. For instance, the production of a single pair of jeans uses around 10,000 liters of water. Therefore, industrial technologies with efficient water usage technology will be in demand in the future.

This even applies to the process of water purification and water reuse. The water industry must understand the responsibility of reducing environmental impact, and it's definitely a long way to go in terms of water, carbon and even in energy footprint certification. At present, there is no standard of measuring or identifying the company which is more sustainable. Yet, this is undeniably the growing need.

Water is one of the key elements in smart cities, where there are endless requirement for the use of technology. Local authorities have already commenced their search for solutions that help them in reducing the impact of tourism, minimize their water footprint and improvise their management of energy.

In the present world, regional conflicts over water may certainly increase, and satellite technology in that regards may help in resolving such issue by providing with information and transparency regarding their origin and status of water sources.

Water is vital for life, and is the reason that technologies that improvise the access to water at underdeveloped nations in sync with the Sustainable Development Goals will be largely concentrating their

investment on the planet. There is an urgent need for everyone on the planet to reduce their environmental impact, and there is a long way to go regarding water, carbon as well as energy footprint certification.

### Water Management Technology Worldwide

In Africa, numerous water utilities been helped by the multilateral banks have been investing in infrastructure, but improving maintenance and quality of water are still pending issues. In such regions, digital analysis can help in optimizing network investments in catering the growing population.

In Latin America although the management is more advanced, there are still some persistent issues regarding access of water. Water utilities are majorly focusing on digital transformation of the billing cycle, reducing non-revenue water, measuring consumption of water, and improvising water services and its quality.

On the contrary, the Middle East is making considerable efforts for real-time water monitoring via sensors as well as IoT solutions. They have accelerated the introduction of digital components in the infrastructure to get a better picture of what is happening and have even allocated huge funds in this regards.

Considering the aspects of climate change, water utilities in the United States are introducing predictive analytics, virtual stress testing and real-time modelling in their processes. In response to the external threats, sensors and data analytics will be implemented for contributing to the resiliency.

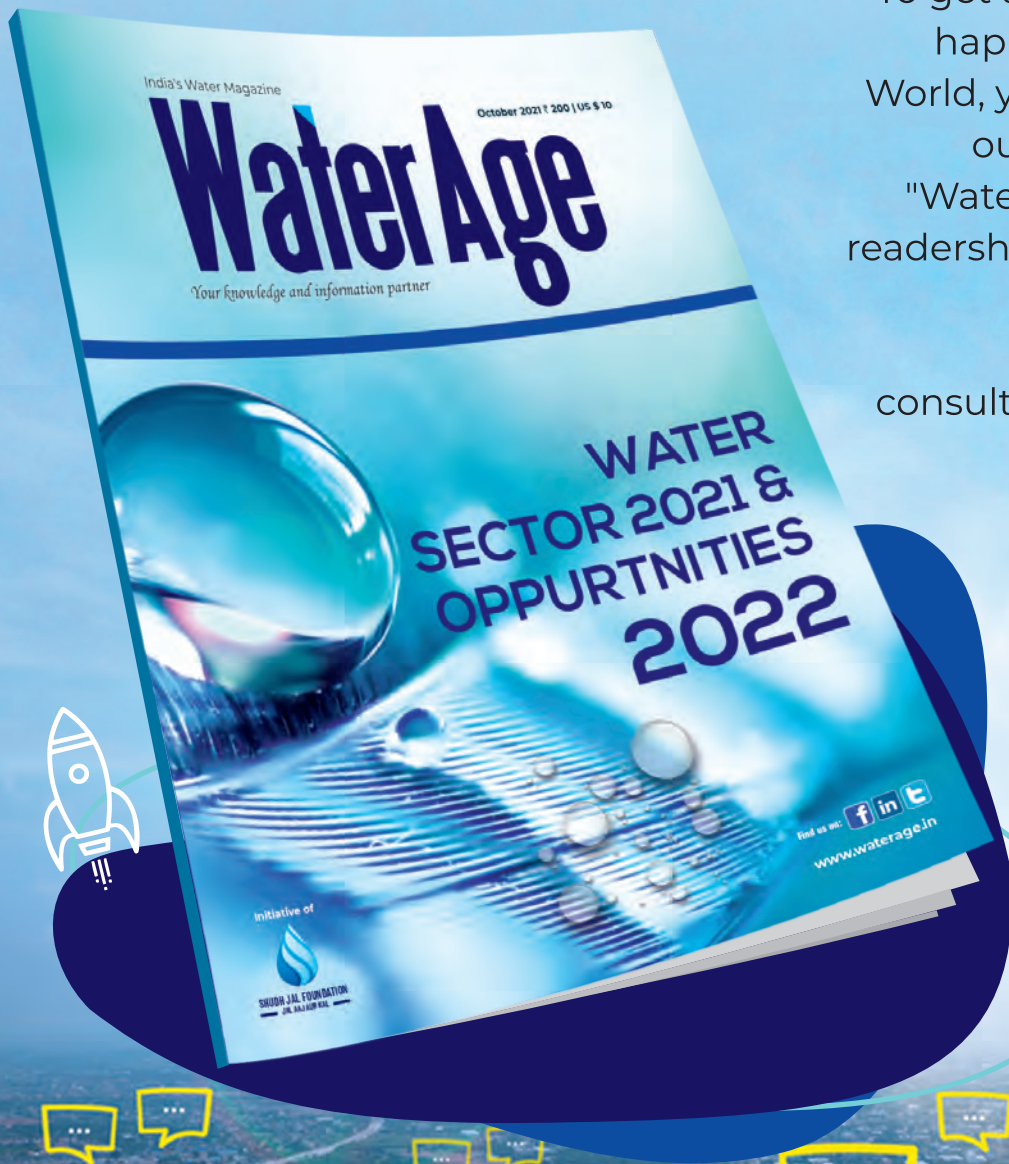
However, on the other side of the planet, basically in India and China, technology is already in place but the water utilities are looking for expert knowledge to make the best of it. For instance, they want the value extraction from their smart metering and digital twin technology.

Conversely, public companies and major private sector companies of Europe are the early adopters of technology. As a matter of fact, all the medium sized utilities are investing in R&D processes to improve customer relationship and asset management, and operational efficiency. Therefore, there is incredible scope for innovation across the world. Unlike a machine, combining every such technologies and innovation can result to the transformation of the water management. We have the opportunity to build a more sustainable world. It's the journey of unlocking the value of water through digital transformation.





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**A. Mohan**

Co-Founder,  
WSAFE Sustainability Services Pvt Ltd.

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

# A PARADIGM SHIFT: RETHINKING OUR APPROACH TO WATER, EARTH’S VITAL ELEMENT

It’s time to recalibrate our perspective on the most crucial element on our planet—water. Rather than viewing greywater, sewage, or effluent as the primary issue, the true problem, the root cause, lies in the deteriorating condition of the native aqua—ecology within our water bodies.

The remedy lies in embracing a holistic, nature-based solution that focuses on the comprehensive rejuvenation of the native aqua—ecology. By adopting this approach, we can address the underlying challenges and ensure the sustainable health of our water bodies for generations to come.

## **Sustainability as a Service: A Revolutionary Approach to In-Situ Waterbody Rejuvenation**

In our rapidly evolving world, the concept of sustainability has become more crucial than ever. As we grapple with environmental challenges, a new paradigm is emerging – “Sustainability

 [contact@wsafess.com](mailto:contact@wsafess.com)

as a Service.” This transformative approach seeks to address environmental issues through innovative technologies, focusing on nature-based solutions without resorting to harmful chemicals, artificial means, or disruptive construction.

One such groundbreaking application of Sustainability as a Service is the In-Situ

**Conditions: Natural Revitalization**

The process is designed to work without the use of chemicals, microbes, enzymes, phytoid, civil construction, or artificial aeration. It requires a minimum water depth of 4–6 feet, making it adaptable to a variety of water bodies in both rural and urban landscapes.

**Defined Milestones: A Holistic Approach**

By embracing nature-based solutions and adhering to defined milestones



Waterbody Rejuvenation, targeting ponds, lakes, drains, and rivers. The unique aspect of this approach lies in its ability to revitalize water bodies without disrupting their natural flow, making it an ideal solution for both rural and urban settings.

**Technology: Nature-Based Solutions**

The core of this sustainable service lies in employing nature-based solutions to revive the native aqua-ecology of a water body. Unlike traditional methods that often involve the use of chemicals, microbes, enzymes, phytoid, civil construction, or artificial aeration, this approach harnesses the power of nature itself.

This sustainable water rejuvenation service is built on achieving specific milestones that contribute to the overall health and well-being of the water body:

- **Eradication of Foul Smell:** Addressing the unpleasant odor that often accompanies polluted water bodies.
- **Eradication of Mosquito Breeding:** Creating an environment inhospitable to mosquitoes, reducing the risk of vector-borne diseases.
- **Reduction in Lab Parameters:** Lowering crucial parameters such as COD/BOD/TSS/TDS/E.Coli/TC, indicating improved water quality.

ensuring a healthier future for both ecosystems and communities alike.



- **Increase in Dissolved Oxygen (DO):** Enhancing oxygen levels to support aquatic life and overall ecosystem health.
- **Eco-Dredging:** Consuming and digesting sludge naturally, contributing to the longevity of the water body.
- **Conservation of Aquatic Life:** Fostering a thriving habitat for fish and other aquatic organisms.
- **Drinkable Water for Animals:** Providing a safe water source for wildlife in the vicinity.
- **Natural Groundwater Recharge:** Facilitating the natural replenishment of groundwater resources.
- **Reusable Water for Irrigation:** Creating a sustainable water source for agricultural needs, promoting water conservation.
- **Higher Fishery Yield:** Enhancing the productivity of fisheries through a healthier aquatic environment.
- **Achieving Bathing Standard Class B:** Transforming water bodies to meet bathing standards, ensuring human safety.

In conclusion, Sustainability as a Service, applied to In-Situ Waterbody Rejuvenation, represents a revolutionary shift towards a more harmonious coexistence with our natural environment. By embracing nature-based solutions and adhering to defined milestones, this approach offers a holistic and sustainable means of revitalizing water bodies, ensuring a healthier future for both ecosystems and communities alike.

**Additional Benefits: A Green Revolution**

Beyond the defined milestones, this sustainable approach to water rejuvenation brings forth a myriad of additional benefits:

- **Carbon Sequestration:** Contributing to the capture and storage of carbon, mitigating the effects of climate change.
- **Carbon Credits:** Potentially earning carbon credits for sustainable practices.
- **Green Credits:** Recognition and incentives for environmentally friendly initiatives.

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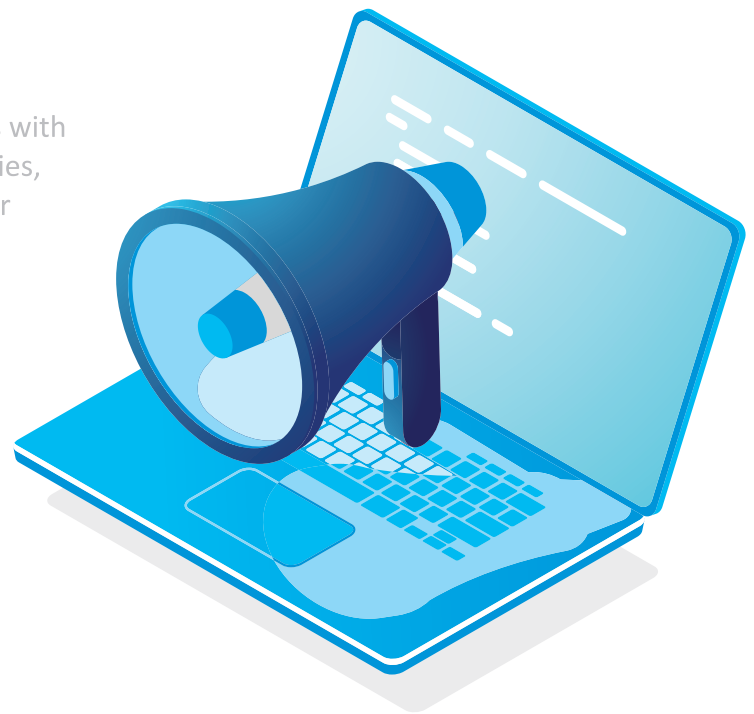
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**Dr Mayur J. Kapadia**

*Trainer, Writer, Editor & Former AGM,  
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Dr Mayur J. Kapadia, MSc, PhD, is an Educator, Trainer, Editor, Technical Writer and former Add Gen Mgr & Lab Head of GNFC Ltd, Bharuch, Gujarat, India. He possesses professional industrial experience of 40 years in the fields of Quality Control of Chemicals / Fertilizers / FMCG products, New Laboratory Set up, Cooling Water Management, ISI certification, and many other areas. He has to his credit technical suggestion awards, >25 publications in journals / magazines and >20 presentations in conferences. He has been conducting full day training programs on Quality Control, NABL, Instrumental Analysis, ISI certification, Cooling Water Management, etc for industry professionals.

He is an active member in technical committee of Bureau of Indian Standards (BIS), which has conferred upon him a 'Certification of Appreciation' for his immense contribution towards establishing and improvising various Indian Standards. He also has been rendering technical services to various organizations for quality improvement, process trouble-shooting and analytical aspects.

# ENORMOUS FUTURE OPPORTUNITIES STRIKING AT THE DOORS OF WATER SECTOR

India GDP has touched the figure of 4 trillion dollars for the first time in Nov, 2023. This is an important milestone for the Indian economy. India's target is to take country's economy to 5 trillion dollars by the year 2025. With growing urbanization, expanding industrialization and steady economic growth, the demand of water for municipal and industrial use has been increasing. Industrial demand for water is expected to increase multi-fold for sectors like Power, Steel, Paper and Pulp, Oil refineries etc. Over the past few years, the water industry in India has witnessed some key trends and developments in the areas of Piped water supply, Setting up of STPs, Waste to Energy plants, Water Recycling, Desalination, Digitization, Remote sensing, Satellite surveillance, use of treated wastewater, rainwater harvesting etc. All these factors present a great opportunity for Water Sector, especially in the fields such as infrastructure, technologies, life style changes and services. There are various areas that hold a great potential for growth and development.

## Sea Water Desalination

Sea Water Desalination is, of course, a significant area of growth in view of the large coastal line available to India. The tremendous cost of production of fresh water through desalination is going to be curtailed by the hybridization of technology. Combination of membrane technology with thermal processes is a promising avenue for those who have in-house power generation

facilities, since it will utilize the waste heat in a constructive way. The demand for desalination is particularly growing in municipal and industrial sectors of the coastal cities posing a good future for this area.

**Waste Recycling Plants**

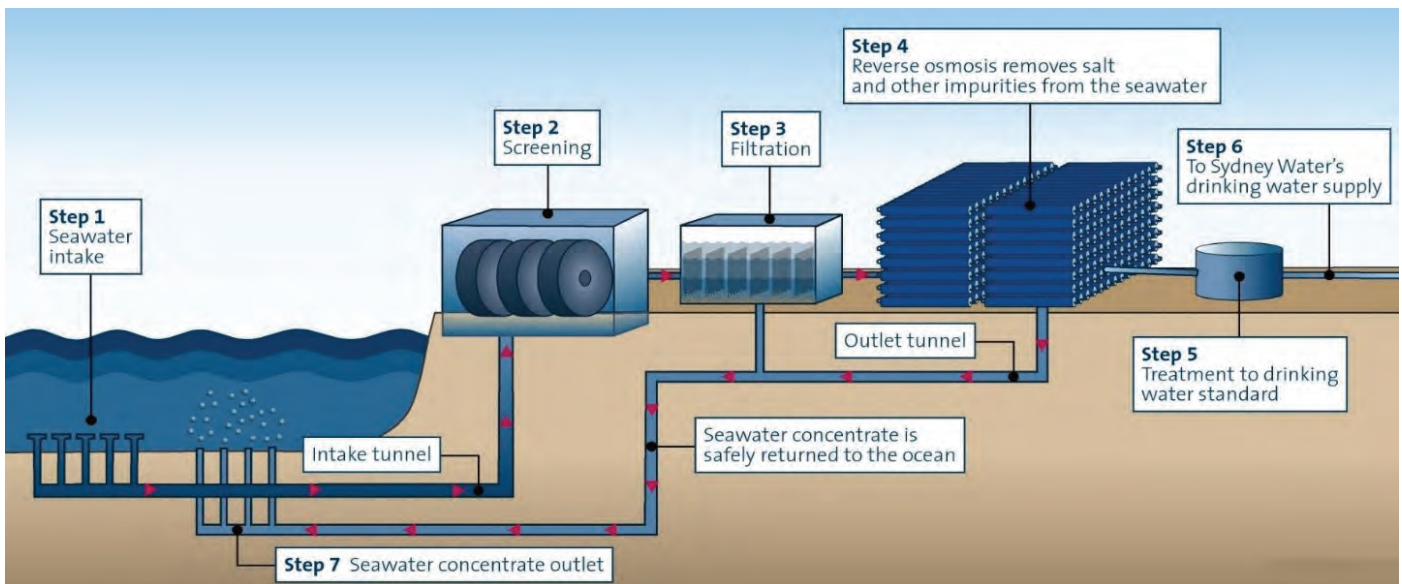
The concept of RRR (Reduce, Reuse and Recycle) has become not only popular in India,

years.

**Zero Liquid Discharge (ZLD)**

This is designed to remove all the liquid waste from a system. Its focus is to reduce wastewater economically and produce clean water that is suitable for reuse (e.g. irrigation), thereby saving money and being beneficial to the environment. Good capacity ZLD plants to

Detection of leaks in distribution systems and prevention of pollution runoff in urban waterways through in-pipe robotic mapping and assessment tools is a promising area.



but also a harsh necessity in view of reduced water availability. Waste water treatment plants having sole aims of recycling maximum water and ensure adaptability to local conditions, complying to health standards and protecting fresh water resources can have double engine effect – they will reduce fresh water consumption and reduce waste disposal.

**Reuse of Sewage**

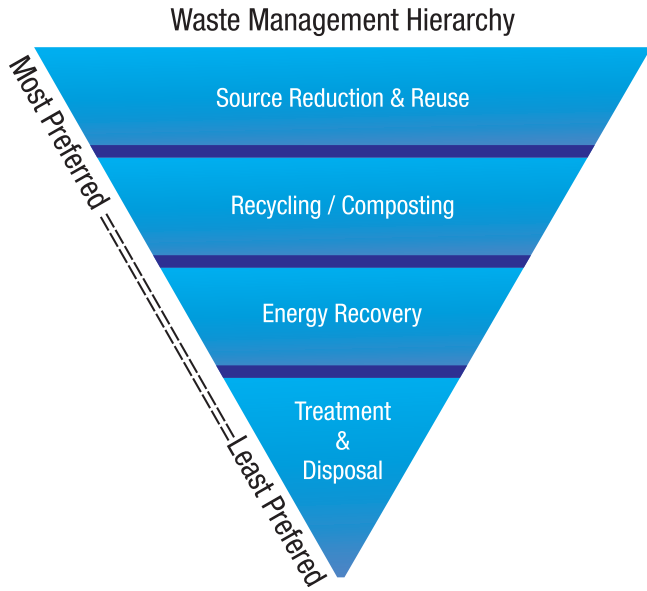
With increased industrial water requirements and reduced resources, there will be a strict requirement to treat domestic sewage and use it in industries. Sewage treatment plants would be a promising business activity in next several

manage stubborn and tough-to-treat waste waters is a wonderful opportunity. Apart from saving water, these plants could also render recovery of valuable products from waste streams. Use of thermal and non-thermal technologies could bring about economy to the operation of ZLD plants.

**Non-Revenue Water Remediation**

The innovation offered by the remote sensing of water helps in water accounting and remediation of non-revenue water. The Internet of things (IoT) has been enabling smart irrigation and water quality control, which, when coupled with new computing capacity,

In the light of estimated 5.2% CAGR in next 5 years, the business future for bottled water appears bright in India.



households in saving approx. 35 percent of water consumption. Mobile management platforms are also presenting profound area of growth to improve customer care and billing services.

**Smart City**

The smart cities motion and AMRUT mission focus on reducing non-revenue water, which is accounted for approx. 30–50 % in Indian cities. For addressing non-revenue water, technology is required to be introduced for metering, automation and monitoring. This poses a potential for metering, instrumentation and equipment supply businesses.

**Crop Irrigation**

The raising of water efficiency in agriculture processes from 30–35 % to higher target puts forward the business prospects for drip irrigation, rainwater harvesting, cloud based micro irrigation, sprinkler equipments etc.

**Solar pumps / Smart Meters / Water ATMs**

The government has been targeting increased use of efficient water distribution network. Solar powered water pumps, Smart Water Meters, Water Vending Machines and other similar tools that increase water-use efficiency seem to be an excellent area of future growth.

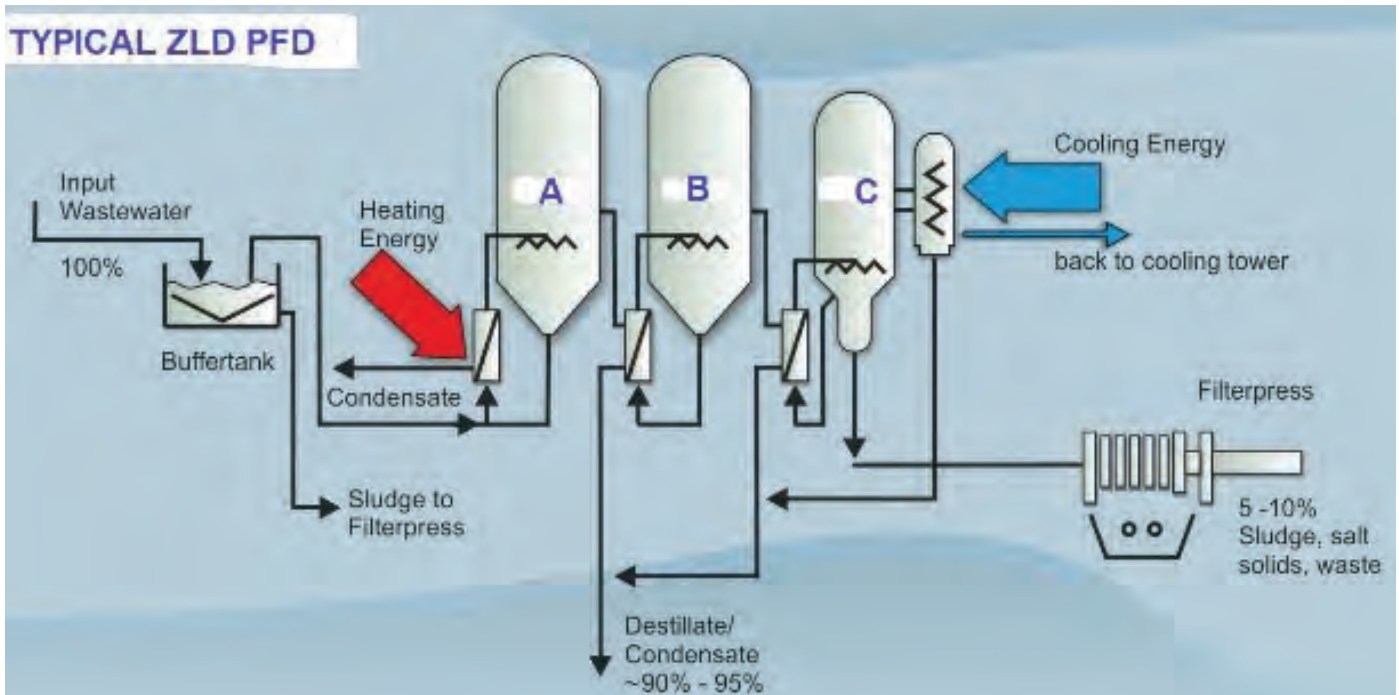
**Packaged Water**

The average volume per person in the Bottled Water market is presently estimated to amount to 17 litre, which is expected to show a volume growth of 4.9% in 2024. The market is expected to grow annually by 5.20% (CAGR 2023–2027). In the light of these statistical figures, the business future for bottled water appears bright in India.

allows the development of complex models for water management. New technologies helping utilities to serve their customers digitally, managing water resources remotely in real time, empowering farmers to make water smart decisions and utilizing distributed technology to expand water and wastewater services have been expanding and transforming the Water Industry.

**Smart Home**

Technology to provide smart metering and automated leakage prevention system for home would grow day by day due to increasing cost of fresh water. The apartment buildings in India will help thousands of

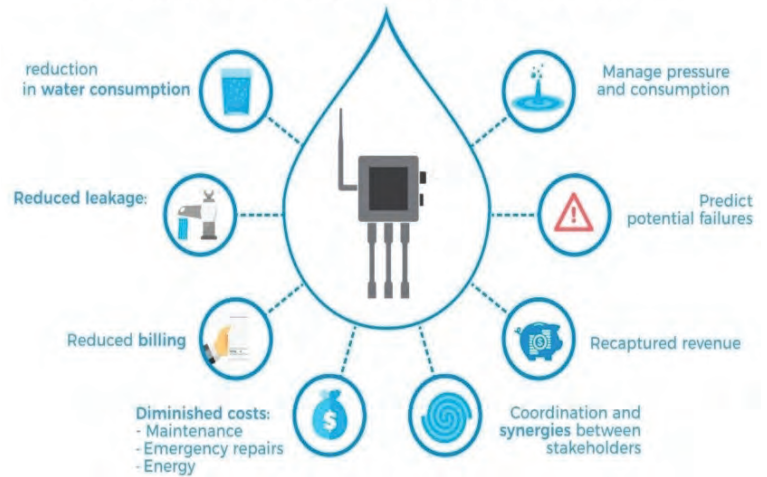




Outcomes of non-revenue water reduction



BENEFITS OF SMART WATER SOLUTIONS



Internet of Things (IoT)

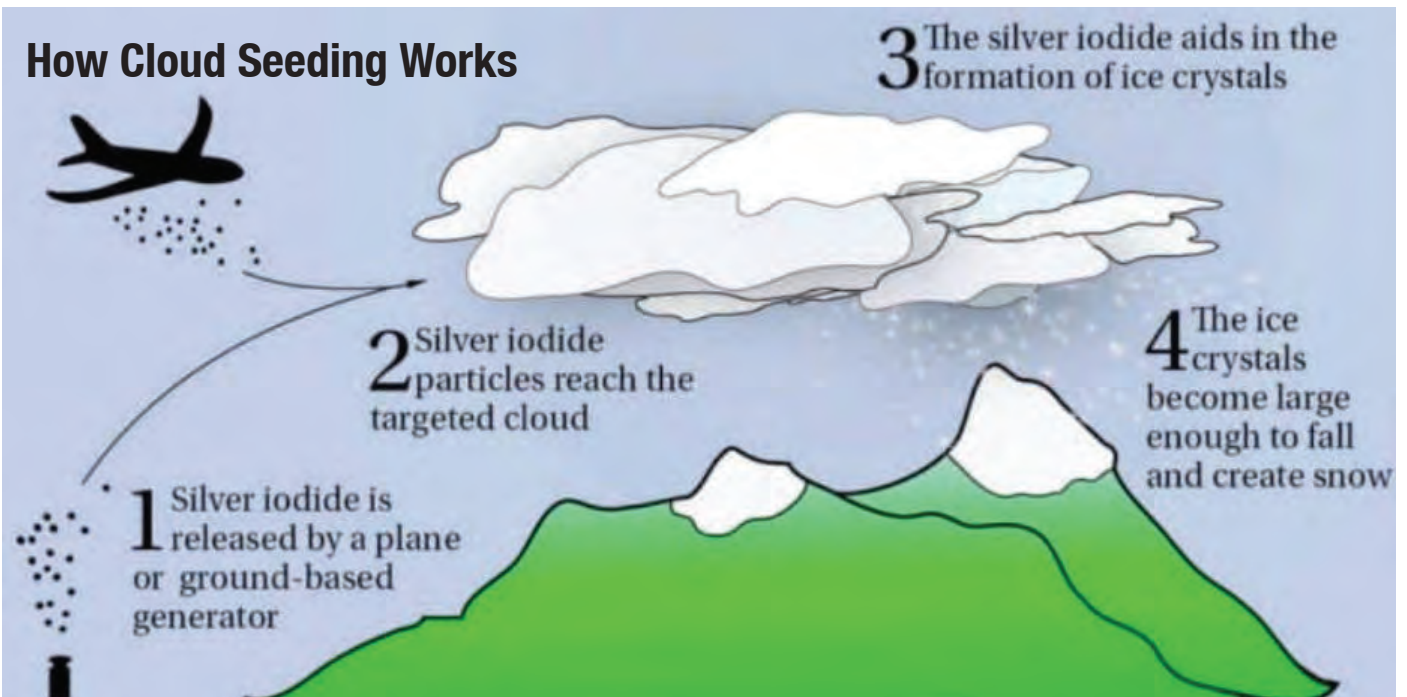
Technologies like Machine learning and remote sensing to send text messages to small-scale farmers with hyper-local information on climates and weather forecasts can greatly benefit farmers in taking decisions about their farming activities. The benefits derived by farmers, in turn, will trickle down to consumers. Water ATMs, IoT enabled water operations and pay-as-you-go cards are going to bring revolution in water industry in near future. Detection of leaks in distribution systems and prevention of pollution runoff in urban waterways can be done through in-pipe robotic mapping and assessment tools. The analytics platform to identify the source of contamination in water is also a highly useful technology for future generations. Advancements incorporating

data insights to inform infrastructure investment planning, as well as regulatory oversight to monitor the compliance of service would be a promising field of business.

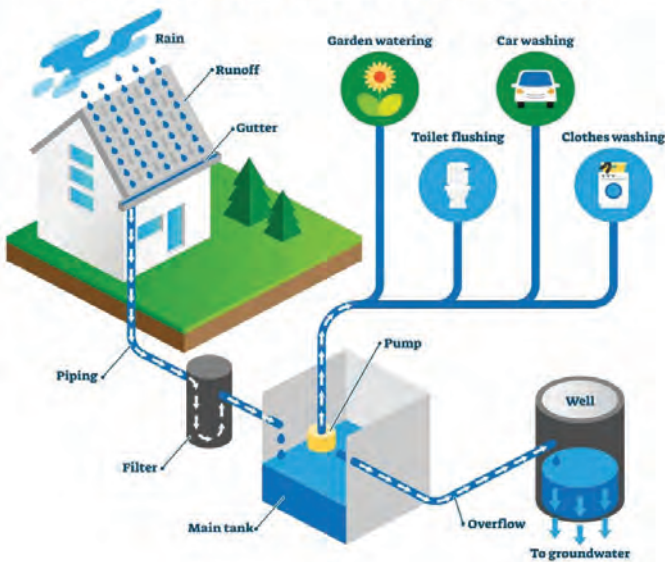
Artificial Rainfall

Artificial enhancement in rain falls through Cloud seeding technique has a potential to harvest more water from air. In this process, artificial frost nuclei are introduced to the already-existing natural frost nuclei within clouds. These particles act as a starting point for raindrops or ice crystals, promoting their formation. In turn, this makes it more likely to rain or snow. Some countries in arid and semi-arid regions have used this technology to increase rainfall volumes. India being largely

How Cloud Seeding Works



## RAINWATER HARVESTING



promising field of future study.

### Rain water harvesting

Though this is a simple and efficient way of collecting fresh water, it is not much practised in India. There lies ample scope in promoting and practising rain water harvesting via rooftop systems and its collection in tanks. This could not only be used for livestock watering and other purposes, but at the same time, it will also allow minimization of pure water turning into saline water. Similarly, rain water collection of ground run-off water into a pond could also be put into the practice for its use in agriculture. For enhancement in rain water harvesting, new plumbing technologies and water storage methods have a high growth potential in coming years.

### Conclusion

Present day challenges faced by Water Sector are mainly high energy costs, water losses due to leakages, financing and the profitability of water industry. It is essential to curtail energy costs by developing and deploying energy efficient pumps & motors, speed regulators, intermittent operation, digitalized operation of pumps and remote control. Water leakages cost water companies a vast amount of money, not only in lost revenues but also in treating and pumping back the lost water. Development of ways for accurate detection of leaks, bursts and other inefficiencies has handsome potential for future. Software driven programs with advanced algorithms should be able to detect, alert, manage and provide real-time insights.

Project financing is a substantial hurdle for the Water Industries. It is not possible for governments of many nations to support full financing for the projects. Therefore, in-house financing through banks and credit agencies is a prominent area of development.

Innovation and technology have a vital role to play in tackling scarcity and safety aspects, water inefficiency, utility operations, monitoring and treatment and data analytics. Water Sector in India is set to introduce various new technologies and changes in near future. Climate change, Increasing fresh water demands, Automation and Digitization are the main and important factors for water companies to stay competitive within the industry. Such factors will eventually turn into futuristic opportunities which will benefit businesses, customers and the environment.

dependent on rain fall for domestic and irrigation requirements, artificial rain fall would be highly beneficial for fighting drought like conditions.

### Fog as a source of water

Fog is an unconventional source of water and presents enough research opportunity to tap it for production of fresh water. In dry coastal areas and mountains, intense fog is regularly seen. The tapping of water imbedded in fog through vertical mesh intercepting the droplet stream can be explored to recover water from fog, if geography and topography of the region are conducive for optimum fog interception. Ample research and establishment of successful technology could result into a green technology and low maintenance option to render fresh water.

### Tapping of Icebergs

Pulling and towing of icebergs from polar ice caps is a potential subject for research to tap water out of it. Though seeming impossible at present, this could be an interesting subject for scientists and students. Moving an iceberg through ocean is technically feasible. Inventing ways of meeting with the power requirement for the same, minimizing melting of iceberg during transit and improving economics of the endeavour is a

RESEARCH	DATA	EXAMINATION	METHOD	ANALYZING



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# LA SOCIÉTÉ WALLONNE DES EAUX CREATES DIGITAL 3D DATABASE OF COMPANY ASSETS

By Aude Camus

## Optimizing Management of Water Assets for Reliable Water Supply

La Société Wallonne des Eaux (SWDE) is a regional water corporation that owns and maintains a series of water towers throughout Belgium. The organization is the dominant producer of drinking water in the Wallonne region, supplying almost 2.5 million people with 1,317 water tanks and towers. The overall goal of SWDE is to provide reliable access to water for individuals and businesses as the population and economy of the region grow.

Some of the structures that SWDE utilizes are very old, so the data on those structures was no longer accurate or, in some cases, available at all. To improve and streamline the management of all SWDE infrastructure, SWDE needed a database to increase the accessibility and accuracy of information about the company's assets. This goal would lead to more reliable water, higher quality food safety, prevention of structural defects, and a lower cost of structural interventions.

SWDE tower, built in 1981 in Juprelle, Belgium, was deteriorating and in need of support. The tower has a storage capacity of 500 cubic meters, and is supported by eight columns and beams. The tower's exterior features siding brick connected by galvanized metal anchors to a supporting wall constructed from terracotta. The concrete helped to reduce the amount of stress put on the brick and to link the exterior and inner structure; however, it also caused some challenges. The concrete caused condensation on the interior walls, which led to significant degradation over time. The degradation included burst joints, cracks, and the separation of edifice bricks. Operating inspectors have also seen superficial cracking on the brick siding. To ensure safe and reliable water service to the area, SWDE needed to repair the tower.

"Water towers are generally tall, imposing structures. A manual inspection from the ground does not allow proper diagnosis, and a complete inspection takes a long time," said Christophe Taelman, engineer at SWDE. Typically, SWDE would conduct a survey of the damage using traditional manual surveying methods, including taking photographs from the ground or using elevators to lift workers up onto the tank. Given the challenges presented by the tower's size, SWDE quickly realized that their traditional approach did not provide a complete or efficient solution.

## Manually Analyzing Drone Footage

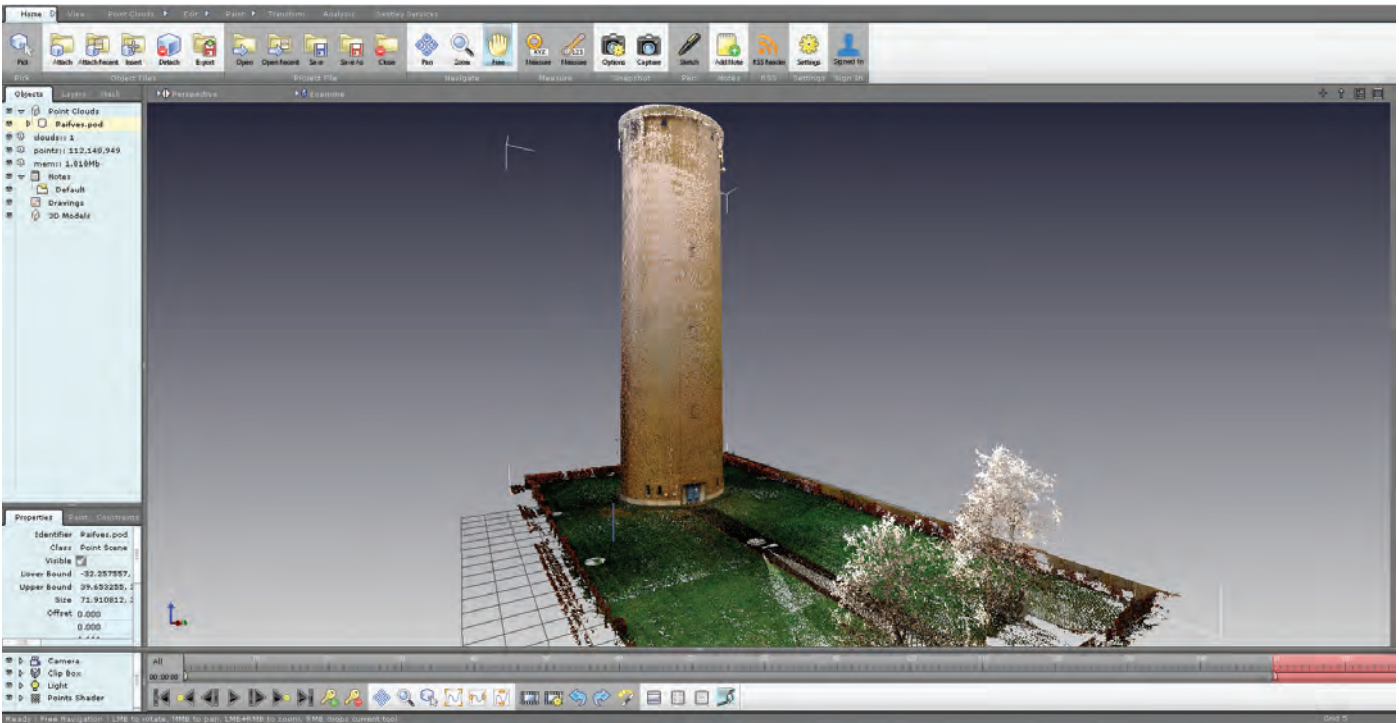
SWDE decided to use drones to survey the damage, as that would allow them to provide a more complete picture of the damage without asking workers to spend as much time. They began to apply photogrammetry by using a Blade Chroma drone to take videos of the tower. Over 3,000 images were extracted from the drone video. However, they faced another roadblock while using drones: the vantage points gathered by the drones still required human interpretation, which came with a significant risk of error, as workers looking at drone footage could easily overlook small cracks. SWDE needed to find a way to ensure that cracks of all sizes could be identified efficiently so that necessary intervention could be taken early on to mitigate long-term deterioration and maintain a reliable and safe water network.

Bentley Applications  
Enable Long-  
term Planning and  
Preventative Intervention  
by Automating Crack  
Detection



## Aude Camus

is a senior solution marketer with Bentley Systems, responsible for ContextCapture, Orbit 3DM, OpenCities Planner, Descartes, and Pointools. She is part of Bentley's digital cities business unit and focuses on Bentley's reality modeling products. Graduated from SKEMA Business School in France, Camus has nearly 15 years of experience in selling and marketing engineering and geospatial software.



## Applying Texture Skin Images to Develop Automated Crack Detection Software

SWDE discussed their options with Bentley Systems representatives, who worked with SWDE to develop technology specifically to meet their need for automated crack detection. SWDE determined they could create a 3D plan for the structure of the water tower in MicroStation. Once this model was complete, the next step was to refine a deep learning approach to analyze images and automate crack detection. They used Pointools to clean up and export the plan as a model in ContextCapture. While ContextCapture does not have crack detecting capabilities, Bentley developers worked with SWDE to refine an artificial intelligence (AI) capability for that purpose.

“With this new analysis using artificial intelligence on the 3D photo reconstruction in ContextCapture, we were able to detect cracks faster and more accurately in both masonry cladding and concrete,” said Taelman. The 3D visualization allowed them to see all angles clearly and analyzed cracks precisely in real time. The precise and efficient crack detection system allowed SWDE to automatically

identify cracks with diameters as small as 0.1 millimeters, and the software helps to predict further development of these small cracks. An algorithm quantified the length, width, and depth of each crack and categorized them by

their size and trace patterns. The resulting statistics contributed to an analysis of the overall condition of the water tower.

SWDE tested the module on the damaged

### PROJECT SUMMARY

**Organization:** La Société Wallonne des Eaux

**Solution:** Water and Wastewater

**Location:** Juprelle, Belgium

### PROJECT OBJECTIVES:

- To create a database of water asset models for future analysis of degradation.
- To sustainably ensure an accessible water supply throughout the region by identifying cracks in the infrastructure early.

**PROJECT PLAYBOOK:** ContextCapture, ContextCapture Insights, MicroStation, Pointools

### FAST FACTS:

- La Société Wallonne des Eaux (SWDE) is a regional water corporation that owns and maintains a series of water towers throughout Belgium.
- While an unmanned aerial vehicle gathered high resolution images of the tower, manual analysis of the images failed to detect small cracks.
- The automatic crack detection technology in ContextCapture helped quickly find cracks as small as 0.1 millimeters.

**ROI:**

- The automatic crack detection technology created using Bentley applications resulted in a 600% faster process of crack detection and analysis.
- SWDE's solution was twice as reliable as manual surveying methods.
- Using Bentley's software, SWDE saved more than EUR 2 million on this complex project.

**Sustainability through Prevention and Savings**

This project was a pilot for SWDE, resulting in a new method to efficiently, accurately, and safely detect cracks in infrastructure. The technology used on the project allows for faster and better-informed decision-making on renovation plans and techniques, ultimately saving costs. The solution reduces the time needed for surveys by 66% and saves significant costs by helping SWDE identify and plan for any necessary renovation work. "The collaborative work with Zheng Wu has allowed us to go beyond our intended aim and be able to calculate the lengths of cracks and classify them by width," said Taelman.

by more than 600% and increased detection reliability by 100%.

The organization also estimates that the automated approach saved more than EUR 2 million in initial costs. The software works for damage prediction, decision-making, and cost reduction. The solution contributes greatly to SWDE's broader goal of secure, efficient, and reliable management and provision of water resources. By saving time and costs, the automatic crack detection software helps SWDE sustainably maintain millions of households' access to clean drinking water.

water tower, by capturing 3,000 images with drone surveys and then using ContextCapture to create a reality mesh of the tower. They then used the AI capability to scan the reality mesh and detect cracks. The scan detected 1,704 cracks in the tower, 520 of which were less than 2 millimeters and, therefore, could not easily be detected by the human eye. The AI also detected that the façade had detached more than 10 centimeters from its original placement, which the human eye also would have overlooked.

The accurate digital renderings have also established a baseline that SWDE can compare to future surveys to identify any degradation, helping them be proactive about preventing any risks of interruption to the water supply. In a comparison of the ContextCapture AI technique and on-site measurements using an electron microscope, SWDE found that Bentley's software was twice as effective and reliable. They determined that the automated crack detection sped up the diagnostic process

"Thanks to our experience and the use of Bentley tools, we can state that this solution is part of a preventative maintenance strategy of our infrastructure and anticipation of risks in our operation processes."

– **Christophe Taelman**  
Design Engineer,  
La Société Wallonne des Eaux

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# LAKE BIOREMEDIATION BY ‘BACTASERVE–POND CLEANER’ WITH ADVANCED TECHNOLOGY OF ‘HYPER OXYGENATION REACTOR’

By **Amalgam Biotech**, we are committed to delivering effective and environmentally friendly solutions for improved water quality and pond maintenance.

## Background:

This organization is a global, high precision metrology and healthcare technology group. They are located in Pune, India. They design, develop and deliver solutions and systems that provide unparalleled precision, control and reliability. They are also a world leader in the field of additive manufacturing, where they design and produce industrial machines which ‘print’ parts from metal powder. From transport to agriculture, electronics to healthcare, their breakthrough technology transforms product performance. They have 77 offices in 36 countries, with over 5,000 employees worldwide.

## Challenge:

In company’s premises having this pond,

natural in origin. In this pond, excess levels of nutrients such as ammonical nitrogen ( $\text{NH}_3\text{-N}$ ) and Phosphorous (P) resulted in problematic issues like algal blooms and the onset of eutrophication. Additionally, there are quantities of Chemical Oxygen Demand (COD) and Biochemical Oxygen Demand (BOD) present in the pond, making their removal crucial for the well-being of aquatic life. To tackle this issue, it is essential to employ bacterial biocultures in the presence of oxygen to remove or reduce these pollutants.

The removal or reduction of these contaminants, including  $\text{NH}_3\text{-N}$ , Phosphorous, COD, and BOD, relies on the activity of bacteria. However, this process demands a significant amount of oxygen. Unfortunately, ponds or water bodies



**Amalgam Biotech**, a biotechnology–based company, specializes in innovative solutions across various sectors.

## Wastewater Treatment (BactaServe):

Offering tailored and sustainable solutions for diverse wastewater treatment needs using specialized bacterial cultures. Catering to industries like Pharma, Textile, Chemical, Dairy, and more. Collaborates with Government of India Research Institutes for specialized waste treatment technologies.

## Odour Control (OdoServe):

Provides an odour control system for neutralizing odours in industrial and domestic–municipal segments. Offers product additives for odour removal from finished product lines such as recycled plastic, rubber, craft paper, and more.

## Process Additives (NutriServe):

Supplies essential micronutrients to nourish bacteria in aerobic and anaerobic processes associated with WWTP. Offers products enhancing conditions for Aerobic and Anaerobic Processes, including BOD enhancers and organic nitrogen–phosphate sources.

## Key Points about Amalgam Biotech:

- Provides optimized and sustainable solutions for diverse waste categories.
- Offers comprehensive expertise in ETP–CETP–WWTP–STP processes.
- Proficient in Primary, Secondary, and Tertiary treatment processes.
- Provides engineering solutions for Odour Control Systems.





often contain insufficient dissolved oxygen (DO) to support effective degradation. This oxygen deficit can lead to the creation of oxygen-depleted zones within the pond or water body, which is undesirable. To prevent these adverse consequences, it is imperative to efficiently eliminate these nutrients, COD, and BOD from the water. Bacterial activity can effectively address this challenge by consuming nutrient-rich algal blooms, COD, and BOD when oxygen is available in the pond or water body. Nonetheless, the rate at which bacteria consume oxygen is substantial. Given that the natural oxygen levels in the water body are typically inadequate for the efficient removal of these pollutants, it becomes necessary to supply a significant amount of oxygen from external sources.

Parameters	Results
Chemical Testing	mg/L
pH	7.74
Total Suspended Solids (TSS)	118.0
Total Dissolved Solids (TDS)	474.0
Chemical Oxygen Demand (COD)	152.988
Nitrate	<0.1
Bio Chemical Oxygen Demand (BOD) @ 270c for 3 Days	61.0
Chloride	45.99
Sulphate	58.28
Oil & Grease	<2.0

#### Targets to Achieve:

- COD – from 152 to 50 ppm
- BOD – from 61 to 10 ppm
- Ammoniacal Nitrogen – from 0.49 ppm to less than 0.5 ppm
- Organic Phosphorous – from 0.257 ppm to less than 0.5 ppm
- DO – from 2 ppm to 5–8 ppm

#### Pond Specifications:

This pond has dimensions of 25 meters in length, 15 meters in breadth and the average depth of 4 meters. From these dimensions, the total volume of this pond is 1500 m<sup>3</sup>. There is pond in their plant facility, which is natural. During the rainy season, this pond gets totally filled with rainwater and over the period of time the algae / algal bloom formation takes place due to high nutrient content in the pond.

These algal blooms are nutrient rich in nature causing 'Eutrophication' in the water body meaning causing harms to the aquatic lives in the water body i.e., Pond.

#### Special Technical Solution:

We provided a solution by introducing a bioculture called "BactaServe – Pond Cleaner" to enhance the ability to break down high-nutrient algal blooms. This bioculture contains a combination of enzymes that can metabolize these nutrients when oxygen is present. To ensure an adequate oxygen supply for the survival of these bacteria within the pond, we employed an external method to capture

oxygen from the atmosphere.

This oxygen capture process involves spraying water from the pond into the atmosphere. As the water is sprayed, it has the capacity to absorb and dissolve gases, including oxygen, from the surrounding atmosphere. This captured oxygen is then made available for the bacteria's needs, enabling them to thrive and effectively combat the algal blooms.

Ms Monika Singh, Mr Ashutosh Vadanagekar were team members from Amalgam Biotech, and had provided solutions with site visits.



**Hyper Oxygenation Reactor (HOR):**

A HOR is a cutting-edge technology employed in pond cleaning and water treatment procedures. Its operation involves the creation of extremely minute bubbles, often at the nanoscale, and these bubbles possess a range of distinctive properties and advantages when it comes to pond cleaning. Their diminutive size results in a substantial surface area-to-volume ratio, allowing them to remain suspended in water for extended periods. This characteristic significantly enhances the efficiency of oxygen transfer. Moreover, due to their remarkable mass transfer rate in terms of oxygen dissolution, nanobubbles excel in tasks such as controlling algae, removing COD/BOD, and eliminating nutrients from the water.

In summary, HORs play a pivotal role in pond cleaning and the management of water quality. They achieve this by elevating oxygen levels, facilitating natural biological processes,

curbing algae growth, and diminishing the need for chemical interventions. This innovative technology provides a sustainable and environmentally friendly solution for preserving ponds in a clean and healthy eco-system.

Sr No	Parameter	Value (mg/lit)
1	pH	8.80
2	(COD)	31.0
3	(BOD)	5.0
4	Total Nitrogen	0.029
5	Total Phosphorous	0.033
6	Ammoniacal Nitrogen	0.019
7	Dissolved Oxygen	2.0

**Results:**

Utilizing bioculture in conjunction with a HOR, we have successfully achieved the degradation of COD/BOD, as well as the reduction of

nutrients like nitrogen (N) and phosphorus (P), along with the control of algal blooms in the pond.

**Executive summary:**

At Amalgam Biotech, we've successfully achieved a reduction in COD/BOD, the removal of nutrients, and the elimination of algal blooms by utilizing our innovative solutions, BactaServe- Pond Cleaning, and HOR technology. These technologies work synergistically to accelerate the breakdown of organic deposits, reduce algal blooms, and enhance the efficiency of oxygen transfer, facilitating the removal of organic deposits. Our expertise extends to providing comprehensive pond cleaning solutions, including the removal of nutrients, COD/BOD, and algal blooms. Additionally, we offer wastewater treatment services, catering to Sewage Treatment Plants (STP) and Effluent Treatment Plants (ETP) through the use of bioculture.

**Amalgam Biotech, we are committed to delivering effective and environmentally friendly solutions for improved water quality and pond maintenance.**

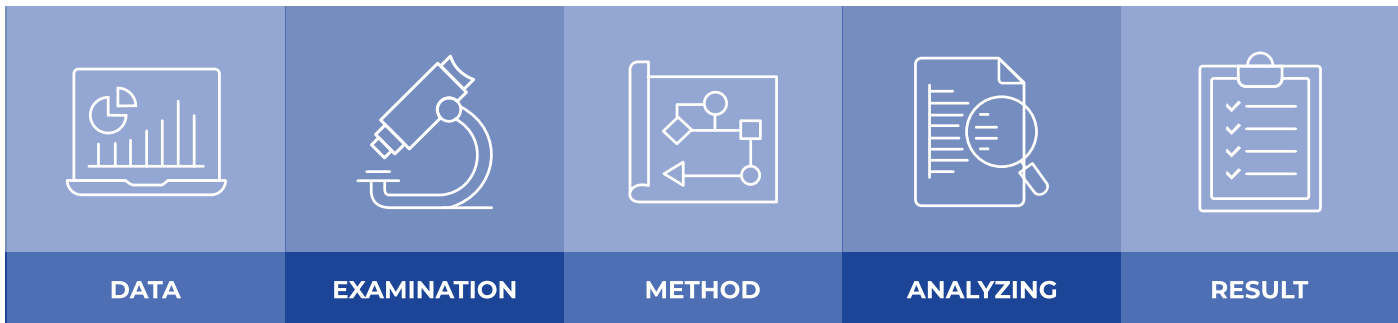


**Ms. Monika Singh – (Sr. Application Engineer, Amalgam Biotech – Pune)**

Monika Singh holds a Bachelor of Technology degree in Chemical Engineering from Bharati Vidyapeeth (2016–2020) with an impressive 9.4 CGPA. She has been an Assistant Manager Engineer at Amalgam Biotech for the past 3 years, specializing in wastewater treatment, solid waste management, bioremediation and odour pollution projects.

Monika is a skilled technical expert with a passion for using biotechnology to address environmental challenges. She has successfully executed projects including troubleshooting STP/ETP, conducting site visits, commissioning wastewater treatment plants and implementing odour neutralization solutions.

Monika has received recognition as the 'Best Performer' in numerous projects highlighting her dedication and proficiency in her field.



# NSF Certifies Microfilter as the World's First Client for NSF/ANSI 53 Total PFAS Reduction

**Seoul, South Korea (December 11, 2023)** – NSF, the leading testing and certification organization in the water industry, announced today that Microfilter, a South Korean water filter manufacturer, has earned certification to NSF/ANSI 53 for its FP-10, FP-10S, FP-15, FP-15S, FP-17, FP-17S, FP-21 and FP-21S products. With this certification, Microfilter becomes NSF's first client in the world to receive this certification for total PFAS reduction.

Microfilter was established in 1996 and has been producing and distributing high-quality water filters for both home and business applications. Microfilter is one of the top companies in South Korea's water filtration sector.

"Microfilter is proud to be the first company to achieve NSF/ANSI 53 for chemicals for Total PFAS reduction. 'Forever chemicals' have been linked with cancer, fertility issues and weakened immune systems, posing a growing health threat to our communities through drinking water sources. We look forward to partnering with companies that share our vision of a cleaner and healthier world. Together we can make a big difference in the fight against PFAS and help ensure a safer and more sustainable future," said Park Chan-ho, CEO of Microfilter.

NSF/ANSI 53 was developed by NSF, whose standards process is accredited by the American National Standards Institute (ANSI) and the Standards Council of Canada (SCC). The standard is continually reviewed and updated to ensure it continues to match current technology. The NSF/ANSI 53-2018 edition added a performance reduction claim for perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS) in drinking water treatment devices that use activated carbon absorption. The NSF/ANSI 53-2019 edition added a performance reduction claim for non-regenerable drinking water treatment devices that use anion exchange media for PFOA and PFOS chemicals. The most recent edition, NSF/ANSI 53-2022, expanded the chemical reduction claims to include newer subclasses of PFAS compounds, such as PFHxS, PFNA, PFHpA, PFBS, and PFDA. Filters are certified to reduce contaminants that cause negative human health effects, which in this standard, are regulated by the US Environmental Protection Agency (EPA) and Health Canada.

"We are proud to certify Microfilter as the first client to the NSF/ANSI 53 for chemicals for Total PFAS reduction," said Jinhee Kim, Senior Manager of Water, at NSF. "PFOA and PFOS are among the most common groundwater contaminants of the perfluoroalkyl substance (PFAS) family of chemicals. Manufacturers obtaining certification must reduce PFOA

and PFOS concentrations in water to below the 70 parts per trillion (ppt) health advisory level set by the US Environmental Protection Agency (EPA). We anticipate that more water filter manufacturers will follow suit in certifying their products for Total PFAS reduction."

For more information on obtaining NSF/ANSI 53 certification for your products, please visit the NSF website ([www.nsf.org](http://www.nsf.org)).

## About NSF

NSF is an independent, global services organization dedicated to improving human and planet health by facilitating standards development and providing world-class testing, inspection, certification, advisory services, and digital solutions to the food, water, health sciences, and consumer goods industries. NSF operates in 180 countries and is a World Health Organization (WHO) Collaborating Center on Food Safety, Water Quality, and Medical Device Safety.

NSF's Water Division provides risk assessments, testing, inspection, and certification services for the water industry from source to tap. NSF facilitated the development of the American National Standards for all materials and products that treat or come in contact with drinking water to help protect public health and the environment and minimize adverse health effects. In 1990, the U.S. EPA replaced its own drinking water product advisory program with these NSF standards.

## About Microfilter

Since our establishment in 1996, our company has been manufacturing and supplying quality water filters for residential and commercial use. With the goal of becoming a world-class filtration company that seeks to "create value for customers and the environment," Our company contributes to the happiness of people and the environment by providing innovative technologies and differentiated products, in the field of filter-related materials and goods. Through these efforts, we have become a leading company in South Korea's water purification industry.

Our industry-leading R&D/QA engineers and production, sales, and marketing professionals work together to provide products of outstanding quality recognized worldwide. With our conviction and our passion for infinite possibilities, we will continue to take new initiatives. We look forward to your continued support and encouragement so that our employees can work together to develop Microfilter into a world-class filtration company.

# K J Somaiya Institute of Management Hosts IconSWMCE and IPLA Global Forum 2023

**MOU signed between ISWMAW and JSMCWM. The 4–day conference saw robust participation, with 380+ research and white paper presentations across 53 tracks from 44 countries, making it a hub of global insights and expertise**



The distinguished speakers, including Dr. Raman Ramachandran, Director at K J Somaiya Institute of Management, alongside Prof. Sadhan K Ghosh of ISWMAW, Prof Gert Morscheck (Rostock University, Germany), Prof Raghunath K. Shevgaonkar (Provost, Somaiya Vidyavihar), C R C Mohanty (UNCRD Japan), Shigemoto Kajihara (President, JSMCWM, Japan) and Prof Misuzu Asari (JSMCWM), Bart De Jong (Consul General of the Kingdom of the Netherlands), Dr Prasad Modak (Environmental Management Centre), Dr Kare H Karstensen (Chief Scientist, SINTEF, Norway), Prof V N Rajasekharan Pillai (Vice Chancellor, Somaiya Vidyavihar University), Nandkumar Gurav (Assistant Secretary, Maharashtra Pollution Control Board) Sanjeev Kumar (Chief Manager, State Bank of India), Prof Prasanta Dey (Lead Partner, Going Global Project, Aston University, UK), (Agamuthu Pariatamby (Professor, Jeffrey Sachs Center on Sustainable Development, Malaysia), (CRC Mohanty, UNCRD Japan), shared insights on waste management and the



**Mumbai, 29th November to 2nd December 2023** – K J Somaiya Institute of Management hosted the 13th International Conference on Sustainable Waste Management & Circular Economy (IconSWMCE) and IPLA Global Forum 2023. This event served as a pivotal platform for discussions and knowledge sharing among diverse stakeholders, addressing global challenges such as resource exploitation, waste generation, increased emissions, and the impact of rising temperatures.

The conference was organized by the International Society for Waste Management Air & Water (ISWMAW) and the International Partnership for Expanding Waste Management Services of Local Authorities (IPLA), featured associate partners, including the Maharashtra Pollution Control Board, UNCRD, State Bank of India, SME Chamber of India, Chemical Engineering World, and SINTEF (Norway).



circular economy. Additionally, a Memorandum of Understanding was signed between ISWMAW and JSMCWM. The 4–day conference saw robust participation, with 380+ research and white paper presentations across 53 tracks from 44 countries, making it a hub of global insights and expertise.

Speaking at the conference, Raman Ramachandran Ph.D, Director, KJSIM, stated, “Hosting this conference underscores our commitment to sensitise business school faculty and students the importance of responsible citizenship, technology, business model innovation and entrepreneurship in sustainable waste management”.

**About the K J Somaiya Institute of Management:**

The K J Somaiya Institute of Management is one of the top 25 Business Schools and top 10 B–Schools in India. Located in Mumbai, it is dedicated to building a world–class research and teaching institution that is global in the reach of its ideas and universal in its service.

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Evolving Trends and  
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# Indian Purified Water Sector in 2023 and Opportunities in 2024

*Navigating through the waves of 2023, the Indian purified water sector steers amidst transformative changes and an escalating demand. This critical industry plays a pivotal role in ensuring access to safe and clean drinking water for millions. Being among the top 10 nations globally endowed with abundant water resources, India offers unmatched prospects. Its yearly utilisation of 750 billion cubic metres of freshwater, projected to escalate to 1.5 trillion cubic metres by 2030, signifies immense potential.*

*With growing water scarcity, pollution concerns, and technological advancements, the industry is expected to witness revolutionary prospects by 2024. In this very context, Liquiclear's LDI technology looks all set to create a revolution in the purified water sector. Let's dig into the details in this article.*

## **Liquiclear's LDI Technology: The Future of Sustainable Water Purification in India**

Over the past year, India's water purification sector has seen a significant upsurge in innovative technologies aimed at addressing the country's pressing water quality concerns. The market for water purifiers in India was valued at US\$3070.7 million in 2023. With a growth rate (CAGR) of 9.1% from 2024 to 2032, the leading market research firm IMARC Group projects that the market will reach US\$ 6880.3 million.

In the year 2023, significant strides have been made in witnessing pioneering advancements, notably highlighting the revolutionary potential of Liquiclear's liqui-deionization (LDI) technology. Specifically, LDI technology has surfaced as a transformative force, offering unmatched efficiency and sustainability in water treatment.

LDI technology combines the principles of deionization, presenting a novel approach to removing impurities and contaminants from water sources. Unlike other conventional methods, LDI technology showcases remarkable efficiency in purifying water, eliminating even the most stubborn pollutants, and balancing essential minerals to produce high-quality potable water.

## Exploring Liquiclear's LDI Water Purification and LDISF Water Softening Technology

Liqui-deionization (LDI) technology utilizes an electrical potential disparity method involving three sequential steps to eliminate impurities and ions from water, presenting a groundbreaking approach to water purification. This process commences with absorption, followed by desorption and subsequent backwashing.

Liquiclear establishes a new standard with its state-of-the-art LDI technology designed for electronic water purification, preserving essential natural minerals while boasting an impressive 67% reduction in energy consumption and a 50% increase in water production. This pioneering system continuously adjusts Total Dissolved Solids (TDS) levels, ensuring consistently high-water quality.

Furthermore, Liquiclear's LDISF technology for water softening achieves an 85% decrease in hardness without relying on resins or salt, concurrently reducing TDS by 50%. What's more, easy installation and minimal upkeep make these systems a hassle-free choice for consumers seeking optimal water quality.

## Revolutionising Water Purification: The Rise of Liquiclear's LDI Technology

Amidst the persistent pursuit of achieving cleaner and safer drinking water, liqui-deionization (LDI) technology stands out as a revolutionary solution, providing an effective, economical, and environmentally friendly option. As discussions persist regarding various water purification methods, Liquiclear's LDI Technology emerges as a compelling alternative to traditional purification systems, showing great promise in transforming the landscape of water treatment.

### Energy Efficiency:

Unlike conventional purifiers, LDI Electronic Water Purifier boasts remarkable energy efficiency. While conventional systems

demand substantial energy to push water through nano-sized membranes, resulting in higher electricity bills, LDI Electronic Water Purifier employs a more efficient process, significantly reducing energy consumption. This not only saves costs but also contributes to a more sustainable and environmentally conscious water purification method.

### Reduced water waste:

In comparison to the alarming water waste associated with traditional systems, LDI Electronic Water Purifier significantly minimises waste. By curbing excessive flushing, it conserves water resources, making it a responsible choice, especially in regions grappling with water scarcity.

### Faster Operation:

LDI Electronic Water Purifier outpaces conventional systems in water purification speed. Its efficient removal of impurities and ions enables faster operation, ensuring quicker access to clean, safe drinking water—particularly advantageous in high-demand scenarios.

### Membrane-Free Approach:

A significant limitation of conventional purifiers lies in their dependence on nano-sized pore membranes, which are susceptible to clogging and inefficiencies in filtering certain impurities. In contrast, LDI Electronic Water Purifier doesn't rely on membranes. Instead, it employs ion-exchange resins and deionization processes for comprehensive water purification, eliminating the need for membrane replacements and lowering long-term maintenance costs.



### **Tunable Total Dissolved Solids (TDS):**

The flexibility of LDI Electronic Water Purifier allows users to tailor the Total Dissolved Solids (TDS) in their purified water. This feature ensures water is free from contaminants while retaining natural minerals, enhancing taste and quality. Unlike RO systems, which can strip essential minerals, LDI Electronic Water Purifier offers a satisfying, natural taste.

### **Opportunities and Vision for LDI Technology in 2024 and Beyond**

The overarching goal of LDI Technology is to provide a groundbreaking, low-maintenance solution for innovative water purification. Its aim is to deliver safe, mineral-rich water to households without the drawbacks of traditional systems, ensuring water safety while preserving essential minerals, thereby redefining the accessibility and quality of clean drinking water for all.

As we enter 2024, the Indian water purification sector stands on the precipice of transformative growth. The opportunities presented by LDI technology in terms of LDI Electronic Water Purifier and LDISF Electronic Water Softener are vast and multifaceted, offering prospects for technological advancements, market expansion, collaborative initiatives, and sustainability focus.

Continuous research and development efforts aim to further enhance LDI technology, making it more efficient, cost-effective, and accessible to a broader spectrum of users.

The increasing awareness of water quality issues and the demand for sustainable solutions create fertile ground for the expansion of LDI technology across industries and regions.

Partnerships between government bodies, research institutions, and private enterprises can drive innovation and facilitate the implementation of LDI technology in diverse applications.

The emphasis on sustainability and eco-friendly practices presents an opportunity to position Liquiclear's LDI technology as a key player in the movement towards a greener and more water-secure future.

### **LDI Electronic Water Purifier and LDISF Electronic Water Softener: Evolving Landscape for a Sustainable and Water-Secure Future**

As the nation progresses in its efforts to combat water scarcity and enhance water quality, Liquiclear's LDI technology in 2024 emerges as a ray of hope, signalling a promising and influential year for India's water purification industry.

Embracing innovation and harnessing technological advancements such as LDI Electronic Water Purification and LDISF Electronic Water Softening Solutions, India strides ahead towards a future where clean, secure, and readily available water becomes more than just a necessity but a tangible reality for all.



### Waptema Water Expo Lucknow

7th – 8th November 2023

Venue: Indira Gandhi Pratishthan, Kathauta Chauraha Rd, Vibhuti Khand, Gomti Nagar Lucknow, Uttar Pradesh

<https://waptema.in/>

### Water Expo – Bengaluru 22nd – 24th November 2023

Venue: BIEC Bengaluru International Exhibition Centre, Bengaluru, India

<https://10times.com/water-today-s-water-expo-bengaluru>

### INDIA WATER EXPO 2023

Wed 20th – 22nd December 2023

Venue: Chennai Trade Centre, Ramapuram, Nandambakkam, Tamil Nadu

### International Conference on Water: From Pollution to Purification

7th – 10th December 2023

School of Environmental Sciences, MG University, Athirampuzha, Kerala

### Call for Proposals:

### Water Matters – Open Electives 2023

11th – 22nd December 2023

National Institute of Design (NID), Ahmedabad, Gujarat  
<http://openelective.nid.edu/>

### SRW India Water Expo 2023 7TH EDITION

20th – 22nd Dec 2023

Chennai Trade Centre, Nandambakkam, Chennai, India

### Smart Tech India

17th – 19th January 2024

Pragati Maidan, New Delhi, Delhi

### India Water Show (IWS)

10th – 12th January 2024

10 am – 6 pm

Auto Cluster Exhibition Center, H-Block, Chinchwad East, 181, Old Mumbai – Pune Hwy, MIDC, Chinchwad, Pimpri–Chinchwad, Maharashtra

### Waptema Water Expo 2024

22th – 24th January 2024

India International Convention and Expo Center, Sector 25 Dwarka, Dwarka  
New Delhi, Delhi

### WATER INTEC Feb. 2024

1st – 29th February 2024

CODISSIA TRADE FAIR COMPLEX, G.V. Fair Grounds, Avinashi Rd Coimbatore, Tamil Nadu

### Water Expo Pune 2024

8th – 10th February 2024

Deccan College Ground, Deccan College Rd, Ranjeet Nagar, Yerawada Pune, Maharashtra

### Water Today's Water Expo

28th February – 1st March 2024

SRW INDIA WATER EXPO, New No.23, Old, 10, 3rd St, Postal Colony, West Mambalam Chennai, Tamil Nadu

### Water Expo – Kolkata

28th – 29th February 2024

G9VW+45X Science city, Kustia Rd, East Topsia, Kustia, Kolkata, West Bengal

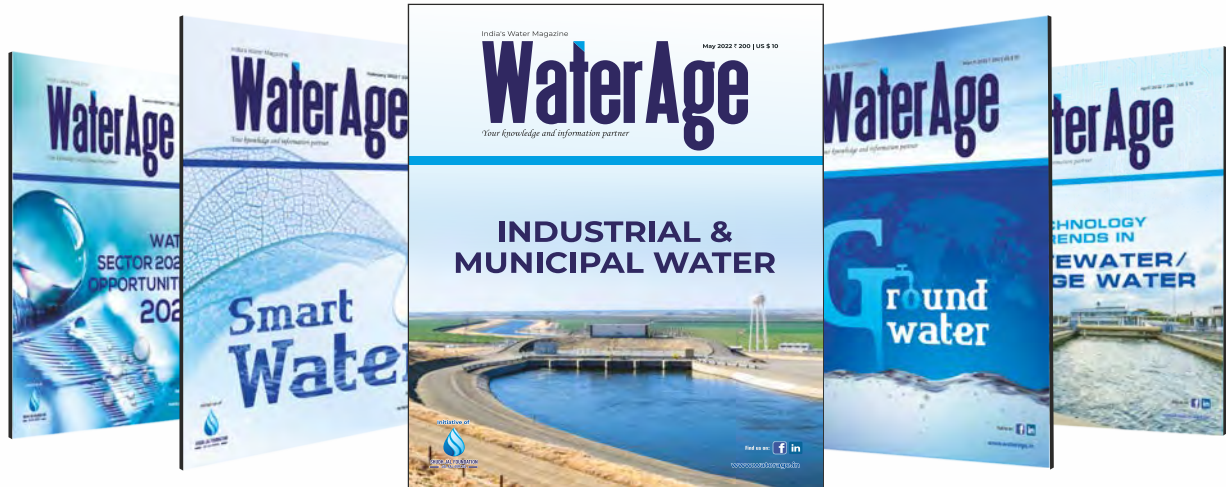
### WAPTAG Water Expo 2024

29th February – 2nd March 2024

Mahatma Mandir Convention and Exhibition Centre Managed by the Leela, Sector 13C, Sector 13, Gandhinagar, Gujarat



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**TID: 67193992 | Gujarat, India****Approx. value: INR 84.54 Cr**  
**Ahmedabad Municipal Corporation**

Engineering procuring constructing commissioning EPC of sewage treatment plant of 30 MLD capacity including operation and maintenance for ten 10 years in t.p. 43 f.p. 221+222 at sola area in north west zone of AMC.

**Tender Bid Submission Date: 30 Dec'23****TID: 67238674 | Gujarat, India****Approx. value: INR 84.54 Cr**  
**Ahmedabad Municipal Corporation**

Engineering procuring constructing commissioning EPC of sewage treatment plant STP of 30 MLD capacity including operation & maintenance for ten 10 years in t.p. 43a f.p. no 221+222 at sola area in north west zone of municipal corporation.

**Tender Bid Submission Date: 29 Dec'23****TID: 67393406 | Jharkhand, India****Approx. value: INR 131.68 Cr**  
**Water and Power Consultancy Services Indian Limited**

Construction of centenary building including internal water supply sanitary installations and electrical works storm water drains roads paths cycle tracks ug sumps at ISM

**Tender Bid Submission Date: 29 Dec'23****TID: 64532411 | Rajasthan, India****Approx. value: 1284.31 Cr**  
**Public Health Engineering Department**

Work of EMI at existing intake well at Chambal river raw water pipeline from intake to RWR 1 and RWR 2 at Dholpur main raw water pumping stations at RWR 1 an RWR 2 water treatment plant 135 MLD near RWR 02 5.0 MLD at Dholpur etc. pkg 1.

**Tender Bid Submission Date: 15 Jan'24****TID: 67544289 | Tripura, India****Approx. value: INR 28.09 Cr****Urban Planning and Development**

Treatment plants STP along with co treatment of used water and seepage with 5 years of operation and maintenance in three towns Dharmanagar Kailashahar & Kumarghat of Tripura.

**Tender Bid Submission Date: 29 Dec'23****TID: 67270041 | Gujarat, India****Approx. value: INR 130.23 Cr**  
**Gujarat Water Supply and Sewerage Board**

design construction and operation & maintenance of water treatment plant at Nagadiya and dron how and providing supplying lowering laying and jointing various d.i. PVC rising main and gravity main pipelines WTP RCC ESR RCC sump pump house compound wall supplying and erecting pumping machinery.

Augmentation of Bediya Machhundri regional water supply scheme with trial run of three months and 10 years of comprehensive operation & maintenance of entire scope of work including existing & new components for supplying water to all beneficiary villages & town.

**Tender Bid Submission Date: 06 Jan'24****TID: 67270062 | Gujarat, India****Approx. value: INR 82.68 Cr**  
**Gujarat Water Supply and Sewerage Board**

Work of MS di PVC raising main and gravity main pipeline water treatment plant RCC ESR sump pump house compound wall pumping machinery fitting work electro mechanical work including repair & maintenance of 10 years. Gujarati image

**Tender Bid Submission Date: 06 Jan'2024****TID: 67578302 | Tripura, India****Approx. value: INR 25.96 Cr**  
**Urban Planning and Development**

Design build operate dbo of sewage treatment plants stp along with co treatment of used water and seepage with 5 years of

operation and maintenance in three towns Khowai Ambassa & Teliamura of Tripura.

**Tender Bid Submission Date: 05 Jan'24****TID: 64425988 | Gujarat, India****Approx. value: RS. 840.00 Cr**  
**Ahmedabad Municipal Corporation**

Design build and operation of new 375 MLD sewage treatment plant and upgradation of the allied infrastructure including three terminal sewage pump station s with operation and maintenance for 10 years at Vasna for the city of Ahmedabad Gujarat

**Tender Bid Submission Date: 04 Jan'24****TID: 64425988 | Gujarat, India****Approx. value: RS. 840.00 Cr**  
**Ahmedabad Municipal Corporation**

Design build and operation of new 375 MLD sewage treatment plant and upgradation of the allied infrastructure including three terminal sewage pump station s with operation and maintenance for 10 years at Vasna for the city of Ahmedabad Gujarat

**Tender Bid Submission Date: 04 Jan'24****TID: 67382573 | Bihar, India****Approx. value: INR 128.04 Cr**  
**Bihar Urban Infrastructure Development Corporation Limited**

Construction of storm water drainage system for various town area Bihar under Atmanirbhar Bihar Saat Nischay 2.

**Tender Bid Submission Date: 09 Jan'24****TID: 67404143 | Bihar, India****Approx. value: INR 128.04 Cr**  
**Bihar Urban Infrastructure Development Corporation Limited**

Construction of storm water drainage system for various town area Bihar under Atmanirbhar Bihar saat nischay 2.

**Tender Bid Submission Date: 08 Jan'24**

Company	Page No.	Telephone	E-mail	Website
<b>Aadys Components Pvt. Ltd.</b>	1	+91 11 4155 1444	sales@aadys.co.in	www.aadys.co.in
<b>E-Procurement Technologies Ltd.</b>	50	+91 93745 19764	sales@TenderTiger.com	www.TenderTiger.com
<b>Indus Waterways</b>	Back Cover Inside	+91 172 5275055, +91 11 4552 4715	induswaterways@gmail.com	–
<b>Jai Maa Associates</b>	19	+91 98111 88819, +91 11 2568 2346	jaimaaassociatesdelhi@ gmail.com, jaimaa98gmail. com, info@jaimaaassociates. in	–
<b>Liquiclear</b>	5	+91 88009 42942	info@liquiclear.in	www.liquiclear.in
<b>Optimus Enviropro Pvt. Ltd.</b>	Front Cover Inside	+91 11 4155 1444	sales@optimusenviro.pro	www.optimusenviro.pro
<b>Rysa Infratech Pvt. Ltd.</b>	Back Cover	+91 11 4552 4715	info@rysainfratech.com	www.rysainfratech.com
<b>Triveni Constructions</b>	4	+91 98143 21749, +91 98141 32026, +91 172 4039 981	trivani_anand@yahoo.com, triveniconstructions.mohali@ gmail.com	–
<b>Vrise</b>	43	+91 8826527527, +91 9871195751	vriseengineers@gmail.com	
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## SERVICES TO PROVIDED BY CONSULTANT

- ▶ Detailed survey of proposed network of sewer line.
- ▶ Preparation of sewer network showing GL/IL.
- ▶ Location type design of manholes, intermediate sump well/lift well.
- ▶ Calculation of sewage generation.
- ▶ Type of treatment of sewage.
- ▶ 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.

## FIELD OF EXPERTISE



H.O.: SCO 146-147, Sector-34A, Chandigarh-160022, T.: +91 172 5275055, 4012755  
Corp. Office: 805, Bhikaji Cama Bhawan, Bhikaji Cama Place, New Delhi-110 066  
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