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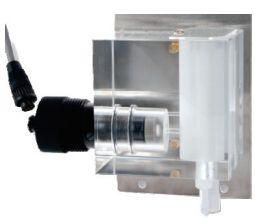

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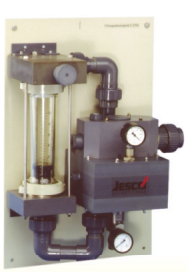
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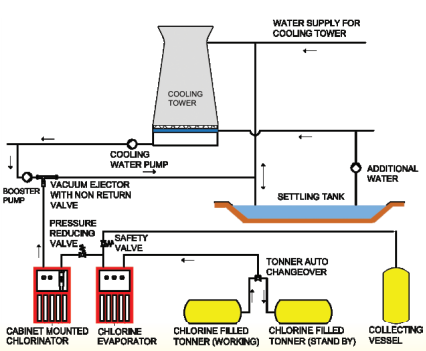
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17th EVERYTHINGABOUTWATER EXPO

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LETTER FROM THE BUSINESS HEAD

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Dear Readers,

On behalf of the entire team at EverythingAboutWater, I extend a warm welcome to all the participants to the 17th edition of the EverythingAboutWater 2022. I hope it would indeed be a rich and enriching experience for all stakeholders, in the water sector, to interact with each other in person after a gap of two years. The last two years have caused untold disruptions, which hampered the manner in which all of us conducted our respective businesses.

As our lives have started to slowly come back on track, the 17th edition of the EverythingAboutExpo is being held at Pragati Maidan, New Delhi. In this edition of the Expo the State of Israel is our country partner. The Expo is supported among others by the Ministry of Jal Shakti, Government of India. Even though the Expo is being held after a gap of two years, because of Covid-19, there will be close to 100 exhibitors and participating companies, from the water sector. International participation at the Expo, will be in the form of 25 international companies. This will be in addition to over 200 delegates at the conclave there will be close to 50 experts, from the water sector, who would be attending the event.

We hope that those who visit the Expo, between 4-6 August, will gain from the rich experience that will be in abundance, at the Expo, in person.

An important part of the Expo, will be the conclave, that would have, intellectually stimulating sessions. While one will gain intellectually by interacting, with experts, at the event, listening to the experts, from Israel, United Kingdom and India, who will share their views, at the conclave on important aspects concerning the water sector. We certainly hope that will be food for thought for many. It has generally been seen that exhibitions and events serve as a common platform, for likeminded individuals to interact and network.

The 17th edition of the EverythingAboutWater Expo will provide room for this and much more. For those looking to make a career, in the water sector, there will be the Aqua Career job fair. In addition to this there will be over 100 products, from the water sector, on display, which you can see for yourself. You could take home an assured gift from the Expo, in addition to happy memories.

I once again take this opportunity to extend warm wishes to all the participants, sponsors, exhibitors and visitors and thank them for being part of this event. We look forward to your suggestions, so that we can improve on them, in the next edition of the Expo. Welcome to the event and hope to see you there.

Nisha Aggarwal
(Business Head)


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MAKING THE MOST OF WASTEWATER



Dear Readers,

Hope you enjoyed going through our anniversary issue. As we get back to bringing out the regular issues of the magazine, we have tried to stick to the new design format that we started with our anniversary issue.

In this issue we have tried to cover an important topic, in the water sector - wastewater. For most of us waste water as the name suggests, is waste. However, considering that India is one of the most water stressed countries in the world, we need to make the most of wastewater and make use of the same, in our daily lives, so that the stress, specifically on groundwater reduces a bit and it gets a chance of recharge. The cover story in this issue, deals with that topic. Wastewater can be used for various non potable purposes like in agriculture, firefighting and so on. In India, the use of water is not used at a scale as in some other countries across the world but with proper awareness, especially about the benefits of the same, its use should increase even, in India. Till that happens, lets take lessons and learn, how wastewater is used, in overseas locations. As you would read in the international news section, Mayniland, a water services company, in Philippines, produces "New Water" which is drinkable and the water used to produce New Water is sourced from water that is used by households. There is also a story which deals with the challenges in India, in using recycled water in agriculture.

While making the most of wastewater, is the need of the hour, it is equally important to conserve fresh water, especially that we receive, in the form of rainfall. Rainwater harvesting is an important method through which, we can conserve water that we receive as rainfall. We have covered the same, in this issue and have dealt with issues like how you can set up a rain harvesting system, even in your house, which is an independent standalone structure.

Next month, between 4-6 August 2022, we are organizing the 17th edition of the EverythingAboutWater Expo at Pragati Maidan, New Delhi. The Expo is supported by Ministry of Jal Shakti, Government of India and the country partner is the State of Israel. On behalf of the entire team at EverythingAboutWater I would like to take this opportunity to extend a warm welcome to all participants, exhibitors and visitors at the Expo. Apart from providing a common platform, to network, there will be a conclave, at the Expo, where experts from India, Israel and the UK, will share their views on issues concerning the water sector. We hope to see you all the Expo.

Do go through the pages of this issue and we would love to hear from you. If you have anything to say to us, please do drop in a mail to editor@eawater.com

thanks & regards,
Pankaj Anup Toppo (Content Head)

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WATER NEWS

A LOWDOWN ON SELECT EVENTS RELATED TO THE

Plastic Creating Havoc in Pune

Even though heavy rains lashed the city, this monsoon, the impact of the downpour brought to light the status of clogged drains, in the city. The primary reason that was responsible for clogged drains was plastic. Even though there has been a countrywide ban on use of single use plastic in the country, from 1 July 2022 plastic used in the past continues to haunt most of us, more so when it rains. Some of the items that were responsible for choked drains in Pune city were single use plastic cups, gutka packets, chips packets and so on.

It is estimated that of the more than 1600 tonnes of waste that the city of Pune generates, around 180 tonnes is plastic waste. Even though the PMC has opened close to 200 material collection centres at close to 20 locations, for recovery, reuse and recycle of solid waste, plastic waste continues to be littered across the city.

Move to Remove Structures Along Rivers and Water Bodies

Cloudbursts during monsoons and that too in the mountainous regions of the country have become a common phenomenon. Normally could bursts are followed by large scale destruction, in and around the areas where it happens. For example, in this season, the state of Himachal Pradesh, had witnessed atleast 2 instances if cloudburst, one each, in Kangra and Kullu. In a move that could reduce the destruction that is accompanied after a cloud burst, there has been a move to remove unauthorised constructions and



FROM INDIA

WATER SECTOR FROM ACROSS THE COUNTRY

encroachments along rivers and rivulets. There is also a move to take the help of advanced technology that could help in forecasting cloudburst and thereby save lives.

NGT Appointed Panel Turns Down Two Proposals

A panel appointed on the orders of the National Green Tribunal (NGT) has turned down two proposals on grounds that they could affect the Yamuna flood plains in Delhi. The said proposals include a power transmission line and an elevated road along the river banks. The petitioner who had brought this matter to the NGT had maintained that building an elevated road along the river banks was "against the ecology of the river." and that, it would reduce the expanse of the floodplains.



Reason for turning down the proposal. One of the reasons why the proposal to build an elevated road along the river bans was turned down was largely because the floodplains, of any river, are an ecosystem, in themselves and are important for groundwater recharge. Further when the rivers swells, to massive proportions, especially during monsoons, these floodplains provide the swelled river, the required space and any construction on the floodplains could affect the flow of the river. Also construction of any form is not permitted on the flood plains and in this, the Delhi Development Authority (DDA) has marked it as Zone O. Even the proposal to have a transmission line over the floodplains was turned down because it was aligned too close to the river which could hinder the flow of floodwaters.

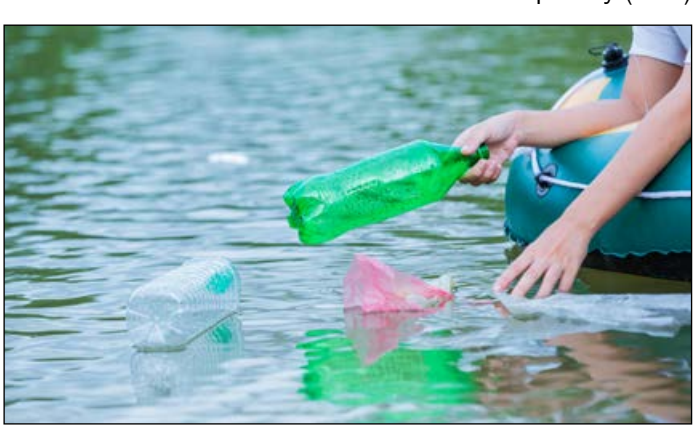
Revision in bulk water use tariff in Haryana

Tariff for bulk water use, of surface water, have been revised recently by the Haryana Water Resources Authority. Tariffs were last revised, in the state, in 2018. In the recent move, tariffs were revised by 100% for use in brick making, pisewall building and for construction. It needs to be noted that the tariff in 2018 was INR 1,500 per 100 cubic metre (cum). It now stands at INR 3,000 per 100 cum. To give an idea of revised prices, for different users. It will be INR 4,000 per 100 cum for the beverage and bottled water industry. On the other hand, it now cost the power plants INR 2,000 per 100 cum. And for the railways and the army the cost would be INR 1,500 per 100 cum. What needs to be however, noted that water that would be used for drinking purposes by the army and the railways will now cost INR 100 per 100 cum, which is an increase of 400% from 2018. There is however, no change in tariff on supply to other states and fish ponds. In case of treated wastewater (TWW), the rate has been hiked from INR 2 per KL (kilolitre) to INR 4 per KL at the STP site, and from INR 3 per KL to INR 5 per KL at the doorstep.

Cleaning of Sabarmati River: INR 282 crore Spent in the Last 3 yrs

In a written response to a question raised by Shaktisinh Gohil, Congress MP, Rajya Sabha, Hardeep Singh Puri, Union Minister for Housing and Urban Affairs had stated that the INR 282 crore have been spent, in the last three years, on the cleaning of the Sabarmati river. It was also clarified that works amounting to INR 179 crore have already been completed. Of the works that have been completed towards cleaning the Sabarmati river.

Of the completed works, to clean the Sabarmati River, the most notable is the construction of a 155 million litres per day (MLD)



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sewage treatment plant (STP), at Pirana. It cost about INR 151 crore, to built this STP. this cost was shared by the Centre and the Ahmedabad Municipal Corporation (AMC) in a 60:40 ratio. Construction of another STP, under the Atal Mission for Rejuvenation and Urban Transformation, with a capacity of 25 MLD has also been completed near Sankarbhuvan, Shahpur, at a cost of INR 27.5 crore. Cost of this STP was shared by the Central and State Government and the AMC. Further, work on fixing gates of the stormwater outlet at Dafnala Behrampura and Hansol have also been completed.

Some of the works that are still underway include cleaning of the green waste which is floating, in the river. It needs to be noted that, in the past three years, the AMC has already spent INR 4.81 crore towards undertaking cleaning initiatives, in this regard. Further work on construction of a 60 MLD STP near Kotarpur and a 30-MLD Common Effluent Treatment Plant in Danilimda, need to be completed.

NGT Intervenes to Protect Water Bodies

The National Green Tribunal (NGT) has directed the Hyderabad Metropolitan Development Authority (HMDA) and the district collector, Ranga Reddy to take steps towards protection of water bodies. The NGT did not stop at this. It also marked the water bodies, as per survey records, on Google maps and to check if the water bodies, reflected in the survey records, were aligned. It also asked to produce original records and a copy of the village map that showed Mamasani Kunta along with copies of D sketch and filed measurement book before the next hearing date. The NGT maintained that it is getting very difficult to restore the water body on account of the developments that are taking place. The NGT maintained that if the concerned personnel did not file the report, then they are to appear in person before the tribunal to show cause as to why action should not be taken against them for non-compliance of the direction issued by the tribunal.

MCM to Begin Repairs of Rainwater Harvesting Systems in Public Buildings

Maintenance and repairs work of rain harvesting systems, in public buildings, falling under the jurisdiction of the Corporation, will soon be started by the Municipal Corporation of Manesar (MCM). The work to carry out the work will be given to a private company. The tender for the same has been floated and the entity, to whom the work will be handed, will be finalised soon. For the system to function to their optimum levels, they need regular repairs and maintenance. Apart from repair and maintenance, if need be, redevelopment of structures would also be looked at.

Haryana to Spread Awareness About Decline in Ground Water Level



A lot has been spoken about declining groundwater levels, in India. Now the state of Haryana plans to raise awareness levels about declining groundwater levels, in the state. And for the this the state plans to do this, in an aggressive and effective manner. The tools used to spread awareness would be information, education and communication.

Himachal Pradesh Records 2,763 Incidents of Forest Fires This Year Between April-June

The hill state of Himachal Pradesh recorded 2,763 incidents of forest fires, between 1 April-30 June, this year. This is the highest number of instances of forest fires being recorded, in the state, since 2007. It also needs to be noted that in previous years (during the entire year), instances of forest fires, were much less compared to 2022. To give an idea, in FY 2021-22, 1,275 incidents were reported and 1.045 incidents were reported, the previous year. The previous highest reported incidents of forest fires, in a year, in the state was 2,544 in 2018-19. The previous high prior to 2018-19 was 1,906 incidents, reported in 2009-10.

The forest fires this year affected around 23,000 hectares of forest area and even large swathes, in plantations. Also, three forest officials lost their lives, while trying to control the fire. As regards the increased incidents of forest fires, this year, forest officials blame it in on dry weather spells, negligence by humans or wilful destruction. Locals on the other hand blame it on large scale development projects that typically disturb the ecology, in an area. With 66% of the state being covered by forest fires, apart from affecting livelihoods, also has a detrimental effect on the ecology of the area.

To give a breakdown of which districts saw the maximum incidents of forest fires, Dharamshala with 618 incidents, topped the charts. Dharamashala was followed by Chamba (522), Mandi (364),

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Shimla (286), Hamirpur (285), Rampur (190), Bilaspur (151) and Solan (110).

9% More Rainfall More This Year but 85 Still Dry



As per data by the Indian Meteorological Department (IMD), the country has received 9% more rainfall since June 2022. What however, striking is that even though the amount of rainfall received, in the country, is 9% more, 85 districts in the country have not received adequate rainfall. Heavy rainfall had been reported in parts of Madhya Pradesh and Maharashtra. Infact heavy downpour and waterlogging was reported from Gadchiroli (Maharashtra). There were also reports of the Mancha river overflowing the highway connecting Bhopal to Betul, in Madhya Pradesh. In comparison, Delhi's luck with the monsoon seems to be not that great. The monsoon did arrive, in the political capital of India but its distribution was largely uneven. While Noida, in Uttar Pradesh, received heavy rainfall, parts of Delhi like Dwarka, Palam and Najafgarh were largely dry.

NMCG approves projects to Control Pollution

The National Mission for Clean Ganga (NMCG) approved projects to control industrial and sewerage pollution, amounting to INR 38 crore. This project will make use of new technologies to counter industrial and sewerage pollution and would also include afforestation and development of Kalindi Kunj Ghat. So this will include, developing the landscape, at the ghat, create eco-friendly seating, put bins in place, have shaded areas and build plantations. To counter industrial pollution, a modular effluent treatment plant has also been approved. The effluent treatment plant will treat wastewater generated by the textile industry, in Mathura. Another project titled "Afforestation Programmes in States of Uttar Pradesh and West Bengal 2022-23" which would deal with developing plantations, building capacity and create awareness along the Ganga, in the two states was also approved. The project which was approved at an estimated cost of INR 10.30 crore would at a macro level will stress on improving the ecosystem and developing the same along the Ganga, in the two states.

HMWS & SB Take Steps to Provide Clean Drinking Water in Monsoons

It is always a challenge to provide clean drinking water, during monsoons. In this regard the Hyderabad Metropolitan Water Supply and Sewage Board (HMWS & SB) to ensure that that good quality water is supplied through the city has adopted a three-step chlorination process. Towards this, officials of the HMWS & SB) visited areas in the Patigadda reservoir to check for water quality. While the first chlorination process is done at the water treatment plant, the second one is conducted at the main balancing reservoirs and the third one is at the service reservoirs. In view of the incessant rains, officials have been asked to be on alert. Special attention is also being given by the board, in slums and in low lying areas. Apart from conducting a three stage chlorination process, awareness programmmes are also being run to sensitize people about benefits of using chlorine tablets to purify water. During this monsoon season special "Monsoon Safety" teams, with five members each, have been formed, that would provide 24*7 assistance, when required.

Microplastic in Farmlands in Bihar

Environmentalists have raised alarm bells after microplastics have been found in farmlands, in Bihar, especially in districts of Buxar and Bhagalpur. Presence if plastics in farmlands is being blamed to extensive use of plastic. It must be noted that single use plastic has been banned in the state from 1 July 2022. Damaging effects on human health due to the presence of microplastics, in farmlands cannot be ruled out.

No Dumping of Civic Waste in Bhatti Mines, Delhi



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The proposal by the erstwhile South Delhi Municipal Corporation (SDMC) to dump inert civic waste, in the now abandoned Bhatti mines, in south Delhi close to its border with Faridabad (Haryana) was turned down by the Delhi Ridge Management Board (RMB). The Bhatti mines is now part of the Asola Bhatti wildlife sanctuary. The Lieutenant Governor of Delhi, G V Saxena had issued directions, to put in place a plan that would dwell into developing abandoned mines that could act as reservoirs where rain, flood and storm water could be stored that would help in recharging ground water. Also once developed these sites could be developed into world class eco-tourism sites. Bhatti mines is spread over an area of 2,166 areas. Mining in the area was stopped around 35 years back and the Government notified the area as a wildlife sanctuary in 1991. Over the years these abandoned mines have become eco-sensitive zones and is home to various flora and fauna, including different migratory birds, in winters and also leopards. The MCD, in 1994, had also requested the Government to use these mines for solid waste management facilities, which was however, turned down, even at that time.

Rivers in Munnar, Kerala, Get a New Lease of Life

Located at a height of 1,532 metres above sea level, Munnar, if often called Kashmir of South India. The place is home to tea plantations, pristine rivers which not a long time ago had vanished which had prompted a disappointed Chief Minister of the state, V S Achuthanandan, in 2007 to ask where are the three rovers that make the town of Munnar. The place gets its name from the Malayalam words 'Moonnu Aar', which means three rivers. It refers to the location of the place which is the confluence of three rivers-- Nallathanni, Kannimala and Kundala. The Muthirapuzha river is formed by the confluence of these rivers, and it flows through the heart of Munnar. Thanks largely to the efforts of the state water resources department, under the "Operation Smooth Flow", the three rivers have received a new lease of life. The encroachments on the Muthirapuzha river were so high that it caused floods in 2018 that had forced around 30 families to vacate their houses. Following the floods, in the river, a report was submitted, to the government, which spoke of steps that needed to be taken to remove encroachments along the river to give it a fresh lease of life. Once this was approved, the Muthirapuzha river and its tributaries where brought under the ambit of the project "Operation Smooth Flow." Funds for this project, amounting to INR 55 lakh, were provided from the state disaster relief fund and work, under this project was completed in three months.

No Industrial Units Near Mattewara Forest, Punjab

The Punjab Government has banned any industrial unity near the Mattewara forest, Ludhiana. This was done so ensure that water in the area does not get polluted. It was must be noted that there were wide spread protests after the proposal to set up industrial units, near the Mattewara forest had come up. The state Government will now allow a new piece of land for the said textile park that was proposed near the Mattewara forest. Now in the land that was acquired for the textile park, around 550 acres will be used to develop a biodiversity park and will given back to the villagers.

Government Schools Fail Water Test in Mohali

In a bacteriological and chemical test. conducted at the State Public Health Laboratory Kharar, samples collected from 12 schools failed the test. The samples to conduct these tests were collected from water taps that were running, overhead taps and water coolers. In the samples that failed the test, bacterial contamination was found. There was also a case where the pH value was low, at 6.4 and TDS was even lower at 17.8. Most of the schools that failed the test were either primary or middle schools and all of them were located in rural areas. Water especially those with bacterial contamination pose a serios health risk of contracting water borne diseases like cholera, jaundice and others.



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LANXESS Increases Prices for Ion Exchange Resins and Iron Oxide Adsorbers

Specialty chemicals company LANXESS will globally increase its basic prices for all Lewatit ion exchange resins and Bayoxide iron oxide adsorbers for water treatment applications by approximately 10 percent. The price increase will be valid for all new orders placed starting July 1, 2022. Recently, the company announced the introduction of a monthly variable surcharge, to compensate the extraordinary cost increases in raw materials, energy and transportation. The monthly variable adder will be maintained and will be adjusted based on the most relevant input costs on a monthly basis. Customers will be contacted individually. The LANXESS Liquid Purification Technologies business unit is one of the world's leading global solution providers for water treatment and liquid purification. Ion exchange resins and iron oxide adsorbers are used in numerous industries and applications to purify water and other liquid media effectively.

Presence of Harmful Chemicals in Tap Water

A recently released study found nonylphenol (NP) in the tap water samples collected from 12 locations, in the country. Of those 12 location two locations were from Delhi, where the chemical found was in high concentration. The two locations in Delhi were Indraprastha, in New Delhi and Balbeer Vihar, in northwest Delhi. Nonylphenol is a toxic substance and is harmful for human health, To be more specific, it affects the endocrine system, in the human body. Even the United Nations Environment Programme has declared nonylphenol a chemical of global concern. Nonylphenol is typically used in production of detergents, wetting agents and for manufacturing of plastic.

40 Lakh Litres of Water Went into Dousing Fires at Dadumajra

Dumping sites in urban areas is not only an unpleasant sight to see but they also pose an environmental health hazard. Under the Right to Information Act, Amit Sharma, a management consultant collected and collated data on the amount of water that was used to douse fires at the Dadumajra dump, in Chandigarh. As per the data collated over a period of six years approximately 40 lakh litres of water was used to douse fires at the site. Water used for firefighting is typically taken from tubewells and this water could have otherwise used to meet the drinking needs of residents. To give an estimate the water used to douse fires, over six years, was enough to meet the daily requirement of water of over 16,000 people.

Ghaziabad uses only One-Fourth of the Water it Treats

Considering that India is one of the most water stressed nations in the world, it makes all the more sense that we as a country make the best possible use of treated water. The reality on the ground is very different. Take a look at the figures. Ghaziabad uses only 25% of the water it treats for horticulture, construction and industrial activities. The rest of the water makes its way into the Hindon river. Similarly, Noida makes use of only 20% of the water it treats. So in these two districts, of Delhi NCR, requirements of non-potable water is met by groundwater and by water supplied from the Ganga river. More reliance on treated water (read non potable water) and on potable water coming from the Ganga would have meant less dependence on ground water that has gone down at an alarming rate, in the region. The average depth of ground water level in Ghaziabad is around 30 metres and in some areas, it is as low as 45 metres. That's not all. In a survey by the Ghaziabad Municipal Corporation, it was found that of the 100 wards, 63 faced water scarcity. This raises the question as to why does Ghaziabad use only 25% of the water, it treats? Surely treated water should be used more efficiently than how it is used, in the present day.

Haryana CM Launches Drip Irrigation Programme



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A more judicious use of water, in agriculture is surely the need of the hour. In this regard ML Khattar, Chief Minister of Haryana, launched a state level programme ion drip irrigation. The programme is aimed at creating awareness about the programme among farmers, In this regard a one day seminar and demonstration was organised across 7,500 locations, across the state, especially in areas of the state where the water table is below 100 ft. 1,445 villages, where the water table is below 100 ft, have been identified for implementation of drip irrigation under the scheme. In addition farmers are also being motivated to grow crops that consume less water.



Sewer Lines to be Laid in 39 Unauthorised Colonies in Delhi

In a move that could reduce pollution, in the Yamuna river, new sewer lines will be laid in four villages which includes 39 unauthorised colonies. In addition, sewage treatment plants (STPs), in the city will also be upgraded. The six STPs that will be upgraded are in Kondli, Coronation, Rohini, Pappan Kala, Narela, and Nilothi. Their capacity will also be increased from 160 million gallons a day (MGD) to 205 MGD. Apart from upgrading and enchancing capacities of the STPs, lakes will be developed near Okhla STP, so that the groundwater gets recharged. Also treated water from the STP will be released into these lakes. And any excess water will be released in the Yamuna river.

Schneider Electric brings Green Yodha Yatra to Bengaluru

Aligned to the Ministry of Jal Shakti's vision of efficient and sustainable water management, Schneider Electric, the global leader in digital transformation of energy automation and management has brought its pan-India roadshow-Green Yodha Yatra to Bengaluru. Creating awareness on the need to ensure sustainability in the water segment, the initiative will serve as a discussion forum to talk about the need to adopt digital technologies for reducing carbon emissions.

Launching the Green Yodha Yatra in Bengaluru, Shri. Rakesh Singh, IAS, Additional Chief Secretary, Urban Development and Water Resources & Irrigation, Government of Karnataka said, "In a state like Karnataka or a city like Bengaluru, water management becomes even more important and relevant compared to other parts of the country as the state is the second most arid area after Rajasthan and at the same time some parts face severe rainfall. There are still parts of Karnataka where people have to walk to get access to drinking water. There is no dearth of money to implement projects, the need of the hour is to have a vision for effective water management. Let us all work together to make it happen."

Water utilities today are stressed due to the unavailability of fresh water. This impacts not just industries, but the common man's access to clean water, which is key to both life and health. Addressing these challenges, the Ministry of Jal Shakti has initiated a sustainable and efficient water management practice for ensuring the availability of safe, reliable, and affordable water. To drive this vision, Schneider Electric, along with APAC, has initiated the Green Yodha Yatra with an aim to reach out directly to water and wastewater organizations in Bengaluru. Through this, the company aims to demystify sustainability in the water and wastewater sectors by providing hands-on experience on the IoT-enabled software and technology - EcoStruxure Automation Expert, word's first universal automation platform.

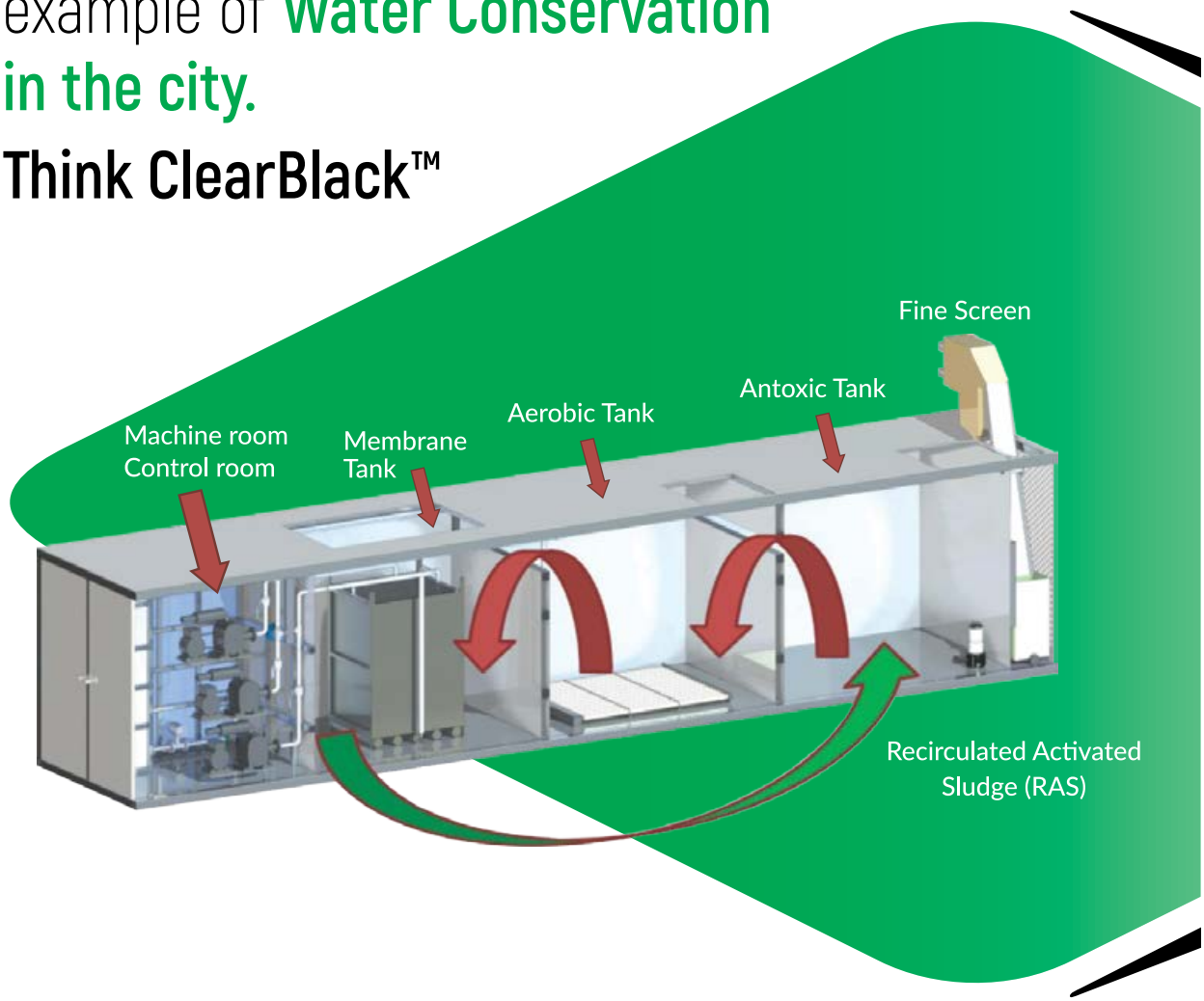
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water management, Senthil Kumar V, Vice President, Industrial Automation, Schneider Electric India said, "At Schneider Electric, sustainability is at the core of our purpose, culture and business as we continue walking on the path of building an inclusive and sustainable world. The Green Yodha initiative has enabled us to raise awareness and encourage the use of sustainable alternatives across segments. We believe that digitisation has the potential to transform industries. The time is now for the WWW segment to leverage this and make impactful decisions to conserve and protect the most precious resource available to humankind. We are honoured to support the Ministry of Jal Shakti's mission of achieving sustainable water management through our IoT enabled EcoStruxure Automation Expert platform that ensures efficiency, sustainability & resilience in water sector. Our aim is to bridge the gap between different water processes and digitization to make WWW facilities sustainable and efficient. Further, the comprehensive curriculum will provide first-hand experience on software and technologies related to water governance and conservation; efficient operation and management of water and wastewater treatment plants; and efficient desalination processes using digitisation."

EcoStruxure Automation Expert helps water and wastewater plants overcome efficiency roadblocks by combining complete lifecycle management, seamless IT and OT integration, and improved automation system diagnostics that can future-proof operations across the WWW segment. It can also enable WWW operators to cost-effectively modernize rigid and outdated operations without regard to brand.

Schneider Electric's Green Yodha initiative was launched in conjunction with the vision of building a community of Eco-Warriors that unite conscious citizens, businesses, and institutions to take collective action to adopt energy efficiency, renewables and solar, automation, digitalization, and a new world of electricity to meet both individual and corporate sustainability goals.

Danfoss' climate targets receive approval from SBTi

Danfoss announced that its science-based target has been approved by the Science Based Targets initiative (SBTi). The Science Based Targets initiative (SBTi) has validated that the corporate greenhouse gas (GHG) emissions reduction targets submitted by Danfoss A/S are in conformance with the SBTi Criteria and Recommendations (version 4.2).

The science-based target provides a clearly defined pathway for companies to reduce GHG emissions in line with the goals of the Paris Agreement and help to prevent the worst impacts of climate change.

The SBTi's Target Validation Team has determined that Danfoss' scope 1 and 2 target ambition is in line with limiting warming to 1.5°C. As part of the science-based target, Danfoss will reduce absolute scope 1 and 2 GHG emissions by at least 46.2% by 2030 from a 2019 base year. In addition, Danfoss has committed to being carbon neutral in scope 1 and 2 emissions by 2030. Danfoss will reduce absolute scope 3 GHG emissions by 15% in the same time frame.

Danfoss President and CEO Kim Fausing said: "We have built a strong foundation to achieve our science-based target, an important pillar of Danfoss' new 2030 ESG ambition. Our science-based target expands our GHG emissions reduction goals beyond our own business, across the entire value chain. It reflects our continued dedication to taking action on climate change and becoming the preferred decarbonization partner to our suppliers and customers."

Ravichandran Purushothaman, President - Danfoss India Region said: "In tandem with its 2030 ESG goals, Danfoss is committed to achieving new heights for energy efficient power and climate change solutions. Through the Science-Based Target initiative (SBTi), we aim to help transform India into one of the most energy-efficiemt countries in the world. Our integrated energy efficient systems are helping cut down on consumption, reduce carbon footprint and more importantly creating a better tomorrow. Danfoss believes that these initiatives will accelerate India's decarbonization and Green Transition exponentially.

"Martin Rossen, SVP, Head of Group Communication & Sustainability said: The validation of our science-based target confirms that Danfoss' climate ambitions are in line with science and the goals of the Paris Agreement. But it's more than order in our own house. Customers, employees, and the public increasingly demand transparency and reward action on ESG. For good reasons. Companies can't simply get away with saying that they act, they need to document it. The science-based target provides a level playing field. It gives a competitive edge to the companies that truly care and take action. United Nations Secretary-General Kofi Annan once said who cares wins, and we believe that companies that care will win."

Danfoss is poised to build a Greener India by promoting energy efficiency, implementing all available energy efficiency solutions and sourcing renewables. The company has been taking the necessary measures and deploying high-end technologies for facilitating the adoption of energy-efficient solutions in the country

Danfoss India is scaling up its sustainability drive across employees, partners, customers, industry, and other stakeholders to bring about a green transformation across the nation. to create a climate and environment friendly India for future generations ■

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A WRAP UP OF SELECT EVENTS IN THE FIELD

Potable Water from Waste Water

This could be the new reality, especially considering the stress on fresh water that is there across the globe. Mayniland, a water services company, in Philippines, produces "New Water" which is drinkable and the water used to produce New Water is sourced from water that is used by households. To be more precise, the company collects used water to produce New Water from the Paranaque Water Reclamation facility, in Philippines. The used water, once collected, is then put through a Modular Treatment Plant, which is a more rigorous purification process. New Water has recently been issued a certificate of potability by the Paranaque City Health Office. What this means is that the water so produced, is safe for human consumption. New Water produced by the company will now be distributed through taps, to its customers. What this means that the New Water so produced will augment the supply coming from Angat Dam. What more the New Water so produced will be mixed with treated water sourced from the company's treatment plants. The water so blended would be supplied to Barangays San Dionisio and San Isidro. It is expected that around 39,000 people are expected to benefit from this additional supply. Infact, Mayniland has plans to encourage the reuse of potable water, in a bid to augment supplies, so that they can meet the growing demand for water.

While the concept of treating used water, to an extent that its potable, is being done for the first time by the company, in Philippines but this has already been done in countries like Namibia, South Africa and in some regions of the United States. Mayniland also did a series of surveys, with relevant stakeholders to gauge the social acceptability of water that is treated to make it potable. It must be noted that Namibia has been the pioneer in making potable supply water from treated water. Infact about 24% of Windhoek, the capital of Namibia, drinking water needs are met through recycled treated water. Namibia has been making use of used water that is treated, since 1968. On the other hand, Singapore produces NEWater, to meet its demand for water.

Global Functional Water Market to Witness Major Jump in the Next 10 Years

A study by Global Insight Services, on the Global Functional Water market, predicts that this space is expected to witness a major boost in the next years and is expected to reach USD 31,264.2 million, globally, by 2030. Before getting into details of the findings, its important to understand, what is Functional Water? To put in simple words, functional water is water that is enhanced with certain ingredients, that would provide health benefits. Some of the health benefits that this water provides, is that it helps in improving hydration, helps in weight loss and boosts energy levels. The ingredients used to enhance water could be minerals, vitamins, herbs amino acids and so on. The water so produced by the and marketed as functional water is typically and healthy alternative to sugary beverages that are available in the market. Among the notable trends about Functional Water that are visible, which the report makes a mention of is that this water is marketed as a healthy option over sodas and sugary drinks and that that it is sold in a manner which is convenient to consume. For example,



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OF WATER FROM ACROSS THE GLOBE

it is packed in single serve bottles which means that it can be consumed, even when one is on the move.

The key drivers that are expected to drive the growth of this segment, is the growing trends towards wellness products and the increasing awareness about environmental concerns. With the increasing shift of consumers moving towards products that promote wellness, the study points out that people are ready to pay a premium for a product that promotes such needs. Some of the key players in the Functional Water space are companies like Coca Cola, PepsiCo, Nestle, Group Danone, Sunny Delight Beverages and so on.



Most Successful New Product Launches in 2021

2021 was typically the year when the fight against the Corona virus started, in many countries, with the help of vaccines produced to combat the virus. Those were the first small steps that all took towards returning to a life of normalcy. Chicago based market researcher, brought out some interesting findings in its new study. It must be noted that 2021 was the first full year, plagued by the Covid pandemic, for which their report (2021 New Product Pacesetters™) captured the data. As per the findings of the study beverages and plant based frozen foods were among the most significant products that were launched in 2021. It must be noted that the 2021 report is in its 27th year of publication. To delve deeper into the findings of the study, launches in the beverages category stood out in 2021. In the beverages section, launches in alcoholic and non-alcoholic beverages were popular. With regards plant-based beverages, Oatly oat milk was among the popular ones.

In the beverages category, sparkling beverages were very popular. One of the notable launches in the sparkling water category was Coca-Cola's AHA. Launches in tea and coffee were also popular. Performance enhancing drinks were also popular in 2021. Some of the notable products that witnessed launches, in 2021, in this category, include Pedialyte Sport which is used for rehydration, Gatorade Bolt24, Powerade Power Water and so on. The beverages section, also saw major launches of zero sugar drinks.

As Temperatures Reach New Highs, Forest Fires Create Havoc

As wild fires spread across Europe, heat waves set temperatures across Europe and United Kingdom. The impact of these heatwaves can be gauged from the fact that London recorded its hottest ever day on 19 July 2022, when the city recorded 40.3 degrees centigrade. Belgium too issued the code yellow alert for storms after it recorded temperatures, in excess of 39 degree centigrade. Infact firefighting officials have been having a hard time tackling forest fires that have spread across tens of thousands of hectares across countries like Portugal, Spain, Croatia, Hungary, France, United Kingdom, Greece and Morocco. Countries like Portugal and Spain recorded temperatures in excess of 45 degrees centigrade. The rising temperatures apart from causing deaths, major discomfort and hardship to people have had other implications as well. To give an example, authorities in the French Alps had urged climbers to Mount Blanc, the highest mountain, in Europe had

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request climbers to postpone their trips as the areas witnessed repeated rockfalls, a result of unprecedented climatic conditions and drought. This request, by the French authorities, was necessitated after that there reports of one a an alpine glacier, in Italy gave in, killing 11 people. Experts blame the caving in of the glacier to climate heating.

Remove Single Use Plastic From National Parks

Days after ban on single use plastic was banned in India, in a major policy change, the Biden administration issued orders to phase out single use plastic from the country's national parks by 2032. As a result of this order, single use plastic would gradually be removed. Infact, single use plastic and polystyrene foam products contribute to the almost 70 million pounds of garbage that are is generated, in national parks, in the United States.
Canada Bans Single use plastic

Water Taxi in Kelowna, British Columbia

If you happen to visit Kelowna, in British Columbia, Canada, don't forget to take a ride on the new water taxi that has been launched by Okanagan Lake Boat Rentals. You can hire this water taxi and take a ride along the lake and enjoy, the various views that this place offers. This taxi service is open for both locals and tourists. Another attraction at the lake is Tiki Bar and those planning to vist it, can hop on to the newly launched taxi service and head to Tiki bar. Further, the taxi service provides pick up and drop to places like Hotel Eldorado, Downtown at King Taps, the Tiki Bar at Lake Okanagan Resort, McKinley Beach, and Fintry.

Global Sparkling Water Expected to Reach USD 67.6 billion in 2030

The new study by InsightAce Analytic, predicts that the global sparkling water market is expected to reach USD 67.6 billion by 2030. The market size, was estimated to be valued at USD 29.3 billion, in 2021. While the concept of sparkling water is not that common, in India, it is fairly common overseas. Many believe that sparkling water is the best alternative to carbonated drinks and alcoholic beverages. Some of the major players of sparkling water, at a global level are Nestle, PesiCo Inc, The Coca-Cola Company, Evian and so on.



One of the major reasons for the market size reaching USD 67.6 billion by 2030, has been predicted to be the growing preference of sparking water over carbonated drinks. Moreover, with people becoming more conscious about their health, changing lifestyles and the general trend of choosing healthy product would act as propellors for this market. one needs to however remember that sparkling water is a little costly than other types of water, plus lack of awareness about the product and its availability, could act as dampeners. The markets that are would be important for sparkling water, during the forecast period, would include the North American region Europe and Asia Pacific regions. The report also mentioned the fact to meet the demand, especially from health-conscious players major players, in this space, are developing new products. Citing the example of PesiCo, the report mentioned that the company, under its bubbly brand, in February 2021, introduced five new caffeinated sparkling water flavours--mango passion fruit, blood orange grapefruit, triple berry, blueberry pomegranate, and citrus cherry flavours.

Water Sector Needs to Attract Young Talent

One of the UK water sector's 'rising stars' has called on the industry to find new ways to attract young talent in order to tackle urgent social and environmental challenges. That was the message of the latest Water Action Platform webinar from technology consultancy Isle, which sought to uncover the views of younger people coming



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into the water sector, delve into the challenges they face, as well as celebrate their achievements across the world. The event also featured interviews with Siddhartha Roy, an environmental engineer and research scientist who rose to prominence as a result of his work on the Flint water crisis, and Bob Taylor, chief executive of Portsmouth Water. This special edition of the webinar was hosted by Isle technology consultant Alisha Syal, one of the UK's Institute of Water's Rising Stars--an initiative designed to develop the skills and professional excellence of new industry talent. The water sector has "tremendous potential to benefit society and the environment," she said, but has a reputation for being "set in its ways." An injection of younger workers is needed to meet the complex challenges that lie ahead, she added.

An ageing workforce has been listed as one of the top ten issues facing the water sector today, according to American Water Works Association (AWWA) State of the Water Industry (SOTWI) Report in 2020. In addition, the US Environmental Protection Agency, states that in the next ten years it is projected that 37% of water utility workers and 31% of wastewater utility workers will retire. At present just 1.7% of workers in the US water sector are younger than 25, and in the UK just 8% of all water workers are under 24. "Different generations can learn from each other and ultimately make better informed and forward-thinking decisions," said Syal. In an exclusive interview, Roy discussed his own journey in the water sector, how he faced accusations of 'youthful idealism' and gave advice to young water professionals. "So many young people get into this field so that we can be of use to society and uphold their health and wellbeing, so to be accused of youthful idealism is bizarre. In 2015, as a graduate student at Virgina Tech, Roy played an instrumental role in uncovering the water crisis in Flint, Michigan. This public health crisis left tens of thousands of Flint residents exposed to dangerous levels of lead in their water supply and has become a signature case of environmental injustice. In his advice for younger water professionals, Roy impressed the importance of communication, and the need to be able to work with multiple stakeholders, as well as being willing to gain knowledge across many different fields.

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The three key takeaways Roy wanted younger water workers to consider were:

- Develop your competence and be useful: always be eager to learn, and share this knowledge, for example, in teams and at conferences, so you are contributing to solving problems
- Be curious and ask for help and advice from experts in your field so you can get to where you want to: If someone is doing what you want to do, reach out – it´s more than networking, it´s about understanding what they did, who they know and what drives them
- Pay it forward – be generous with sharing your own knowledge and information that could be useful to others.

Bob Taylor, chief executive of Portsmouth Water, was interviewed by Syal about the benefits of having a young workforce, and how to attract and retain young people in the water sector. He said, "The advantage of having a young workforce is that you've got people coming in to replace and replenish an ageing workforce. In addition, young people come with a different mindset, a different skillset and different angles on important topics. "While you are not going to get young people fresh out of university that have the same knowledge and experience as seasoned workers, it's clear younger people of today learn quickly and are used to being inquisitive. Water companies need new ideas, ways of thinking, and innovation, and young people can offer these fresh perspectives." Portsmouth Water, based in southern England, is leading the way when it comes to age diversity in its workforce, explained Taylor. The water company has set up a board of Future Innovators, comprised of younger employees charged with delivering specific projects, such as the company's programme of community work.

Sensitive Housing Development Meets Stringent Environmental Requirements



The developers of high-end properties built on a historic Hampshire estate have selected WCS Environmental Engineering (WCSEE) technology to treat wastewater flows to strict environmental standards. The Home Farm development of 23 properties is situated in Embley Park, Romsey, a picturesque 18th century estate. The wider park houses Florence Nightingale's former family home, now an independent school, and is located at the edge of the New Forest.

Because of its rural location, the new development is unable to connect to the public sewer network and therefore onsite wastewater treatment is required. Environment Agency discharge permit requirements are particularly stringent, due to the park's sensitive receiving waters. The high environmental standards required include 10mg/l biological oxygen demand (BOD), 15mg/l suspended solids, and 5mg/l ammonia. To ensure compliance is met, WCSEE has designed a custom onsite solution, comprising a below-ground HiPAF® (high performance aerated filter) treatment plant and 3.1 x 2.6m sand filter, also below ground.

The sand filter will remove any excess suspended solids from the treated wastewater before it is discharged, providing a level of tertiary treatment to bring discharge consent standards above what is normally expected from a biological process. Additionally, the planning authority – Test Valley Borough Council – has a nutrient neutral policy in place for new residential developments. Nutrient neutrality is a means of ensuring new residential developments do not increase the nutrient burden of nearby protected waters.

WCSEE liaised with developer Capital Homes' nutrient neutrality adviser throughout the design of the plant, to ensure the technology's nitrate removal capability was considered as part of the neutrality calculations, submitted as part of the planning application. WCSEE technical manager Dominic Hamblin: "We are proud that our technology has been selected by Capital Homes for this historic and environmentally sensitive site.

"Working closely with Capital Homes and their engineering consultants BP Civils, we have designed a high-end solution that is fully compliant and offers the highest levels of environmental protection, even in this sensitive spot. "Due to the site's rural location, our engineers have been conservative in the plant's design, including reducing the tank's original size by one metre, taking into account narrow access roads to avoid future issues when it comes to installation and maintenance.

"The nutrient neutrality approach was another area that made this project particularly interesting, and we were pleased to offer our technical expertise to help bring the desired outcome." Capital Homes managing director Mike Paddock said: "We have been pleased to work with WCSEE to bring the highest quality wastewater treatment to Home Farm. We have collaborated closely with their technical experts throughout the design process and we look forward to the installation and commissioning stage, expected this summer." WCSEE's HiPAF technology is suitable for properties from 60 up to 2,000 population equivalent (PE) where mains drainage is unavailable. Modular in design and built off site,

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the units are simple to install, operate and maintain.

Partners Capital Closes its Inaugural Environmental Impact Private Equity Fund

Partners Capital recently today announced the closing of its inaugural private equity environmental impact fund, Partners Capital 15 degrees Fund, LP., with USD 143 million in client commitments. The fund has strong support from a variety of limited partners globally, including foundations, endowments, and family offices.

The Partners Capital 15 degrees Fund will invest in private equity opportunities focusing on proven technological innovations and long-established businesses which are most critical to the global energy transition to net zero carbon emissions. The private equity investment partnership will invest via specialist fund managers as well as direct co-investments in a diversified set of environmental sustainability sectors and themes, including renewable energy generation and storage, transportation and mobility, industrial processes & management, food and agriculture, smart buildings, and water, waste, plastic and recycling.

John Beil, Head of Private Equity and Real Estate, leading the 15 degrees investment portfolio said, "We are very excited about investing behind this mega-trend, while also being acutely cautious. The energy transition will provide many high-impact, high-returning opportunities, but is critically dependent upon many scientific, technological, regulatory, geopolitical and consumer behaviour developments which are highly complex and largely unknown today as we describe in detail in our recently published Partners Capital Global Energy Transition Investment Framework." This is Partners Capital's first dedicated impact fund, building on a 20-year history of investments across its private markets program. Partners Capital's Co-Chief Investment Officer, Suzanne Streeter, commented that, "Partners Capital will leverage its 20-year history of private equity investments, deep and experienced team and strong network to invest 15 degrees across venture

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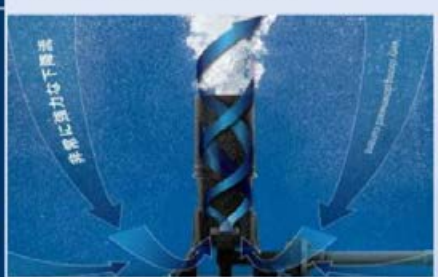
[Not just an "air diffuser"]

OHR AERATOR



Comparison table

The OHR Aerator is quite different to conventional air diffusers in terms of technological concept and mechanism.

	OHR Aerator	Conventional air diffusers (Porous air diffuser, etc.)
Technological Concept	Air and water are thoroughly mixed by hydrodynamic process to forcibly oxygenate the activated sludge	In order to oxygenate activated sludge, air is discharged from numerous fine pores to increase the contact area.
Basic structure and mechanism	 1. Air is blown from a large diameter hole for 30mm 2. Extreme vortexes are created by cross plates and mushroom-shapes cutters to powerfully mix air and activated sludge	 1. Air is blown from a numerous number of small pores of a few hundred micrometers. 2. No action for mixing air and wastewater provided, and whether or not oxygen is mixed into wastewater is left to nature
Alpha value	Approx.**1.0.** To forcibly mix oxygen by powerful mixing action	Approx.**0.2-0.7** Significant reduction in wastewater with heavily concentrated sludge density
Clogging	**In principle, the OHR Aerator never clogs.** Over 15years of product life.	**Inevitable clogging.** (For reasons, refer to the following) Accordingly, the oxygen transfer rate further decreases.
Required number and coverage area per unit	**The required number is small** for a large coverage area. (Approx. one-tenth of the number of porous diffusers.	**The required number is large** for a small coverage area.
Concentration of activated area per unit	**No clogging is recorded even when intermittent running is performed at MLSS:50,000 to 60,000mg/L.**	**Clogging progresses and the alpha value remarkably decreases** under highly – concentrated MLSS.
Installation without anchor and draining	**No draining or anchoring to the tank bottom required.** Because the main body presses to the tank bottom by powerful reaction of powerful upward current	**Draining and anchoring to the tank bottom are required.** Accordingly, when a heavily clogged porous air diffuser is replaced, draining is required



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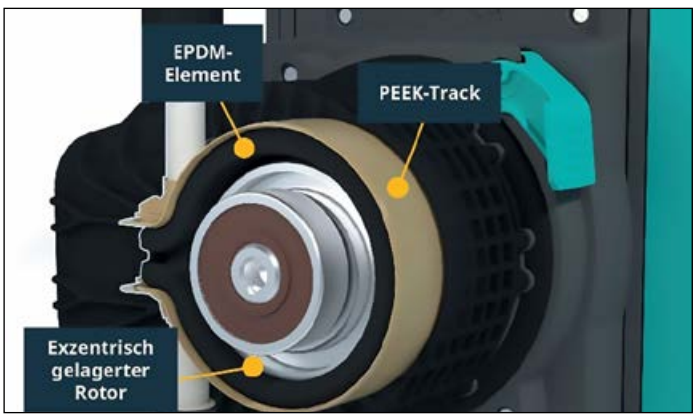
capital, growth and buyout opportunities with exposure to hard-to-access specialist managers and newer emerging managers who are well-positioned to understand this complex landscape. It is a very short list of private equity firms who bring years of successful green energy investment experience to the opportunity set that lies ahead. We believe we have assembled that group of managers who will have significant impact on the energy transition and deliver strong returns at the same time."

German WWTP achieves 97.5% phosphorus load reduction



The wastewater treatment plant (WwTP) serving the town of Hessisch-Lichtenau in Germany is taking an innovative approach to chemical metering in a phosphorus removal application. Two diaphragm pumps, originally used to dose ferric chloride to eliminate phosphate, are being replaced with a single Qdos CWT peristaltic pump from Watson-Marlow Fluid Technology Solutions (WMFTS), in a first for the country. The Fürstenhagen wastewater treatment plant serves an 18,500 population-equivalent (PE) in the Werra-Meissner district of Hessen state. The primary wastewater processing system includes a mechanical pre-cleaning system with grill and sand trap and an aeration tank with upstream de-nitrification and downstream nitrification, with recirculation. There are two secondary clarification basins and a sludge treatment unit.

Ferric Dosing. Chemical dosing with the precipitating agent, ferric chloride sulphate (FeClSO4), is required at the biological treatment stage for consistent phosphorus reduction, because the phosphorus load at the plant inlet is highly variable. Environmental regulations mean discharge of treated effluent to the river Losse is strictly limited to 0.70 milligrams per litre (mg/l) total phosphate. Single-point dosing is used to deliver the precipitate, with the chemical metering pump drawing the ferric chloride from a 25m3 holding tank. It is then transferred to the dosing point, which is some 30 metres away. According to the operator, it is essential that dosing is carried out consistently 24/7, but the two legacy



diaphragm pumps performing this task, operating alternately, were unreliable and required frequent servicing.

Wastewater operations manager Marco Quehl said, "We need a constant basic amount of precipitant to be dosed, and the quantity needs to increase automatically in line with the phosphorous load at the inlet."

Corrosion Challenge. According to Quehl, the biggest problem with the diaphragm pumps was that the corrosive ferric chloride sulphate left iron residues on the pump valves, resulting in poor sealing against the valve seats and constant minor leaks. "This required frequent minor maintenance work, and after an average operating time of around 12 months, in which the two diaphragm pumps ran alternately, we had to replace the pumphead, or even the entire pump," he said. "When the necessary cleaning operations were also considered, this turned out to be time-consuming and expensive in the long run." Most chemical dosing pumps need



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regular maintenance to remain operational. This can take a pump out of service for hours, often needing a back-up pump to provide process continuity. It also takes the full attention of at least one skilled onsite technician.

Time Saving. Pumpheads across Watson-Marlow's entire Qdos range do not need to be taken apart. Instead, the pumphead is simply removed as a single unit and a new one clicked in place. It takes one operative less than a minute, offering substantial benefits in terms of time saving and onsite health and safety, as maintenance staff have no chemical contact. "We'd already had positive experience with using Watson-Marlow Qdos tube pumps for dosing ferric chloride sulphate and other chemicals," Quehl said, "which is why we agreed to testing the CWT pump at our site." The new Qdos CWT is the world's first peristaltic pump with no tube, which represents a step-change in the mechanics of peristaltic pump design. The pump underwent its first field trial at Fürstenhagen WwTP as part of a long-term test period.

Reduced Stress. While a conventional peristaltic tube is compressed flat via plastic deformation, the Qdos CWT pumphead incorporates an EPDM element, which is elastically compressed against a PEEK track. This reduces material stress and fatigue, providing significantly longer service life, reduced maintenance, and less plant disruption. The pump is self-priming and there is no fluid back flow, even when the pump is not in operation. This also prevents gas locks, so there is no risk of interruption and no need for additional equipment such as pressure-sustaining valves, air-discharge valves or holding pumps. Operations manager Bernd Sennhenn said, "The Qdos CWT was installed 12 months ago, and it has been running faultlessly since then. It was possible to install this pump as a direct replacement for a diaphragm pump." Reflecting on the trial at Fürstenhagen WWTP, Quehl said, "The Qdos CWT has been in operation for more than 8,000 hours and dosed a total of almost 90,000 litres of precipitating agent and hasn't needed any maintenance. "In comparison with diaphragm pumps, the Qdos CWT also doses more evenly and with lower pulsation, which protects the pipework and connectors. There's no need for pulsation dampers."

Continuous Operation. The dosing pumps upgrade has saved the plant considerable outlay in time and cost. The Qdos CWT has been operating at an average of 75% of its maximum capacity, demonstrating its capability and reliability at higher performance ranges. This reliability of the Qdos CWT lies in the design of the technology. The fluid contact element is subjected to low stress levels, and although a second metering pump is kept in reserve at Fürstenhagen, to ensure operational availability, it is practically never needed. Due to the overall reliability and functionality of the Qdos CWT pumphead, the Fürstenhagen plant has achieved a 97.5% reduction in phosphorus load over the year. "The new Qdos CWT technology is simply the best when it comes to dosing precipitating agent at our plant. There's no need for anyone else to come to me with other solutions," concluded Quehl ■





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- Account Number: 10056535743, Swift Code: IDFBINBBMUM, IFSC/RTGS/NEFT Code: IDFB0040101, PAN No.: AAACE7028F, Account Type: Current

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Date_____ Signature_____

Mail to: Earth Water Foundation, A-1/152, Neb Sarai, IGNOU Road, New Delhi 110 068, India,
Call: 91- 85958 45490, Email: subscription@eawater.com, Web: www.eawater.com/in

RECYCLED WATER IN AGRICULTURE SECTOR

S K Sarkar

Overdependance on ground water is one of the inhibiting factors for use of treated water in agriculture sector. There are however, challenges regarding its use, in agriculture.

Water is essential for life and is an important ingredient for economic development. Water resources are limited in supply, but its demand in various sectors is continuously growing. The water resources supply in India is to the extent of 1,123 bcm (billion cubic meter); but its demand is likely to surpass water supply by 2050. According to estimates by NITI Aayog, the water demand is likely to exceed its supply by 2030. The sources of water are monsoon rains, melting of iced water and so on. The rainfall is limited, spans over about 4-5 months in a year, but the rainfall is unevenly distributed. There is spatial and time variation of water supply. The uses of water are in the domestic sector, in the industry and the agriculture sector. It use is highest in agriculture sector, to the extent of 80-85 percent, in India. Due to higher economic growth and increasing population the demand of water is increasing in all the subsectors.

The use of recycled water. If the demand of water is continuously increasing and the water supply resources are limited, how would the balance between the demand and supply be created? Freshwater use, in all circumstances, in all the sectors is not the solution. Herein comes the use of recycled water. Treat waste water, recycle it and then reuse the treated waste water. The objective of doing the same is to solve the water problem and ensure its security. Who could use the recycled water? This can be done in the agriculture sector, industrial sector and even in the domestic sector. The waste water in the domestic sector or industrial sector can be reused after treatment or can be reallocated to the agricultural sector for meeting its increasing demand.

Why recycled water needs to be used? Agriculture receives water from surface and ground water. Surface water comes from dams, that is replenished by rains. If surface water is not available, then farmers use ground water, to meet their farming needs. The capacity of reservoirs, in the country, is limited, and is much lower compared to other countries. So one can understand the high or can say over reliance of farmers, on groundwater, for their farming needs. Things have reached to such a situation that over extraction of ground water has resulted in diminishing of aquifers. There is no denying the fact that agriculture based industries need water and recycle and reuse of water resources could be an option to meet this demand. The reason for use of recycled water, in the agriculture sector are many. It helps in conserving drinking water supplies; helps ease stress of natural water bodies that are used for extracting irrigation water; recycled water contains nutrients thereby reducing the fertiliser requirements in the agricultural sector; this also reduces discharges to the environment.

> *There is no comprehensive policy for water reuse in the agricultural sector. Also, there is no awareness programme for farmers about reuse of treated water in the sector.*

INTERNATIONAL EXAMPLES OF RECYCLED WATER USE IN AGRICULTURE

Recycled water is widely used across Australia and many other countries, across the globe. In Australia, it is used in agricultural industry, mostly in dairy farming, pasture irrigation and livestock sub-sectors. Due to the nature of source water used in the recycling process, there is a potential for pathogen organism to exist in recycled water. A majority of these organisms present in very less quantity do not pose any major risk. It must be noted however, that some parasites and bacteria have the potential to affect the health of the livestock. However, some general precautions should be taken to reduce risk to livestock, public health and the environment. For example, recycled water should not be used for washing milking machinery as recycled water contains valuable nutrients and this should be noted before fertilising.

California and Florida in United States of America (USA) have been using recycled water in agriculture sector for over 40 years and are among the top producers of recycled water in the United States. Israel is also a major

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producer of recycled water for use in irrigation since the 1970's. Today Israel recycles 90 percent of its waste water. About 85 percent of this water is used in agriculture every year. Spain reuses about 20 percent of its water and applies nearly 70 percent of it in agriculture. China, Greece, Italy, Kuwait, Mexico, Singapore and several African countries effectively use recycled water for agricultural production and drinking water.
Depending on the type of crop being irrigated, recycled water needs a high level of treatment resulting in production of high-quality water. They can also be used for irrigating food crops safely. The benefits of water reuse in agriculture are many. Its cost-effective, saves energy, its dependable, reliable and safe. The reasons for water reuse are that it saves money, generates revenue, create jobs and so on in the agriculture sector.

CHALLENGES IN INDIA

In India, overall 37 percent of municipal waste water is treated where as in industrial sector about 60 percent waste water is treated. Reuse of such water is very less, mostly in the industrial sector. The reuse of waste water is less talked about in India. There is less political commitment either at the central level or state level. There is, however, a policy for waste water reuse in some Indian states, but they do not talk about such reuse in agriculture sector.

There is no awareness programme for farmers for reuse of treated water in the agricultural sector. There is no comprehensive policy for water reuse in the agricultural sector.

In states, in arid and semi-arid zones in India, the water availability poses problems to policy makers. Waste water reuse in agriculture could ensure water security in these states.

Reliance of farmers on excessive use of ground water is one of the inhibiting factors for reuse of waste water in agriculture sector. This causes depletion of aquifers and poses problems for adopting opportunities in the context of human induced climate change in the water sector.

Concluding remarks

For enhanced water security in India, like in other countries, recycled water reuse should be the priority of policy makers. Capacity building of farmers is a must in this context. Political commitment at various levels should also be ensured ■



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POLLUTION OF RIVERS IN INDIA

Rama Pal, Sadikul Islam, M. Muruganandam, I. Rashmi and C. Roy

A status check on the quality of water in major systems, in India, especially the Ganges and Yamuna and suggestions on corrective measures need to be taken, to improve the quality of their water.

Growing urbanisation and industrialisation impose severe stress on providing clean and safe drinking water to all citizens, in the country. The aftereffects of rapid economic development are water pollution, environmental degradation and the results of which can be seen in rivers and streams. The discharge of untreated or partially treated sewage from cities/towns and industrial effluents into rivers, problems in operation and maintenance of sewage / effluent treatment plants, lack of dilution, dumping of solid waste on river banks and other non-point sources of pollutants are the main causes of pollution that affect the overall health of rivers. According to a report published by the Central Pollution Control Board (CPCB) in March 2021, the country's sewage generation from urban areas is anticipated to be 72,368 million litres per day (MLD), with a sewage treatment capacity of only 31,841 MLD which would leave more than half of sewage to the tune of 40527 MLD untreated.

The case of two rivers. Approximately 12,000 MLD of sewage is generated in the Ganga river basin, with a current treatment capacity of only 4,000 MLD. Approximately 3,000 MLD of sewage is released into the Ganga's main stem from the Class I and II towns located along its banks, with a treatment capacity of roughly 1,000 MLD built to date. Industrial pollution makes up for around 20% of all pollution thereby contributing a significantly bigger impact due to its hazardous and non-bio-degradable nature (National mission for Clean Ganga).

Yamuna river, the second largest tributary of the Ganga river, that merges with the Ganga at the Sangam in Prayagraj, Uttar Pradesh is the worst affected river in the country. According to a report given to the Yamuna Pollution Control Committee by the Delhi Pollution Control Committee and the Central Pollution Control Board (CPCB) at least 90% of waste water, from households, in Delhi, runs into the Yamuna. ***(https://earth5r.org/yamuna-river-pollution-sustainable-solutions-future/)***. The Central Pollution Control Board (CPCB), in 2018, identified 351 polluted river stretches in India. In all, Ganga and Yamuna rivers were the most polluted rivers of India.

Status check. The gap between sewage generation and treatment capacities continues to be a major source of river contamination. As a result, the municipalities are finding it difficult to treat river water to safe levels and supply it to citizens. The assessment of water quality for identification of polluted river stretches found that 31 states and Union territories (UT) had rivers and streams that did not meet the water quality criteria. These states / UTs have been directed to submit their action plans for the same (Ministry of Jal Shakti, 2021).

Maharashtra has the highest number of polluted rivers stretches (53), followed by Assam (44), Madhya Pradesh (22), Kerala (21), Gujarat (20), Odisha (19), West Bengal and Karnataka (17). For more details, see **Polluted rivers in various states**.



POLLUTED RIVERS IN VARIOUS STATES

S.No.	State	Polluted rivers	Total number
1	Maharashtra	Godavari, Kalu, Kundalika, Mithi, Morna, Mula, Mutha, Nira, Vel, Bhima, Indrayani, Mula-Mutha, Pawana, Wainganga, Wardha, Ghod, Kanhan, Kolar (Mah), Krishna, Mor, Patalganga, Pedhi, Penganga, Purna, Tapi, Urmodi, Venna, Waghur, Wena, Bindusar, Bori, Chandrabhaga, Darna, Girna, Hiwara, Koyna, Pehlar, Sina, Titur, Amba, Bhatsa, Gomai, Kan, Manjeera, Panchganga, Panzara, Rangavali, Savitri, Surya, Tansa, Ulhas, Vaitarna, Vashisti	53
2	Assam	Bharalu, Borsola, Deepar Bill, Digboi, Kamalpur, Panchnai Brahmaputra, Kharsang, Pagldia, Barak, Baroi Bega, Beki, Bhogdoi, Boginadi, Borbeel, Bordoi-bam, Beelmukh, Burhidihing, Dhansiri, Dikhow, Dikrong, Diplai, Disang, Gabharu, Holudunga, Jai Bharali, Jhanji, Kalong, Kapili, Killing, Kohora, Kulsi, Malini, Mora Bharali, Parashali, Puthimari, Ranga, Samaguri, Sankosh, Silsako, Sorusola, Son, Sonai, Tenga, Pukhuri	43
10	Madhya Pradesh	Chambal, Khan, Kshipra, Betwa, Sone, Gohad, Kolar, Tapi, Bichia, Chamla, Choupan, Kalisot, Kanhan, Katni, Kunda, Malei, Mandakini, Newaj, Parvati, Simrar, Tons, Wainganga	22
9	Kerala	Karamana, Bharathapuzha, Kadambayar, Keecheri, Manimala, Pamba, Bhavani, Chitrapuzha, Kadalundy, Kallai, Karuvannur, Kavvai, Kuppam, Kuttiyady, Mogral, Periyar, Peruvamba, Puzhackal, Ramapuram, Thirur, Uppala	21
4	Gujarat	Amlakhadi, Bhadar, Bhogavo, Khari, Sabarmati, Vishwamitri, Dhadar, Triveni, Amravati (Tributary Of Narmada), Damanganga, Kolak, Mahi, Shedhi, Tapi, Anas, BalehwarKhadi, Kim, Meshwa, Mindhola, Narmada	20
3	Odisha	Gangua, Guradih Nallah, Kathajodi, Nandirajhor, Daya, Kuakhai, BanguruNallah, Bheden, Brahamani, Budhabalnaga, Kusumi, Mahanadi, Mangala, Nagavalli, Nuna, Ratnachira, Rushikulya, Sabulia, Serua	19
8	Karnataka	Arkavathi, Lakshmantirtha, Malprbha, Tungabhadra, Bhadra, Cauvery, Kabini, Kagina, Kali, Krishna, Shimsha, AsangiNalla, Bhima, Kumardhara, Netravathi, Tunga, Yagachi	17
17	West Bengal	Vindhadhari, Mahananda, Churni, Dwarka, Ganga, Damodar, Jalangi, Kansi, Mathabhanga, Barakar, Dwarakeshwar, Kaljani, Karola, Mayurkashi, Rupnarayan, Silabati, Teesta	17
15	Uttar Pradesh	Hindon, Kalinadi, Varuna, Yamuna, Gomti, Ganga, Ramganga, Betwa, Ghaghara, Rapti, Sai, Saryu	12
23	Goa	Sal, Mandovi, Talpona, Assonora, Bicholim, Chapora, Khandepar, Sinquerim, Tiracol, Valvant, and Zuari	11
6	Jammu and Kashmir	Devika, Banganga, ChuntKol, Gawkadal, Tawi, Basanter, Chenab, Jhelum, Sindh	9
11	Manipur	Nambul, Imphal, Iril, Khuga, Khujairok, Lokchao, Manipur, Thoubal, Wangjing	9

POLLUTED RIVERS IN VARIOUS STATES

S.No.	State	Polluted rivers	Total number
13	Mizoram	Tiau, Tlawng, Tuipui, Tuivawl, Chite, Mat, Saikah, Tuikual, Tuirial	9
16	Uttarakhand	Bhela, Dhela, Suswa, Kichha, Kalyani, Ganga, Kosi, Nandour, Pilkhar	9
26	Telangana	Musi, Manjeera, Nakkavagu, Karakavagu, Maner, Godavari, Kinnersani and Krishna;	8
5	Himachal Pradesh	Sukhana, Markanda, Sirsa, Ashwani, Beas, Giri, Pabbar	7
7	Jharkhand	Garga, Sankh, Subarnarekha, Damodar, Jumar, Konar, Nalkari	7
12	Meghalaya	Umkhrah, Umshyrpi, Kyrhukhla, Nonbah, Umtrew, Lukha, Myntdu	7
14	Nagaland	Dhansiri, Dzuna, Chathe, Dzu, Dzucha, Sano	6
19	Bihar	Sikrahna, Hasdeo, Kharoon, Mahanadi, Seonath, Kelo	6
28	Tamil Nadu	Cauvery, Sarabanga, Thirumanim Uthar, Vasista, Bhavani and Tambirapani;	6
29	Tripura	Burigaon, Gumti, Haora, Juri, Khowai and Manu	6
18	Andhra Pradesh	Kundu, Tungabhadra, Godavari, Krishna, Nagavali	5
20	Chhattisgarh	Sirsia, Farmar, Ganga, Poonpun, Ram Rekha	5
24	Punjab	Ghaggar, Satluj, Kali Bein and Beas	4
27	Sikkim	Maney Khola, Rangit, Ranichu and Teesta;	4
25	Rajasthan	Banas and Chambal;	2
21	Daman and Diu and Dadra and Nagar Haveli	Damangang	1
22	Delhi	Yamuna	1

(Source: Down to Earth, 2021)

As per the Table **Polluted rivers in various states**, the following seven are states with the worst polluted rivers - Maharashtra (53), Assam (44), Madhya Pradesh (22), Kerala (21) Gujarat (20), Karnataka (17), West Bengal (17), Uttar Pradesh (12), and Goa (10). The ither states with lesser number of polluted rivers are Mizoram (9), Manipur (9), Jammu and Kashmir (9), Uttarakhand (9), Telangana (8), Jharkhand (7), Himachal Pradesh (7), Meghalaya (7), Bihar (6), Nagaland (6), Tripura (6), Tamil Nadu (6), Chhattisgarh (5), Andhra Pradesh (5), Punjab (4), Sikkim (4), Puducherry (2), Haryana (2), Rajasthan (2), Delhi (1), Daman and Diu and Dadra and Nagar Haveli (1). However, the severity and extent of river pollution varies among various states, which require categorical attention and solution.

GANGA AND YAMUNA RIVER WATER QUALITY STATUS AND THEIR BEST DESIGNATED USE

Natural water bodies are increasingly subjected to competing and conflicting demands from various sectors besides ecosystem services, requiring restoration or maintenance, often for multiple uses. The CPCB has categorised the water quality of water bodies according to their best use based on pH, BOD, DO, and total coliform as follows:

DESIGNATED BEST USE WATER QUALITY CRITERIA

Name of parameter	Best designated use category		
	A (Drinking Water Source without conventional treatment but after disinfection)	B (Outdoor bathing (Organised)	C (Drinking water source after conventional treatment and disinfection)
Ph	6.5 - 8.5	6 -9	6.5 - 8.5
BOD (mg/l)	≤ 2	≤ 3	≤ 3
DO (mg/l)	≥ 6	≥ 4	≥ 5
Total coliform (MPN/100 ml)	≤ 50	≤ 5000	≤ 500

Source: (CPCB, water standards)

The average water quality of the Ganga and Yamuna rivers, based on parameters viz., pH, BOD, DO, and Total coliform (CPCB, 2019), represented in Tables **CATEGORISATION OF WATER QUALITY OF GANGA RIVER IN DIFFERENT STATES ACCORDING TO ITS BEST-DESIGNATED USE** and **CATEGORISATION OF WATER QUALITY OF YAMUNA RIVER IN DIFFERENT STATES ACCORDING TO ITS BEST DESIGNATED USE** indicate that the water quality of the Ganga river is poor in most parts of Uttar Pradesh, Bihar, and West Bengal. It is even unfit for category C. Similarly, except Uttarakhand and Himachal Pradesh, the water quality of the Yamuna river is worse than category C in all states.



CATEGORISATION OF WATER QUALITY OF GANGA RIVER IN DIFFERENT STATES ACCORDING TO ITS BEST DESIGNATED USE

State	Location of the monitoring station	pH	BOD (mg/l)	Dissolved Oxygen (mg/ L)	Total Coliform (MPN/ 100 ml)	Best designated use category
Uttarakhand	Bhagirathi at Gangotri	-	-	9.8	9	
	Alaknanda B/C Mandakini at Rudraprayag	7.7	1	9.9	2	A
	Swarg Ashram - 1	8	1	9.7	140	B
	Ganga Rishikesh U/S	7.8	1	10.8	220.5	B
	Ganga at Har ki Pauri Ghat	7.95	1	9.6	75	B
	Upper Ganga river D/S Roorkee	7.85	1.1	9.3	140	B
Uttar Pradesh	Ganaga at madya ganga barrage, bijnor	7.55	1.55	8.6	-	
	Ganga at Kanpur U/S (Ranighat)	8.25	3.25	8.05	4850	C
	Ganga at Kanpur D/S (Jajmau pumping station)	8	1	7	45500	Not suitable for A,B and C
	Ganga at Dalmau (Rai Bareilly)	8.3	3.45	8.8	3600	C
	Ganga at Allahabad D/S (Sangam)	8.1	2.7	9.15	17700	Not suitable for A,B and C
	Ganga at Varansi U/S (Assighat)	8.25	2.5	8.6	2250	C
	Ganga at Varansi D/S (Malviya Bridge)	8.3	3.8	7.2	30000	Not suitable for A,B and C
	Ganaga A/C Gomti river, Bhusaula	8.4	3.4	7.9	12500	Not suitable for A,B and C
Bihar	Ganga at Buxar	8	2.1	8.5	81150	Not suitable for A,B and C
	GANGA NEAR DANAPUR (NEAR PIPA PUL) PATNA	7.95	1.85	8.05	15550	Not suitable for A,B and C
	Ganga at Barh	8.7	1.75	7.95	30500	Not suitable for A,B and C
	Ganaga at U/S Bhagalpur near Bararighat	8.1	2.3	7.25	85500	Not suitable for A,B and C
	Ganga at Kahalgaon	8.05	1.7	7.8	85500	Not suitable for A,B and C
Jharkhand	Ganga U/S near LCT Ghat	8.1	2.4	8.2	-	-
	Ganga D/S near Janta ghat	8	2.4	8.3	-	-
	Ganga at Sang Dalan	8.15	2.5	8.4	-	-
	Ganga at Rajmahal	8.35	2.5	8.3	-	-

CATEGORISATION OF WATER QUALITY OF GANGA RIVER IN DIFFERENT STATES ACCORDING TO ITS BEST DESIGNATED USE

State	Location of the monitoring station	pH	BOD (mg/l)	Dissolved Oxygen (mg/ L)	Total Coliform (MPN/ 100 ml)	Best designated use category
West Bengal	GANGA AT BAHARAMPORE, MURSHIDABAD	7.95	2.8	8.05	257000	Not suitable for A,B and C
	Tebeni on Ganga near Burning ghat, Hooghly	8.05	3.65	7.15	154000	Not suitable for A,B and C
	Ganga at Serampore Hooghly	7.9	3.6	7.9	253500	Not suitable for A,B and C
	Ganga at Dakhshmineshwar, Kolkata	7.85	4.1	6.25	824500	Not suitable for A,B and C
	Ganga at Howrah-Shivpur	7.6	4.05	5.7	290000	Not suitable for A,B and C
	Ganga at Uluberia, Howrah	7.6	3.4	5.75	115500	Not suitable for A,B and C
	Ganga at Patikali near Durga Chak	7.65	2.2	6	50500	Not suitable for A,B and C

CATEGORISATION OF WATER QUALITY OF YAMUNA RIVER IN DIFFERENT STATES ACCORDING TO ITS BEST DESIGNATED USE

State	Location of the monitoring station	pH	BOD (mg/l)	Total Coliform (MPN/ 100 ml)	DO (mg/l)	Best designated use category
Uttarakhand	Yamuna at Yamunotri	7.3	-	4	9.8	A
	Yamuna at Hanumanchatti	7.9	-	240	9	B
	Yamuna at U/S of Lakhwar dam	7.75	1	2750	9.4	C
	Yamuna at U/S Dak Pather	7.45	1.1	170	8.9	B
Himachal Pradesh	Yamuna river U/S Paonta Sahib	7.1	0.85	47.5	7.85	A
	Yamuna river, D/S Paonta Sahib	7.2	1.1	61.5	7.65	B
	River Yamuna U/S Ranbaxy	7.4	0.5	51.5	7.4	B
	River yamuna D/S Ranbaxy	7.35	0.55	52	7.3	B
Haryana	Yamuna at hathnikund, Yamuna nagar	7.85	2.3	42650	6.45	Not suitable for A,B and C
	River Yamuna at Kalanaur, Yamuna nagar	7.75	2.4	214350	6.85	Not suitable for A,B and C
	River Yamuna at Khojipur, Panipat	7.75	7.65	214700	7.9	Not suitable for A,B and C
	Yamuna at Sonepat	8	11	47011.5	8.7	Not suitable for A,B and C

CATEGORISATION OF WATER QUALITY OF YAMUNA RIVER IN DIFFERENT STATES ACCORDING TO ITS BEST DESIGNATED USE

State	Location of the monitoring station	pH	BOD (mg/l)	Total Coliform (MPN/ 100 ml)	DO (mg/l)	Best designated use category
Delhi	Yamuna at Palla, Delhi	8.1	2.3	42650	6.45	Not suitable for A,B and C
	Yamuna at Nizamuddin, Delhi	7.1	2.4	214350	6.85	Not suitable for A,B and C
	Yamuna at Okhla Bridge (Inlet of Agra Canal), Delhi	7.15	7.65	214700	7.9	Not suitable for A,B and C
	Yamuna at Okhla after meeting of Shahdra Drain, Delhi	7.35	11	47011.5	8.7	Not suitable for A,B and C
Uttar Pradesh	Yamuna at Mazawali, U.P.	7.35	25.55	555500	2.95	Not suitable for A,B and C
	Yamuna at Shahpur	6.9	13	116000	4.6	Not suitable for A,B and C
	Yamuna at Kesighat, Vrindavan	7.45	9.7	81000	5.45	Not suitable for A,B and C
	Yamuna at Mathura U/S, U.P.	7.6	11.4	40350	5.55	Not suitable for A,B and C
	Yamuna at Vishramghat, Mathura	7.45	11.3	90000	4.8	Not suitable for A,B and C
	Yamuna at mathura d/s, mathura	7.45	11.05	471000	5.15	Not suitable for A,B and C
	Yamuna at Agra U/S, U.P.	7.5	9.75	14700	4.25	Not suitable for A,B and C
	Yamuna at D/S of Agra	7.45	13	71300	6.55	Not suitable for A,B and C
	Yamuna at Bateshwar, U.P.	7.9	12.85	175001	9.95	Not suitable for A,B and C
	Yamuna at Etawah	7.9	11.1	46024.5	10.4	Not suitable for A,B and C
	Yamuna at Juhika B/C with Chambal, Etawah	7.9	7.05	460011	9.1	Not suitable for A,B and C
	Yamuna at Yamunotri	8.05	5.65	620	9.2	C
	Yamuna at Allahabad D/S (Balua Ghat)	7.85	2.25	9300	9.25	Not suitable for A,B and C

The above tables of indicate that the two major rivers of the country are unsuitable for various uses and are losing their significance of lotic ecosystems.

CAUSES/SOURCES OF RIVER WATER POLLUTION

There are several causes of water pollution in India. The main causes are briefly described as under:

Urbanisation

Urbanisation without adequate planning and drainage facilities is the major cause of riverine pollution. Many towns and cities that grew up along rivers' banks haven't given the issue of wastewater, sewage, and other related issues enough thought. The amount of sewage treated in cities with existing treatment plants ranges from 2.5% to 89% (Mission Ganga). With rising living standards, the use of soaps and detergents, as well as the amount of various food ingredients pouring down the drain



increased many folds. Sewerage, on the other hand, has lagged behind the water supply networks by a significant margin. According to CPCB, sewerage collects only 22% of wastewater from class I (above 1 lakh population) cities and 14% of wastewater from class II towns.

Industries

The overall amount of wastewater generated by industrial sources is about 83,048 MLD. Paper mills, steel factories, textiles and sugar industries are among the other major sources of wastewater. Distilleries, followed by paper mills, are the primary sources of pollution in terms of organic load (Mission Ganga).

Agricultural runoff and inefficient farming practises

At the start of the monsoon season or whenever there are heavy showers, traces of fertilisers and pesticides reach adjacent river courses as nonpoint sources of pollution. Its environmental effects grew when farmers use fertilisers and insecticides in excess beyond the recommended or acceptable dosages.

Water withdrawal exceeding minimum environmental flow of rivers

Indian rivers, particularly the Himalayan Rivers, are a source of water in their upper course. Further, irrigation canals divert clean water away from rivers as soon as they reach the plains, preventing water from flowing downstream (below minimum flow of rivers). Therefore, the flow of the river looses much of its strength and minor streams and drains carrying untreated sewage and effluents trickles into the river, which has already lost most of its water to irrigation canals.

At Tajewala in Haryana, where the Eastern Yamuna Canal and the Western Yamuna Canal take major quantity of water for irrigation, the Yamuna is left with very little water. Similarly, the Upper Ganga Canal and the Lower Ganga Canal have almost completely dried up the Ganga downstream. The Yamuna and Ganga rivers become smelly sewers as they pass through Delhi and Kanpur, respectively. Therefore, it is critical to maintain a minimum amount of water flow in the river to maintain stipulated river water quality (Mission Ganga).

Religious and social practices:

Our river waters are also polluted by religious faith and societal practises. Cattle and other animal carcasses are often disposed into rivers. On the riverbanks, dead bodies are burned. Bodies that have been partially burned are also often thrown into the river. All of this is done out of religious belief and in accordance with old rites. These actions contaminate river water and have a negative impact on its quality.

Impact of River Water Pollution

Rising pollution of rivers in India is adversely affecting various components of environment. The consequences of river water pollution are explained

can be briefly summed up in the following headings:

Extinction of flora and fauna

Chemicals, effluents, and sewage polluting Indian rivers are causing some aquatic species to become extinct or migrate to safer habitats. This has a direct influence on the central and state governments' wildlife conservation efforts in national parks and wildlife sanctuaries. Contamination of rivers poses a threat to biospheres and natural conservation zones. Migratory birds avoid these waterways, putting them at risk of extinction. Other flora and fauna species in India are threatened by habitat loss caused by increased river pollution.

Financial loss to fishermen

Fishermen and fish farms that formerly thrived along the banks of several Indian rivers are now finding it difficult to catch enough edible fish. Such aquatic species have either relocated or are on the verge of extinction in contaminated waterways. Mercury, lead, and cadmium levels in fish from contaminated rivers are high, making them unsafe for human consumption. Salmonella, Shigella, and other dangerous microorganisms found in human faeces are also present in edible fish on which limited knowledge presently exist.

Agriculture

While rising river pollution has a negative influence on agriculture. In many parts of the country river water is being used for agriculture. The rivers receiving industrial/municipal effluents without proper treatment are not suitable to irrigate crops. Polluted water prevents seeds from germinating, resulting in stunted growth and a poor harvest for farmers which can further affect the sustainable food production.

Water-borne Diseases

Rising river water pollution is a major source of concern, as it can cause moderate to severe health problems in humans and domestic animals. Bathing in contaminated river water can cause skin diseases, allergies, and other issues. Cancer, osteoporosis, vision loss, impotence in men, sterility in women, tuberculosis, and other major medical problems can all be caused by drinking contaminated water. Hepatitis, salmonellosis, cryptosporidiosis, typhoid, cholera, diarrhoea, dysentery, amoebiasis,





cancer, fluorosis, and trachoma are water-borne disease which can all be caused by microbial contamination in drinking water.

Loss of Export Revenue

Freshwater fish species from Indian rivers, such as the famed Hilsa, Rohu, Catla, and prawns, were previously in high demand in foreign nations, particularly the Middle East. Unfortunately, pollution of river water affects valued fish with disease-causing germs and toxins. As a result, countries may impose import bans on Indian freshwater fish, including farmed species bringing significant loss of export earnings.

ORGANISATIONS AND PROGRAMMES FOR MONITORING RIVER WATER QUALITY IN INDIA

Many organisations are involved in monitoring and help improve water quality of rivers. Following are few organisations and programs involved in river monitoring:

a. Central Pollution Control Board

The CPCB has been monitoring the water quality of rivers and other water bodies across the country through a network of monitoring stations in partnership with Pollution Control Boards / committees in various states / Union territories as part of the National Water Quality Monitoring Programme. According to the CPCB's most recent report, 351 contaminated portions were demarcated on 323 rivers, based on monitoring data for biochemical oxygen demand, an indicator of organic pollution. To avoid and manage pollution, states, UTs, and local governments must ensure that sewage and industrial effluents are treated to the required standards before being discharged into water bodies, coastal waters, or land.

b. Central Water Commission

Since the late 1950s, the Central Water Commission (CWC) has been monitoring river water quality, and its water quality network now spans all over India. The CWC's water quality network is an afterthought to the hydrological observation system. All of India's major river basins are monitored by the Central Water Commission at 552 critical locations (519 water quality sites and 33 water quality sample stations). CWC also has a three-tier laboratory infrastructure in place for parameter analysis. The level- I laboratories are located at 295 field water quality monitoring stations on major rivers of India where physical characteristics such as temperature, colour, smell, electrical conductivity, total dissolved solids, pH, and dissolved oxygen of river water are on major rivers.

c. Government programmes

The Union Ministry has supplemented state/UT efforts by providing financial and technical assistance for pollution abatement in identified stretches of rivers across the country through the Central Sector Scheme of Namami Gange for rivers in the Ganga basin and the Centrally Sponsored Scheme of National River Conservation Plan (NRCP) for other rivers. Under NRCP, the construction of 2,522 MLD of sewage treatment capacity has been completed to date. The Namami Gange initiative has sanctioned 346 projects, comprising 158 projects for sewage treatment of 4948 MLD and sewer network of 5213 kilometres, totalling Rs 3,0235 crore (Down to Earth, 2021).

LAWS REGULATING WATER POLLUTION IN INDIA

Pollution of water being a serious issue the Government of India and State Governments have taken important steps for its reduction and control. Some are briefed below:

Water Prevention and Control of Pollution Act, 1974

The fundamental goal of this Act is to avoid water pollution, to maintain water quality and also to raise awareness about the importance of water body restoration. CPCB and SPCB execute the Act throughout the country with an authority to encourage and undertake research and study with the goal of significant prevention of water contamination, as well as advising the Central Government and Agencies on possible solutions to control water pollution.

The Water Prevention and Control of Pollution Cess Act, 2003

The industrial wastewater is being disposed of into the rivers which pollute the river at a large scale. With a view to augment the resources of the Central Board and the State Boards for the prevention and control of water pollution constituted under the Water (Prevention and Control of Pollution) Act, 1974. The Act imposes levy and collection of a cess on water consumed by persons and by local authorities carrying industries.
The River Boards Act, 1956
This Act aimed to the establishment of rivers and the regulation of interstate water disputes. The Act gives the power to the State Governments to establish Boards by issuing a special notification. The object of this Act is to resolve and regulate inter-state water disputes. Article 262 of the Constitution of India gives the power to the Union to establish and adjudicate inter-state water disputes prevailing in the country.

Right to Clean Water

The right to clean water and environment has been included under the ambit of Article 21, Article 48, Article 51(g) of the Constitution of India. The state has a responsibility to supply sufficient drinking water as well as preserve water sources from pollution and encroachment. The conduct of the State Government ignoring pollution of a water bodies will be regarded a violation of right to clean water as envisaged in Article 21.

The Indian Penal Code

Under the Indian criminal law a person who violates the Code is punished.



Section 277 of the Code which stipulates that anyone who knowingly fouls a public reservoir or a public spring is liable to a three-month jail sentence or a fine of 500 rupees, or both. In recent days, the Supreme Court OF India and some High courts have given rivers the status of a living entity with legal rights. This would give great relieve for resource/ river managers.

Conclusion:

There is a need to consider the threat to river ecosystems in a more realistic, comprehensive, and long-term sustainable manner. Due to changes in lifestyle and increased demand for water in numerous industries, river contamination has worsened in recent decades. It is high time to enact and enforce strict environmental legislations in order to prevent further damage of our river ecosystems. Along with wastewater treatment systems at point sources, in-situ remediation methods should be used to restore river's health.

Moreover, initiatives should be taken in such a way that balances the social, environmental, and economic interests of people that helps in voluntary active participation. For example,

- To prevent sewage waste entering the river, more public restrooms and crematoria should be built.
- It is necessary to implement educational programmes to raise awareness and encourage people to use bio-degradable paints when painting idols and to refrain them from dumping them in waterways.
- Existing sewage treatment facilities (STPs) that do not meet criteria should be upgraded.
- Integration of water management through bringing together. This mean bringing the business sector, local communities, and non-governmental organisation together, so that water is allocated and used effectively and efficiently by everyone.
- Use rainwater collection to meet all of your water needs throughout the year, including in residential and other uses.
- People should be trained and educated on how to properly maintain the sewage system and waste disposal procedures.
- Circular economy-based programmes must be developed as an alternative to the traditional linear economy in emerging cities (make, use, dispose).

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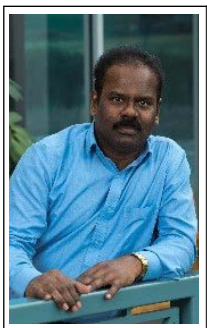
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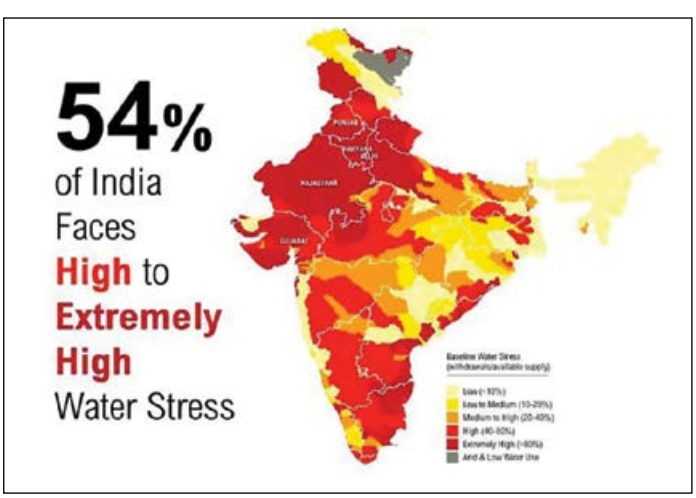
THE FUTURE OF WATER CONSERVATION

Ashish Mishra

What is rainwater harvesting? Know all about it and why you need to install one of such systems in your house, especially now.

Water is the reason why life exists on planet Earth, without it life is unimaginable. However, freshwater sources are becoming scarce with the passage of time. Reports of several global agencies, including United Nations, world population is steadily inching towards 8 billion, and we're using the equivalent of 1.6 Earths to maintain our current way of life. That not all, global warming is taking its toll on climate patterns across the world. Rains have become unpredictable in nature with some regions suffering with usual than longer dry spells, while some regions are hard hit by incessant rains. Rain hit regions are unable to utilise or control the excess waters, that they receive, which leads to a flood-like situation. Rainwater harvesting can help overcome the problem of floods, and also help in storing excess water that can used to provide water to the water scarce regions. This renewable source of water management can help in overcoming major water-related problems, that are not only plaguing the world right now but can also have a severe impact on the global population and environment in the future.

The need for rainwater harvesting. Water availability per person is dependent on the population of the country and for India, the per capita, water availability in the country is reducing due to an increase in population. The average annual per capita water availability in the years 2001 and 2011 was assessed as 1,816 cubic meters and 1,545 cubic meters respectively which may further reduce to 1,386 cubic meters and

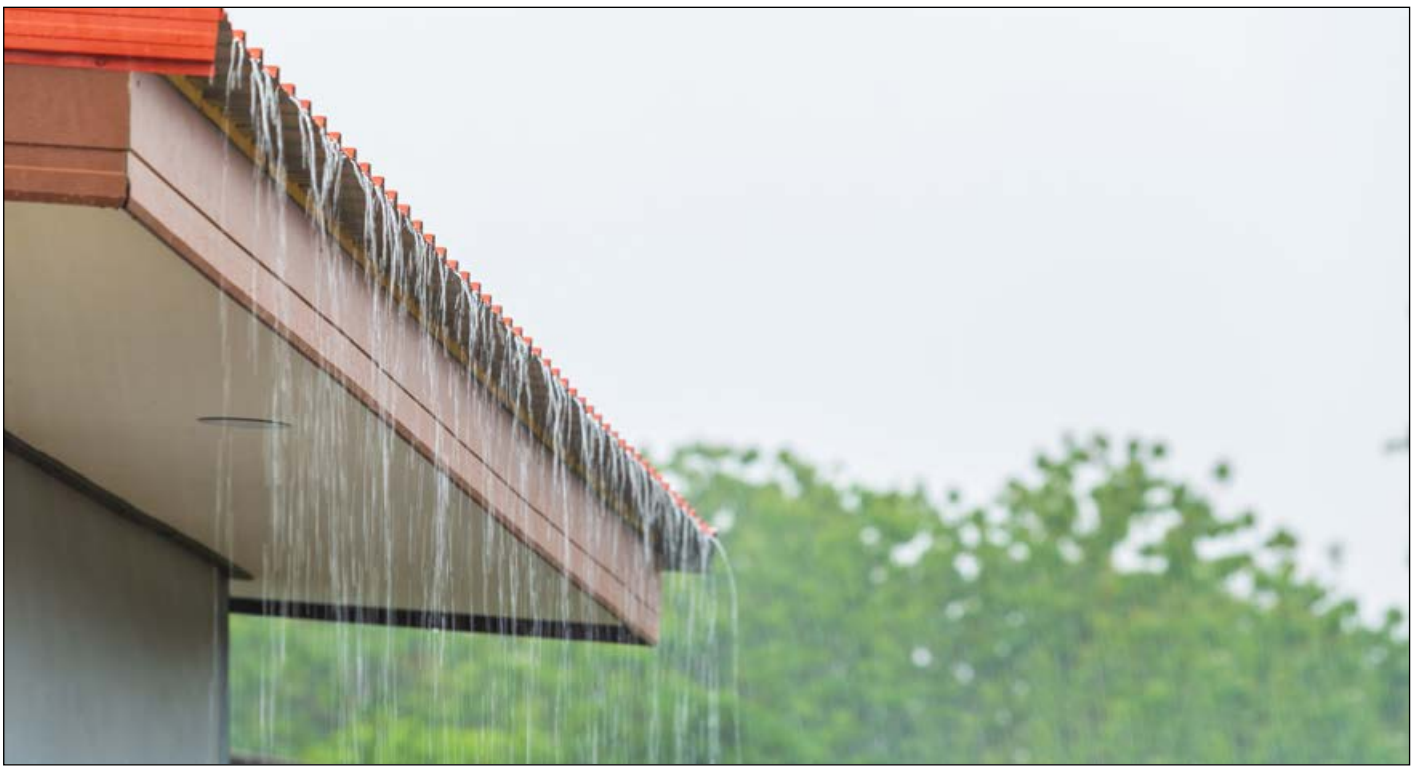




1,167 cubic meters in the years 2025 and 2050 respectively. As per the global standards, India is already in the water stress zone. If the condition is the same and exploitation continues without proper action and control, 54% of India face high to extremely high water stress by 2030.

Shockingly, India uses only 10-20% of its annual rainfall. When rainfall occurs, only a little amount of this water infiltrates and touches the groundwater aquifers. This means that the major part of the rain, that occurs, goes to the drain and into the ocean, due to lack of proper storage facilities. Not to forget the unrestricted use and rapidly increasing numbers and depth of borewells that impose a great threat to our country's groundwater resources. As rainfall, in India, has typically been erratic, in recent years, a renewable water resource like rainwater, if properly rain harvested, can mitigate water scarcity to a huge extent.

What is rainwater harvesting? It is a technique or strategy for collection of rainwater and storing it in the right way for future use. The water can



be collected from various surfaces and platforms and can be stored for later use. In most cases, the water is usually collected from rooftops and other hard surfaces.

How is rainwater harvesting done? Rainwater harvesting has been in practice, in India for more than 4000 years. It simple words it is a simple process of accumulating and storing of rainwater. Rainwater harvesting systems, since ancient times, has been applied as a source of supply for drinking water, water for irrigation, and water for livestock. Unfortunately, in the modern era, the age-old methodology of rainwater harvesting was greatly neglected. Years of negligence, and short-sighted water management policies that mostly rely on over-exploitation of ground and river water, has once again brought rainwater harvesting to the fore because of its life-saving qualities. Over the past few years, this ancient method of water storage has grown quite popular. It plays a vital role in reducing the use of potable water and increasing the reliability on rainwater. In simple words, harvesting rainwater means utilising every single drop of rain to recharge the groundwater, by simply directing it to the well or under the ground.

Today, rainwater harvesting systems are acting as incredible support system in many Indian cities, providing a superb alternative to the main water supply, especially during dry seasons. Moreover, the advantages of storing rainwater are not only limited to a particular individual or a family, but it is becoming a lifesaver for many urban communities as well. Widespread installation of these systems is also revitalizing the natural properties of land, helping to improve the quality of groundwater, raising its level, and preventing wells and tube wells from drying up. Additionally, efficient deployment of rainwater harvesting systems is limiting surface runoff of water, which is reducing soil erosion, and increasing its fertility. The systems are easy to construct from locally sourced inexpensive materials, and it has proved to be a success, in most areas. The primary advantage of rainwater is that the quality of water is usually good, and it does not necessitate any treatment before consumption. Household rainfall catchments can significantly contribute where the source of drinking water is contaminated and scarce.

How much rainwater can be harvested? Explained below is an illustrative theoretical calculation that explains the massive potential for rain water harvesting. This same procedure can be used to get the potential for any plot of land or roof top area, using rainfall data for a particular area.

Area of plot = 1,000 sq.m.
Height of rainfall = 1,180 mm
Rainwater harvested: Assuming that only 60% of the total rainfall is effectually harvested,

Total volume of rainfall harvested over the area of plot = Area of plot X Height of rainfall X Rainwater Harvested Efficiency
= 1000 sq.m. x 1.18 m x 60% = 708 m3 (708,000 litres)

In the example, consider the area of the plot as 1,000 sq.m. The average rainfall in India is 118 cm (1180 mm or 1.18 m) according to annual data from the Meteorological Department.

This volume is about 4 times the annual drinking water requirement for a family of five. The average daily water requirement, of water, per person is 70-100 litres according to IS 1172: Indian Standard Code of Basic Requirements for Water Supply, Drainage and Sanitation.

Benefits of rainwater harvesting. There are numerous benefits that rain harvesting systems provide. Some of them are enumerated below.



- Improves the quality and quantity of groundwater.
- It reduces soil erosion, stormwater runoff, flooding, and pollution of surface water with fertilizers, pesticides, metals and other sediments.
- It is a sustainable process that helps in preserving water for future needs.
- Reduces water bills.
- The system is easy to maintain.

Disadvantages Of Rain Water Harvesting. There are however, some disadvantages with these systems. Some of them are listed below.

- Erratic rainfall could prove to be a dampener.
- It is not suitable for all areas.
- There are limits to how much water you can store, by employing this system.

METHODS OF RAINWATER HARVESTING

There are primarily two prevalent methods of rainwater harvesting that are widely used.

1. **Surface run-off rainwater harvesting:** The rainwater that flows off in urban areas can be collected and stored to recharge the groundwater level or the aquifer bed, instead of letting the water flow into the drains.
2. **Rooftop rainwater harvesting:** In rooftop harvesting the rainwater is directly collected from the roof of buildings and is transported either into a tank or an artificial aquifer. The system can be installed in an individual home environment, schools, colleges, and other institutional buildings that have more available roof space. Through this method the harvested water can be used for daily use (including drinking and cooking, only after purifying the water at a basic level) and for recharging the aquifers and help restore groundwater levels.
3. **Recharge pits:** Another common rainwater harvesting process is constructing recharge pits to hold the rainwater. Recharge pits can be of any size and shape, depending on the intensity of rainfall in a particular area. It is important to fill these recharge pits with coarse sand, boulders, and gravel, which act as natural filters that keep away dirt and impurities usually carried by the first flow of rainwater.

BASIC STRUCTURE OF RAINWATER HARVESTING SYSTEM

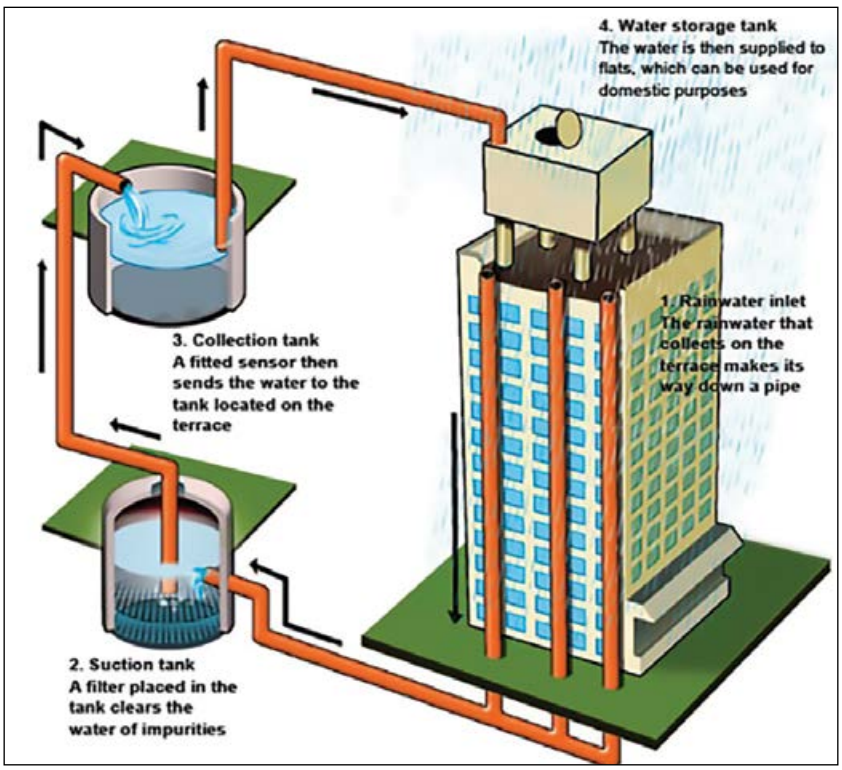
The design of a basic rainwater harvesting system is relatively simple. It fundamentally contains components for:

1. **Collecting the rainwater:** Known as catchment area, it can be a terrace or ground surface. It should be capable of collecting a large amount of water.
2. **Primary filter:** This is required to filter the collected water and remove large sized debris, mud and so on from the water. Metal meshes are mainly used for this.
3. **Gutters:** The pipelines or channels that transport the collected water to the storage area are known as gutters. These can be fully cylindrical or half-cut pipes made of iron or PVC plastic.
4. **Cistern:** The storage tanks are known as cisterns. These can be man-made tanks or could be natural reservoirs like ponds



TECHNIQUES OF RAIN WATER HARVESTING

The collection of rainwater can be done in various ways depending on a few factors. A few common methods that can be adopted include the following:



1. Rain barrels

It is the easiest and affordable method of rainwater harvesting, especially when it is done at your home. Under this method, barrels or water tanks are installed below the downspouts of the rooftops guttering system. The water is then funnelled/directed into the tanks. The tank can be connected to provide backup water to your current plumbing system, or it can be attached to a pipe for drip irrigation. The use of barrels or tanks is ideal since it can store significant amounts of water.

2. Dry System

It is similar to the barrel's system, but in the dry system, a larger storage container is used. The container is usually a few meters away from the property. The gutter is redesigned so that water is diverted to the large storage tank. It is a quick and cheap method to implement but provides significant rewards.

3. Wet System

It is a technique that is entirely different from the dry system. Here, the collection pipes will always have water in them. It is because they will be situated underground. In the wet system, many collection pipes are connected to the downspouts of a building and are diverted into a storage tank, which is also underground. The pipes need to be secure and well maintained to ensure there is no leakage into the soil.

4. Green Roof

This method of harvesting does not require the use of storage tanks. Instead of storing the water in a reservoir, the water is channeled straight to the garden. The process will require installing a drainage system on the building's roof straight to the backyard. It is a very low maintenance method.

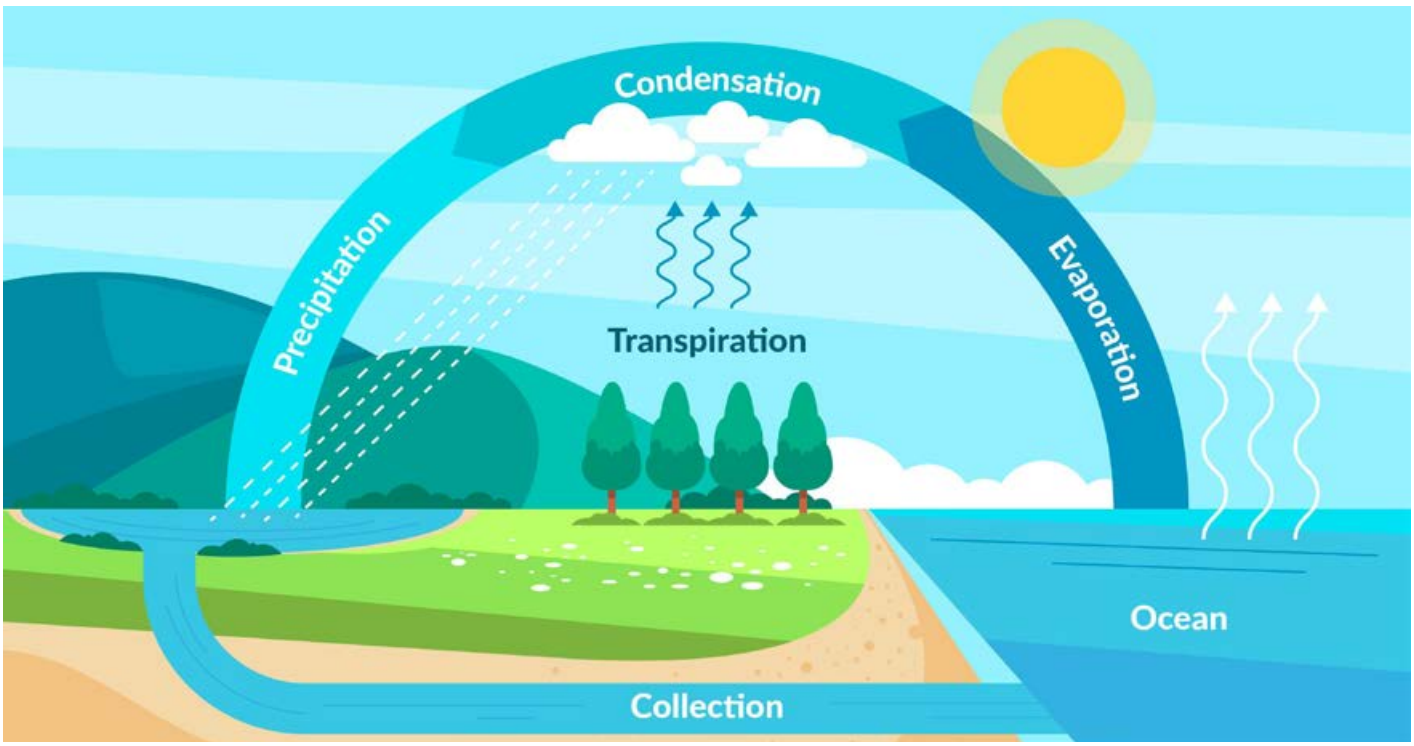
MECHANICAL PRE-TANK FILTERS

The most effective way of keeping rainwater clean is to prevent dirt and debris from entering the storage tank in the first place. To do this, most systems use a pre- or in-tank filter. This generally consists of a stainless steel element housed within a plastic body, though some inferior models are entirely plastic. The element is usually a stainless mesh or grill. The fineness of the mesh is measured in microns – the lower the micron rating, the finer the degree of filtration. So for example, Vortex filters have a mesh rating of 280 microns (0.28mm) which will remove all but the finest particles without the mesh getting blocked.

MICROSCOPIC FILTRATION

A much finer degree of filtration can easily be achieved through the use of particulate filters. These days such filters are generally in the form of a sealed housing containing a cartridge or bag which traps very fine particles to provide an even cleaner standard of water. Mostly these require the cartridge or bag to be changed periodically when they begin to clog up, though some of the coarser grades can be washed and re-used. One important point is that such filters require





pressure in order to function effectively; they work by the water being forced through. Hence such filters are generally only found on pumped water supplies.

CARBON FILTERS

If rainwater is to be used for drinking (this is rare, but if no other water supply is available, then there may be no choice) further treatment may be recommended in the form of carbon filtration. By passing the water through carbon, taste and odour gets significantly improved and also discoloration to a degree. A Granular Activated Carbon module can be added to any rainwater system, or used as a stand-alone unit.

DISINFECTION

In addition to these components, Ultraviolet Sterilizers are sometimes used to sterilize the water for indoor uses.

- Simple roof water collection system, a pump and a storage tank comprised of a basic rainwater harvesting system.
- A pump is needed to circulate water between filter, storage tank and house.
- UV disinfection systems (Ultraviolet light of wavelength 253.7 nanometers) is used for disinfection water. These systems typically remove bacteria, viruses, moulds, algae, and other microorganisms, which multiply and grow, from water. UV disinfection technology destroys the DNA of microorganisms which leaves them dead and unable to grow further to make water safe for drinking. The UV lamp will need to be replaced annually, and is a simple unskilled task

In The End…

Erratic monsoon rains, sudden and heavy downpours result in flash floods and capacious flow in the rivers. Even when many parts of our country have little or no water, we have to let the rain water flow into the sea. Women in villages, at times, walk miles to fetch a pot of potable water while city residents lose sleep and time waiting in serpentine queues for a bucket of water. Since natural resources (like rain water) are free of cost we need to realize its value and find ways to save it. Green living with modern water-saving technologies and lifestyle is also catching on. Our world is reeling under an extreme water crisis, cities and communities would need to become more aware of rainwater harvesting, storing, and most importantly – wisely using water. Access to sufficient clean water is everyone's right, lets pledge to save water as it could save several lives in the future. When builders and architects are designing a new home or a building, it is important that they think of implementing rainwater harvesting methods. It will be able to reduce reliability on other natural resources like groundwater. In the long run, there will be energy savings, water savings, and resource savings ■



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THE IMPEDIMENT OF WASTEWATER

Mohammed Naser Azeez

Wastewater is not a waste, but a valuable resource. Across the world, focused efforts are being taken to make the most of it. In India, though there are a few examples of such activities which need to be taken to the next level.

Rising population, economic development, changing consumption patterns not only see great prosperity but also enhanced risks. With rapid urbanization and the evolution of cities, there are new pressures on water supply and challenges with accumulation of wastewater. The utilities and local governments struggle to keep pace with that development with matching infrastructure.

The rapid growth in urban population and sub-urban areas along with declining water sources and impact of climate change creates significant challenges for water and wastewater infrastructure. India had 28.53% population residing in urban areas in 2001 that has increased to 35.39% by 2021. The pace of annual increase of urbanization in India is 2.3% in the last few years and according to a report by the United Nations, 40.76% of country's population is expected to reside in urban areas in 2030.

Wastewater in India

India is generating nearly 72,368 MLD (million litres per day) of sewage from urban settlements whereas the installed capacity of STPs is 31,841 MLD (43.9%). Out of this installed capacity, developed and operationalized capacity is 26,869 MLD and out of which only 20,235 MLD is the actual utilised capacity. In effect, out of 72,368 MLD sewage generated, only 20,235 MLD is treated which is just under 28% of the sewage being treated. This leaves a big gap of almost 72% sewage not receiving any kind of treatment and being disposed untreated into the water bodies. CPCB (Central Pollution Control Board) has estimated that sewage generation from urban centres will increase to over 1,20,000 MLD by 2051 and by that time even the rural areas will be generating another 50,000 MLD of sewage.

> *The reuse of treated wastewater has not assumed much importance in India despite the fact that our fresh water sources have declined substantially.*

Pollution Challenges

Water Pollution is a primary concern for India due to drastic reduction in the availability of usable water and unsustainable wastewater disposal into surface water sources. There are various kinds of pollution but water pollution is a major issue as it is directly related to the health and wealth of the nation. An estimated over 70% of the available water in Indian rivers are polluted because of improper disposal of untreated sewage and industrial wastes directly into rivers and streams.

About 80% of stomach diseases in India are caused by lack of safe water. Waterborne diseases like cholera, typhoid, paratyphoid fever, dysentery, diarrhea, tuberculosis, jaundice, and amoebiasis are most important factors responsible for nearly 80% of human mortality in India. Children are worst affected, especially in rural areas and in urban slums. Unsafe drinking water contributes to high infant mortality. Every year an estimated 1.5 million children die due to diarrhea and around 73 million working days are lost leading to an economic burden of over USD 600 million a year.

Central Groundwater Board data reveals that as high as 66 million people are drinking water with fluoride levels beyond permissible limits, in India, leading to dental and skeletal fluorosis. Contamination of drinking water with arsenic is rampant in the states of West Bengal and Bihar besides Uttar Pradesh, Madhya Pradesh and Karnataka leading to arsenic poisoning and cancers.

Central Water Commission studies show that all major rivers which are a vital source of drinking water for millions of people in India are loaded with heavy metals such as lead, arsenic, copper, cadmium, mercury and nickel that are highly toxic and carcinogenic



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4000 LPD 6 stage Drinking water plant for Amazon Campus, Hyderabad

way beyond standards prescribed by the Indian Council of Medical Research (ICMR) and Bureau of Indian Standards (BIS). To put things in perspective, about 15,000 MLD of municipal and industrial waste is released into the holy River Ganga every day and other rivers across the country are facing the same fate.

Market Dynamics

As the volume of wastewater is growing every year, so is the wastewater treatment market in India. It was valued at USD 4.394 billion in 2019 is expected to grow at a CAGR of 12.76% to reach a total market size of USD 10.185 billion by 2026. The water and wastewater treatment (WWT) technology market is also growing and was valued at USD 2.1 billion in 2021 and is projected to register a CAGR of more than 8% during the period of 2022-2027. Collection, treatment, and reuse of municipal wastewater provides an opportunity not only for environmental rehabilitation but also for meeting the increasing water needs of different economic sectors.

Reclaim & Reuse

The reuse of treated wastewater has not assumed much importance in India despite the fact that our fresh water sources have declined substantially and more than 40% of the population is facing severe water scarcity. A report by CPHEEO (Central Public Health and Environmental Engineering Organization) suggests that treated sewage can be reused for horticulture, irrigation, washing activities (road, vehicles and trains), fire-fighting, industrial cooling, toilet flushing and gardening with proper policy planning and infrastructure support.

There are only a few examples of wastewater reuse in India. The State Government of Gujarat has envisaged a Policy for Reuse of Treated Waste Water (2018) which aims for full reuse of treated wastewater by 2030.

Chennai is a classic example of using around 20% of generated sewage for reuse enabling the city to reduce its consumption of fresh water after it has setup two Tertiary Treatment Reverse Osmosis (TTRO) plants of 45 MLD capacities each. This plan was initiated after severe water shortage hit the city in 2019 when water had to be brought in by trains from almost 200 kilometers away. The city administration has begun to recycle wastewater at scale to meet the non-drinking water needs of industries falling under its jurisdiction. The industries in Chennai's northern belt and the neighboring areas of Sriperumbudur, Oragadam and Vallamvadagal will receive the treated water of the same quality as the raw water that has traditionally been supplied to them.

Nagpur Municipal Corporation is developing sewage treatment plant and infrastructure for collecting and treating around 200 MLD of sewage for reuse. The state power generation utility has agreed to utilise 190 MLD of treated water reducing the consumption of fresh water. There is not much progress made so far in terms of policy guidelines and infrastructure creation for reuse facilities across the country, which is now becoming essential as the fresh water is declining fast and remaining sources are getting polluted.

Global Trends

There are good examples from across the world. Over 43 countries are using almost 5.5 BGD (Billion Gallons Daily) treated water, on a regular basis. Approximately 1,500 water reuse facilities are there in the United States alone. China has developed wastewater reuse network across Beijing and almost 22% of total water supplied in the city is reclaimed water. Singapore has successfully adopted smart wastewater management system to meet 40% of their fresh water demand which they have planned to increase to 50% by the year 2030. Israel is the world leader in wastewater recycling. Nearly 90% of wastewater in Israel is treated for reuse, most of it in agriculture for irrigation. With the total percentage above 65% of treated urban wastewater, Slovakia is not the last on the list, but still significantly falls behind Netherlands, Britain, Austria, and Germany.

Data suggests that Morocco, Algeria, South Africa, and Botswana treat 25% to 50% of wastewater. In Netherlands, a water utility offer treated or processed water that is customized for specific requirements and preferences of each customer. Belgium provides tailored water for industry and service business customers.

Way Forward

Wastewater is not typically discussed and most people take wastewater treatment for granted, preferring to flush and forget. This makes the work

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by wastewater professionals, municipalities, engineers, regulators, and health departments to protect public health and our water resources even more challenging. Wastewater treatment, both residential and commercial is a big concern.

The rapid growth of urban population has created significant challenges for the provision of water and wastewater infrastructure. There is a need for serious thinking and planning process to meet the challenges. Some relevant policy recommendations could be:

- Invest in sanitation, wastewater treatment, and circular economy.
- Improve water cost-effectiveness and affordability.
- Improve pollution load management and stimulate circular economic activities.
- Stakeholder engagement should be prioritized in all states and cities.
- Wastewater reuse has to assume much importance in the policy planning of government. Central and state governments must work in partnership to create markets for treated water.
- Treated wastewater can be reused for horticulture, irrigation, washing activities (road, vehicles and trains), fire-fighting, industrial cooling, toilet flushing and gardening.
- Wastewater can be a cost-efficient and sustainable source of energy, nutrients and other useful by-products like organic and mineral have benefits on food and energy security as well as climate change mitigation.
- Monitoring and evaluation should be improved in all regions with adequate institutional coordination.
- Reliability can be improved by promoting legal and institutional frameworks to make stakeholders more accountable.
- Make the best use of available assets and financial resources to improve operational efficiency and effectiveness of infrastructure by extending the operational life of assets and providing better services.
- Minimize future investment needs through policies promoting sustainable and integrated water resources management.
- Effective governance is essential to create synergies and trust, as well as to manage complexity.

As a responsible corporate entity, Aquality Water Solutions intensively endeavour in growing water scarcity and health impact on our people due to increased contamination and work with environmental consciousness. With the purpose of mitigating the water and wastewater challenges and resources depletion, it integrates latest technology and excellent products to provide the desired solutions as it firmly believe in innovation for the benefit of people. With the commitment to preserve the environment, Aquality Water Solutions ardently contribute with effective water and wastewater treatment and resource augmentation ■



Mohammed Naser Azeez, is the Managing Director of Aquality Water Solutions Pvt. Ltd. that provides technologically advanced and innovative solutions for water and wastewater treatment. Mr Azeez is an engineering graduate with an MBA from Preston University, USA.

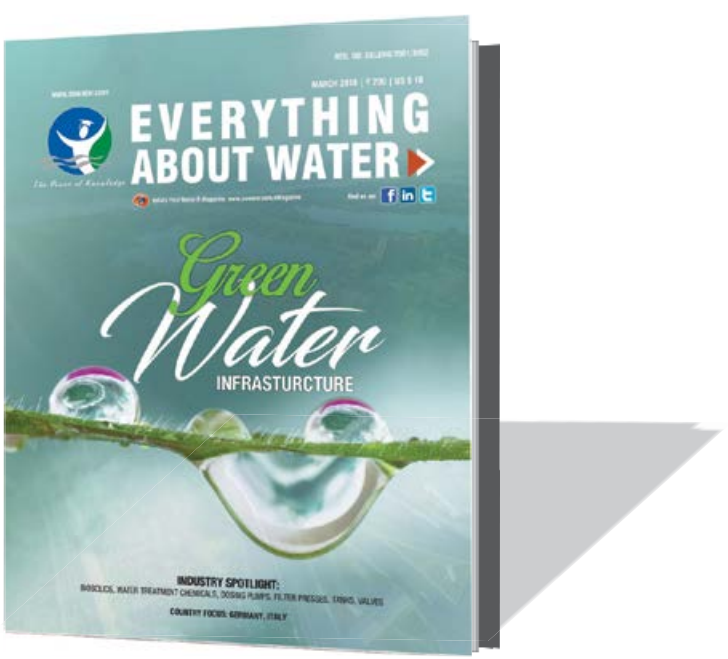


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INDUSTRIAL WASTEWATER: TREATMENT & REUSE

Abdul Rahman Mohammed

With the evolution of technology and advance treatment methods, there are a number of wastewater treatment processes, but selecting the best solution, that's technically and commercially viable, is always a challenge.

The need for water is growing fast and millions of people, across the globe, are deprived of clean water. Population growth, rapid industrialization and urban migration have driven the consumption of everything from farm produce to goods manufactured in industrial units. The fast-depleting water sources and extreme climate change events have driven people from their land, and in some cases turned them into refugees. The world over, we have depleted most of the fossil water in deep artesian.

The existing and anticipated water scarcity has forced Governments, across the globe, to think deeply and take remedial actions towards water conservation and seeking alternative sources of generating water. Water reuse, the use of treated wastewater or reclaimed water for purposes such as drinking, irrigation, or industrial uses is gaining momentum. Municipalities and industries, across the globe, are contemplating or implementing water reclamation and reuse facilities by treating their municipal and industrial wastewater as the best possible option that can help in addressing water scarcity concerns and augmenting their water supplies.

INDUSTRIAL DEVELOPMENT IN INDIA

Industries are important engines for economic growth. They generate employment and provide livelihood, to many, across the globe. In India, the industrial growth picked up pace only after the independence as a large number of industries were established. But the actual surge in industrial development came after the reforms invoked after 1990s, as a new era in business helped India achieve the industrial growth of over 8% for a prolonged period afterwards.

A variety of industries were established that played a crucial role in adding to India's richness in production and manufacturing of goods and boosted the economic growth of the country. However, the industrial development also brought significant changes in the environment through emissions into the air and industrial wastewater into water bodies and the soil. Although the industrial sector in developing countries, consumes close to 10% of the total water, in case of India, as per the estimates of the World Bank, it is about 13% of the total freshwater withdrawal, in the country,



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and the demand for water for industrial use and energy production will grow at a rate of 4.2% per year, from 67 billion cubic metres in 1999 to 228 billion cubic metres by 2025.

INDUSTRIAL WASTEWATER

Industrial wastewater has variable quality and volume depending on the type of industry producing it. It may be highly biodegradable or may not contain compounds recalcitrant to treatment. These include organic synthetic substances or heavy metals whose content in waste water produced in developing countries' may be considerably different (in quantity and quality) from that produced in developed countries. The main concern with industrial wastewater is the increasing amount (in quantity and variety) of synthetic compounds contained in and discharged into the environment.

India is facing the dual challenge of declining water sources as well as increasing water pollution in surface and ground water sources. It is challenging for industries to find fresh water as its scarcity is threatening lives. It is quite evident that industries have to look for alternative sources of water supply, like making use of recycled water, if they are not self-sufficient, in water. Among different industry sectors, thermal power plants consume the most water and are termed water-intensive. In India, the thermal power plant sector is a major power-generating source and as per the Ministry of Power accounts for ~ 59% of the total installed power capacity. And in view of the huge demand for power, contribution of thermal power plants towards power generated, in the country, is expected to increase further, in the future. Not only is the thermal power sector most water intensive, but it also discharges huge amounts of wastewater and is one of the largest contributors to industrial wastewater discharge. A recent trend in Maharashtra indicates the increased dependency of industry on treated water which is gradually being used during production process.

> *If India reuses 80% of its untreated wastewater from 110 of its most populous cities, 75% of projected industrial water demand will be met by 2025.*

Industrial wastewater from chemical and pharmaceutical production often contains substances that need to be treated before being transported into a biological treatment plant and subsequently being discharged into water bodies. Generally this is done close to the site of production, in selected wastewater streams before reaching a central treatment plant. Each of the approaches used has certain advantages and some disadvantages. With the evolution of technology and advance treatment methods, there are a number of industrial wastewater treatment processes, but selecting the solution, that is technically and commercially viable, is always a challenge.

TREATMENT PROCESS

India is a large consumer of pulp and paper, meat and poultry. What needs to be noted in that manufacturing and processing industries produce large volumes of wastewater that contain high levels of degradable organics.



Industrial Water Treatment Plant

The meat and poultry processing facilities typically employ anaerobic lagoons to treat their wastewater, while the paper and pulp industry also use lagoons and anaerobic reactors.

The non-animal food and beverage industries produce considerable amounts of wastewater with significant organic carbon levels and are also known to use anaerobic processes such as lagoons and anaerobic reactors. Anaerobic reactors treating industrial effluents with biogas facilities are usually linked with recovery of the generated methane (CH_4) for energy. The most suitable approach for effective and efficient method of industrial

wastewater treatment is to understand how substances are dissolved or suspended in water and then to deduce reasonable chemical or physical actions that would reverse those processes.

At Sahara Industry, we offer a variety of water and wastewater treatment solutions based on the nature of wastewater coming from either municipal sources or industries. The treatment methods are mostly customised based on the treatment requirement that may vary from disposing off or reclaiming it for reuse. The electro-coagulation (EC) based system to remove pollutants from municipal or industrial wastewater is the commonly used method. The Sludge Activated Flocculation (SAF) technology and activated treatment process helps to treat industrial wastewater with high turbidity, coloration and harmful chemicals having very high content of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD) and Total Dissolved Solids (TDS).

Sludge from treated wastewater can irrigate upto 3 million hectares of land annually, while providing nutrients to crops and reducing fertiliser dependence by 40%.



3672 FRP Pressure Vessel for Industrial RO Water Purification System installed in Le-Meridien

Sedimentation technology is the simplest and most economical method of treatment as the process allows separating solid substances from the liquid by allowing it to settle in a sedimentation tank. The settled sludge is then removed from the tank. The treatment method is specially used for effluents with high fibre concentrations.

Anaerobic treatment of industrial wastewater has found widespread application for treating a large variety of different effluents. This treatment is most commonly used for effluents originating from paper and pulp factories along with other manufacturing plants.

Aerobic treatment requires oxygen to support the micro-organisms and metabolic activity. In effluent treatment, oxygen is supplied to the effluent in the form of air by a special aeration equipment. Aerobic treatment allows fully biological degradation of effluents. Aerobically operated plants exhibit higher plant stability and are less sensitive to fluctuations in effluent and plant parameters.

Electrodialysis is an electrochemical membrane separation technique for ionic solutions that has been used by industries for decades. It can be used in the separation and concentration of salts, acids, and bases from aqueous solutions, for separation of monovalent ions from multivalent ions, and for separation of ionic compounds from uncharged molecules.

Advanced flocculation treatment is a crucial process as it promotes the aggregation of particles after being destabilized by a chemical agent. It is used in the industrial wastewater treatment to separate the colloidal material and in sludge thickening.

Membrane treatment serves to optimize loop closure and therefore helps to reduce fresh water intake as well as wastewater treatment. Other purposes of membrane processes are improved product quality because of lowered pollution of loop water, re-use of treated effluent in production, recovery of valuable substances and minimizing environmental impact because of improved effluent quality.

Electro Oxidation technology is a multi-stage controlled wastewater treatment process. It can treat very high content of organic carbon, oxygen demanding substances and a host of other pollutants present in industrial wastewater. After the treatment, reclaimed water can be used for a variety of non-potable purposes based on its quality.

Advanced and tertiary treatment is used to remove specific wastewater constituents that cannot be removed by secondary treatment. Different

treatment processes are necessary to remove nitrogen, phosphorus, additional suspended solids, and refractory organics or dissolved solids. Sometimes it is referred to as tertiary treatment because advanced treatment usually follows high-rate secondary treatment.

There are other emerging treatment methods too that are being used but the modern treatment facilities also require the use of innovative technology, such as sensors, Internet of Things (IoT) devices and Artificial Intelligence (AI)-based trackers.

GOING FORWARD

India generates nearly 14,000 million litres daily (MLD) of industrial wastewater, which require treatment before being discharged so that it meets environmental norms. Studies suggest that around 60% or a little over 8,000 MLD is being treated leaving a gap of almost 6,000 MLD that does not receive any treatment before its disposed into land and water bodies, thereby highlighting the need for better wastewater management, in the country.

A serious consideration of the current situation is required and policy reforms and strategic planning is needed to make the paradigm shift from "use and throw - linear" approach to a "use, treat, and reuse – circular" approach towards managing wastewater. There should be a policy intervention for the following steps:

- Every drop of waste water (be it from the domestic sector, industries and commercial wastewater) must be treated.
- There should be adequate capacity to treat wastewater and sewage.
- Infrastructure should be properly maintained, and cost recovery should be ensured through reuse and/or recycling of treated water.

Reusing wastewater that is treated is becoming a necessity as water scarcity is not only affecting people but also the industrial production. It was reported that nearly 7 billion units (kWh) of coal power, with an estimated potential revenue of INR 2400 crore were lost in the first five months of 2016 due to lack of water for cooling the thermal power plants. In addition to augmenting water supply, wastewater treatment also offers new economic opportunities for energy production and fertilizer reclamation. We at Sahara Industry have been advocating for integrated water management practices while providing advance treatment solutions to a large number of industries and commercial units across the country. The testimony of our efforts towards making industrial plants water positive is the success rate of our products which provide quality and longevity. It will be our endeavour to drive, facilitate, and sustain wastewater management interventions across the Indian industry ■



Abdul Rahman Mohammed, is the CEO, Sahara Industry. He is an MBA with rich experience in handling focussed business activities. His modern business approach supported by technological interventions has catapulted the turnover of his group companies in excess of INR 100 crore, in a short span of time.



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"WE GO BEYOND THE 3R'S BY IMPLEMENTING THE 4TH R THAT IS REPLENISH".

Rajneesh Chopra, Global Head - Business Development, VA Tech WABAG Ltd, shares his views on why we need to adopt the three R's and goes on to say that VA Tech WABAG Ltd has implemented the fourth R, replenish.

1. How severe is the stress on water, as a resource?

Being the essence of life, water has always been an essential commodity on earth. A vital resource for ensuring growth and economic prosperity as well. Furthermore, the recent tough times faced globally due to COVID, has brought into focus the importance of water and sanitation as a top priority. However, continuous extraction of water from fresh water sources for human consumption as well as for various agricultural and industrial uses have led to rapid depletion of fresh water sources.

The recent statistics by various organizations on water scarcity are very alarming. As per UN Water, 2.3 billion people live in water-stressed countries, of which 733 million live in high and critically water-stressed countries. As per UNICEF, today, 1.42 billion people - including 450 million children - live in areas of high or extremely high water vulnerability. Hence, water as a critical resource, needs better management to combat the acute water stress.

2. Do the three R's (reduce, recycle and re-use) provide a viable solution to reduce stress on water, as a resource?

Yes. 3R's definitely offer a viable solution. In fact, as an organization, we go beyond 3R's by implementing the 4th R that is Replenish. By recharging the various sources of water with treated water, if immediate reuse is not possible.

As I mentioned earlier the need of the hour is better understanding and management of water recycle.

I. Reduce: The need to manage the demand side, in urban areas today, water transmission losses are as high as 50 to 60%. The need for implementation of NRW, GIS Mapping and revamping the distribution network is a must. Use of equipment and gadgets utilizing minimum water needs to be promoted. In the agriculture sector which consumes as high as 81% of water, the need for right irrigation techniques can lead to huge savings in water and help optimize ground water extraction. Selection of right crops can also help in optimizing irrigation needs for the agri-sector, without compromising on the yield. Bigger industries have realized the economic value of water and have been working on reducing their water footprint for each process and recycle every drop of water. The need is to have this implemented right up to MSME and SME's which can not only



110 MLD Desalination Plant, Nemmeli, Chennai



45 MLD TTRO Plant, Koyambedu, Chennai

save water but can lead to abatement of pollution.

II. Recycle:
"Water is too precious to be used just once" - Mr Rajiv Mittal, CMD and Group CEO, VA Tech WABAG

We have been a front-runner in promoting recycling of water in industries as well as municipalities. Currently we are recycling more than 2,500 million liters of industrial and municipal water each day.

III. Reuse: Water is treated as per reuse requirement, be it for industrial processes, agriculture or recharging water resources, we have the distinction of treating water right up to drinking water standards.

IV. Replenish: Wherever treated water cannot be reused, the same needs to be treated as per standards to recharge water resources like river, lakes and ground water aquifers to enhance ground water level.

3. Are there any alternate solutions other than the three R's that can help mitigate the stress on water that we can use?

In coastal areas, with ease of access to abundant seawater, desalination emerges as a reliable, sustainable and affordable alternate source of water. Given that, the source of raw water in desalination is virtually inexhaustible, it becomes a great alternative and a perennial source for municipalities - for use as potable domestic water and for industries for captive consumption, ensuring industrial water security. The cost of desalinated water has been coming down over the years because of technological innovations and will be coming down in future because of use of renewable energy.

One of the time-tested examples of the same is the 110 MLD Nemmeli Desalination plant in Chennai built by WABAG in 2013. Since then, the plant has become a reliable source of water for the city quenching the thirst of over 10 lakh people. WABAG has done double that size in OMAN and several other desalination plants for captive use in industries.

4. Is enough being done to promote the use of the three R's? What more needs to be done? Please elaborate.

Historically, there has been a lag in both promotion and adoption of the

three R's, despite the wide array of advantages they carry. However, in recent times, the three R's are slowly, but surely getting the due acknowledgment and recognition from both Govt's and the industry.
Water is a precious gift for the future generations and their prosperity is directly linked to its availability. Hence, conservation of water is the responsibility of every individual. This must be emphasized through various public awareness campaigns. Meanwhile, Government's should also take decisions to include water as an economic good. Like other utilities, use of water must be monitored and to be charged based on consumption.

In India, recycle and reuse has been a focus at the state as well as the national level. Five States in India - Tamil Nadu, Karnataka, Maharashtra, Haryana and Gujarat - have come up with a national level reuse policy aiming at 70% reuse of treated wastewater by 2030 and ultimately at 100% reuse. A national level policy for safe reuse of treated water is also under consideration, which sets out guidelines and inputs for the adoption and implementation of the three R's.

5. Is desalination a viable way to augment the usable water? Please elaborate. Is it a financially viable option?

Desalination has emerged as a sustainable, reliable and affordable alternate source of water, especially in coastal regions. Also seawater being a virtually inexhaustible source of water, desalination emerges as an excellent alternative to supplement the freshwater source.
Technological developments in the last two decades have brought down the cost associated with desalination considerably, with improved recovery rate, energy recovery devices, reduced power costs and specific power consumption. Today, the production cost of desalinated water is much less than the bubble cans and water tankers, which are widely used and provide much superior quality of water. Going forward, innovations such as integration of renewable energy with desalination, advanced membrane materials and technologies such as forward osmosis will only bring down the costs.

6. Going forward, will the adoption of the three R's gain further strength both by the industry and public at large?

As mentioned earlier, in recent times, the three R's have slowly started



DPR Plant, Windhoek, Namibia



45 MLD TTRO Plant, Koyambedu, Chennai

to be acknowledged and its adoption has definitely increased. The State reuse policies of five States have time bound targets to 70% and ultimately 100% Reuse of Treated Wastewater, which will only strengthen the implementation of the three R's. Apart from the five States mentioned above, other States are in the process of coming up with their reuse policies. All these will only drive the momentum in this segment.

There are several proven marque references in this field which stand as role models when it comes to the advantages of the three R's. For instances WABAG built a world-class water reuse plant at Chennai. Employing state-of-the-art technologies like Ultrafiltration, Reverse Osmosis and Ozonation, the 45 MLD water reuse plant is producing potable grade water from secondary treated water, which is being supplied to industrial hubs of south Chennai, thereby freeing up 16 million m3 of freshwater for human consumption.

7. Do you foresee further scientific developments that will make adoption of the three R's easier and simpler both by the industry and by the public at large?

In terms of technology, there is enough development, which enables reuse of treated water for a host of purposes, including direct potable reuse. As mentioned earlier, there are several time-tested projects, which show the way forward on the ease of implementation of these technologies. The acceptance and implementation of these technologies will play a key role in driving the initiative among industries as well as among public at large which will then ensure a water secure future.

At WABAG, we have many global references, which are great examples of implementation of cutting-edge technologies for promoting water recycle and reuse. The world's first Direct Potable Reuse (DPR) plant in Namibia, the industrial effluent recycle and reuse plant at IOCL - Panipat and the Tertiary Treatment Reverse Osmosis (TTRO) plant in Chennai are a few time-tested references from WABAG. Backed by its technical competence and extensive R&D, WABAG has emerged as a pioneer in the field of removal of micropollutants. Technology is not a barrier. Public acceptance is something that matters a lot.

8. What message do you want to give to relevant stakeholders regarding judicious use of water, in addition to the 3 R's?

We have always believed and advocated "Water is too precious to be used just once". With such vast scope to treat, recycle and reuse water, discharging water after a single use is totally unacceptable. It is high time to acknowledge the value of water, and stop treating it as an infinite resource.

From a stakeholder point of view, there should be greater emphasis on adopting alternate sources of water, such as desalination and R&R, to not only supplement the freshwater supply, but also to recharge surface water and groundwater, which will improve the availability of freshwater.

9. As the key player in the industry, do you seek any support from the Government, in terms of policy initiatives? Do you want the policy makers to dwell on certain key aspects, in the sector?

Although there has been a lot of focus from the Government with regards policy initiatives, we believe there is always scope for more. Going forward, we strongly recommend mandating the Resource Recovery based circular economy model for wastewater treatment and reuse, which ensures that all three components of wastewater (Water, Sludge and Biogas) are utilized.

There should be greater focus on adopting desalination in coastal areas, especially in a country like India, which is blessed with a 7,500 km coastline. Municipal desalination can substantially supplement potable water supply while captive desalination can address the issue of industrial water security.

We also recommend the implementation of ZLD based Effluent Treatment for the Industrial Sector, ensuring the highest level of treatment for toxic effluents with minimum discharge. Clusters of smaller industries can come up with CETPs for proper wastewater treatment.

Projects which promote municipal - industrial partnerships should be encouraged, which has the twin advantage of being a robust revenue generation model for ULBs and ensuring industrial water security.

Also the Government should consider concessional tax benefits for the private sector so as to encourage recycle and reuse of water.

10. How can digitization and futuristic technologies, in the water sector, change the world for the better?

Digitization and integration of advanced technologies is indeed going to be the next big thing for the Industry. Digitization, automation, IoT and ML are imperative for the future of the water sector. With the trend shifting towards remote working, digitalization, IoT and ML help us safely operate and monitor the plants from a central, remote location, thereby cutting down the time associated with travel and at the same time helping in optimize manpower, as several locations can be monitored and controlled from a single location. Automation and ML can help improve the predictive and preventive maintenance, thereby significantly optimizing the time and costs associated with the O&M Business.

11. As a leading water company, what has been your contribution in implementing the three R's?

As mentioned earlier, we have always believed and advocated that "Water is too precious to be used just once" and our actions have always reflected our belief. WABAG built the world's 1st Direct Potable Reuse (DPR) plant, producing potable water directly from secondary treated water. The plant has been in operation for more than 20 years, and till date has reported zero cases of water related complaints. Currently, WABAG built plants are recycling more than 2,500 million liters of industrial and municipal water each day.

Setting the precedent for a circular economy more than 15 years ago, WABAG built and operated the Kodungaiyur Power-Neutral WWTP, in Chennai, which holds the record of being the 1st WWTP in India to complete 110,000 hours on a single gas engine. The plant utilizes the biogas generated from sludge digestion to generate green energy which is in-turn used to power the plant, thus rendering it power-neutral and independent of grid power.

Similarly, our Dinapur WWTP in Varanasi, is the 1st and the largest WWTP under the prestigious Namami Gange Programme, which was dedicated to the nation by Hon'ble Prime Minister Shri Narendra Modi. The plant, based on the Resource Recovery based Circular Economy model, is a power neutral WWTP, treating wastewater to restore the Aviralta and Nirmalta of river Ganga.

Statistics* of water recycle each day resulting in 4800 million liters of freshwater saved each day

(*GWI Desal Data)

12. Have you taken any measures to implement 3R's as part of your CSR (Corporate social responsibility) initiatives?

CSR is an integral part of our business and it has been our corporate philosophy and continued focus to give back to the society to improve the quality of life. Most of our CSR projects are based on our core expertise i.e. the four R's i.e. Reduce, Recycle, Reuse and Replenish

Reduce: Rain Water Harvesting Structure for the Child Trust Hospital, Chennai, Micro-irrigation project for the National Agro Foundation, Kanchipuram, Tamil Nadu and Sevalaya School Complex, Thiruvalur, Tamilnadu. Awareness campaign on river rejuvenation and pollution abatement in various schools across India through on time Ganga Quest.

Recycle: STP at the Cancer Institute, Adyar, Chennai

Reuse: Decentralized STP with recycling at Warrangal, Andhra Pradesh
Replenish: Water Augmentation Projects in various districts of Tamil Nadu and West Bengal

About Mr Rajneesh Chopra

Mr Chopra is the Global Head - Business Development in VA TECH WABAG Ltd, a leading MNC offering life cycle solutions to industries and municipalities, in water and waste water treatment. WABAG has its presence across 4 continents and has a successful track record of executing projects in 30 countries. He is on the board of various subsidiaries and joint ventures of WABAG actively contributing to ensure growth and profitability of these entities.

TOWARDS SUSTAINABLE DEVELOPMENT

Shuichi Ito

Toshiba Group uses materiality assessment to identify priority sustainability issues across its value chain. A look at the steps taken by the Group, in this direction.

Sustainable development is fundamental for organizations looking to secure their future economic and business growth by creating value in an inclusive way, and at the same time protecting the environment. By integrating sustainability into their businesses, organizations address real and changing needs whilst covering broader environmental and societal challenges.

To embrace sustainability, organizations can harness the 17 Sustainable Development Goals (SDGs) to drive growth, address risk, attract capital and focus on purpose. But the first step is knowing where to start and then translate those ambitions into concrete plans that mesh with business goals. Materiality helps organizations identify and prioritize the issues that matter most to their business and stakeholders. In determining if an issue is material, organizations must consider its impact across the value chain.

Toshiba Group uses materiality assessment to identify priority sustainability issues across its value chain. In late FY2021, the Group reconfirmed its material issues, with reference to the SDGs, the Global Risks Report published by the World Economic Forum (WEF), and guidelines that included the SASB (*1) Standards. It then prioritized issues in respect of the Group's core businesses, and narrowed them down to those requiring further consideration.

Material Issues for Toshiba

The reconfirmed material issues are as follows.

Material Issue	Vision for 2030	Materiality
For the irreplaceable global environment in which we live	Promote corporate activities with full consideration for the global environment throughout our value chain, from design, procurement, manufacturing, logistics and sales, through to disposal.	• Respond to climate change • Respond to the circular economy • Consider ecosystems
For respect of human rights, to nurture people and technology, and to give back to society	Encourage every Group employee to feel pride and fulfillment in their work, and to harness creativity and technology in collaborating with business partners to realize rich value.	• Secure, retain and train human resources • Ensure employee health and safety • Promote respect for human rights • Promote sustainable procurement • Strengthen R&D to stimulate innovation
For further strengthening thorough governance	Practice transparent corporate governance and optimal internal controls; and execute management with integrity, trusted by stakeholders.	• Strengthen governance • Strengthen cyber resilience

1. Responding to Climate Change

To achieve carbon neutrality throughout its entire value chain by FY2050, Toshiba Group set a milestone to reduce GHG emissions by 70% by FY2030 against the FY2019 level. Specific measures include investments in energy-saving equipment in the Group's business activities, the introduction of renewable energy equipment and expanded procurement of energy from renewable sources, and a focus of creating products and services that contribute to lower emissions of greenhouse gases (GHG).

2. Improving Cyber Resilience

Cyberattacks are on the rise globally. With the proliferation of physical devices connected to networks, cyber threats have now expanded to include industrial control systems and products, which traditionally operated in safe, enclosed environments. This vulnerability to cyberattacks can result in economic losses, equipment damage and intangible costs, such as the loss of intellectual property, trust, and reputation.

Toshiba Group is harnessing its digital know-how as an IoT solution provider, and its solid experience in energy and infrastructure business for over 140 years to deliver cybersecurity solutions. The Group applies an intelligence-centric approach to its solutions to mitigate cyber-attacks.

Toshiba Group is harnessing its digital know-how as an IoT solution provider, and its solid experience in energy and infrastructure business for over 140 years to deliver cybersecurity solutions. The Group applies an intelligence-centric approach to its solutions to mitigate cyber-attacks and strengthening cyber resilience. Key solutions include CYTHEMIS, CyberX, Waterfall Unidirectional Security Gateway for protecting control systems in power plant and industrial infrastructure, and a cyber-security incident training for SCADA(*2) operators of electric power companies using Toshiba's original power grid operation training simulator

3. Enhancing Research and Development to Create Innovation

Organizations need to raise their sustainability ambitions and act decisively to develop and deploy disruptive technologies. Toshiba Group has long been committed to advancing the quest for carbon neutrality, infrastructure resilience, and solving global social issues. To achieve this, Toshiba deploys a global innovation network with R&D centers in Japan, Europe, China, U.S. and India.

Toshiba So¬ftware India Pvt. Ltd. (TSIP), a wholly owned subsidiary of Toshiba Group, has excellent So¬ftware development capabilities, and plays the important role of providing So¬ftware engineering crucial to the realization of Toshiba Group's Cyber Physical Systems (CPS) technologies.

Mr. Ramdas Baliga, who was recently elevated to Managing Director, aims to establish TSIP as empowering Digital Agility across and beyond Toshiba, thereby becoming a Digitally Agile Centre of Excellence (CoE). TSIP development centers at Bengaluru and Pune have been applying digital technologies across physical systems, where Toshiba is already a world leader. TSIP's Software development expertise supports a wide range of Toshiba products including energy and infrastructure systems, smart card systems, battery management systems, solid-state memories & hard-disk storage, System-on-Chip (SoC), automotive, Multi-Function Peripheral (MFP), Point-of-Sale (PoS), bar-code systems and medical systems. TSIP is also building a robust dedicated and dynamic research team, which works closely with other research facilities of Toshiba Group on cutting-edge technologies like artificial intelligence, data analytics, machine learning, computer vision, IoT cloud solutions etc.

4. Securing, Retaining and Developing Human Resources

In order to contribute to sustainable development, it is essential to energize human resources who are diverse in personal qualities, skills, and experiences, and who perform to their full potential. Grounded in the Group's basic commitment of "Committed to People, Committed to the Future.", Toshiba Group companies in India have undertaken various initiatives aimed at creating an environment where employees can work towards their self-development, and enhance their skillset.

Toshiba has also contributed to India's goals of "Skill India" with an aim to achieve medium - and long-term economic growth.

Japan-India Institute for Manufacturing (JIM): Toshiba Transmission & Distribution Systems (India) Pvt. Ltd. (TTDI) has been certified by Japan's Ministry of Economy, Trade and Industry (METI) as a Japan-India Institute for Manufacturing (JIM). The TTDI JIM imparts industrial training for developing Japanese standard shop floor leaders and engineers, focusing on areas such as kaizen and the 5S (sort, set in order, shine, standardize and sustain) ■



Mr. Shuichi Ito is the Managing Director, Toshiba India Pvt. Ltd. He is a law graduate from Kyushu University of Japan, Mr. Ito comes with almost three decades of strong and diverse experience in Toshiba's international energy business.

A DECADE OF TURBULENCE - WATER IN THE US

*As technology and innovation consultancy Isle celebrates the 10-year anniversary of its presence in the US water market, **Cristina Ahmadpour**, Isle president and managing director (Americas), draws on the expertise of her team to reflect on the last decade in water and defines the critical drivers that will influence the progress towards a sustainable and resilient water future.*

Key issues when Isle Americas was founded in 2012

Many of the challenges in the US were the same as today - with ageing water and wastewater infrastructure, water quality and chemical contamination all hot button issues.

Managing capital costs and operational costs with declining revenues were ongoing stressors across the last decade, and conversations about the value of water and how adequately priced services were topics of discussion even as far back as 2012. Over the last decade, we have seen a move away from the traditional design-bid-build process and alternative delivery methods such as progressive design-build, construction management at risk (CMAR), and others became more popular in supporting the delivery of large, complex, capital projects.

Resilience became a buzzword for the industry in this time, and throughout the 2010s, there was a big emphasis on the development and implementation of alternative water supply programs to address droughts, as well a water conservation programs through different rate structures, restrictions on water irrigation, and use of water- efficient fixtures and appliances to increase efficiency.

Information technology began to play a more central role in service delivery throughout the 2010s. While advanced metering infrastructure (AMI) technology had been fully deployed in the power and gas industries, water was just beginning to look into its adoption. Discussions around smart technologies and big data were common, but the challenge then was the cost and the capabilities of the technology.

In terms of customer engagement and communication, there was already lots of discussion and planning around ways to engage with customers and educate them, improve the level of service, and help support investments in water, which are starting to bear fruit today.

> *While advanced metering infrastructure(AMI)technology had been fully deployed in the power and gas industries, water was just beginning to look into its adoption.*

Drinking water 2012 - 2022

During the early 2010s, US states, Native American Tribes, the Environmental Protection Agency (EPA), and the regulated community undertook to overhaul the Water Quality Standards (WQS) regulations, before issuing the final rule in 2015. While water quality has improved over the last decade, population growth, limited jurisdiction, and in some cases, unforeseen water stressors, such as emerging contaminants and climate change, have made these improvements challenging.

On the subject of water quality issues - in the aftermath of the 2014 water crisis in Flint, Michigan, many US cities started more closely inspecting and monitoring their own pipe infrastructure and water sources. In Flint, an extensive lead service pipe replacement effort has been underway since 2016, with innovative techniques such as machine learning used to predict the number and location of lead pipes.

In late 2021, EPA announced revisions to its Lead and Copper Rule, requiring utilities to identify and inventory lead service lines in their communities. EPA also announced a new proposed rule, the Lead and Copper Rule Improvements (LCRI), that will require the replacement of all lead service lines. Preparing for this is a current priority for many of Isle's water utility partners.

While the issue of perfluoroalkyl and polyfluoroalkyl substances (PFAS) in drinking water was not a primary issue, in the 2010s, awareness of carcinogenic chemicals such as chromium-6 was. The chemical was brought under scrutiny by campaigner Erin Brockovich, and made famous in a popular 2000 movie that took her name - leading to attention



from the public and legislators alike.

In 2010, the EPA launched a comprehensive health review of chromium-6 and from 2013 to 2015, the Agency required larger water utilities in the US to test for chromium-6. In 2014, California became the first state to put a cap on chromium-6 in drinking water, settling on a value of 10 parts per billion, but currently there is no federal limit for chromium-6 in drinking water.

Fast forward to 2022, and the EPA has turned its attention to PFAS, and recently announced stricter advisory limits on four common substances found in drinking water and the environment. While the advisory is non-binding at present, it does mean state regulators may use these advisories to set legal levels in the coming years.

The impact of disinfectants and disinfection by-products were also under scrutiny in the early 2010s as the EPA considered revising how they analyzed drinking water disinfection by-products (DBPs).

President Obama's American Recovery & Reinvestment Act (ARRA) played a role in jumpstarting a number of water infrastructure projects in the early 2010s. The ARRA mandated government spending, tax cuts, and loan guarantees to boost the ailing economy. It targeted financial relief for infrastructure, alternative energy sourcing, and scientific research and development. We are currently seeing a similar surge in federal investment.

Nutrient pollution challenges have increased over the past 10 years, and 15,000 water bodies in the US have nutrient-related problems, which have led to the increase of significant water quality issues like toxic harmful algal blooms (HABs) and dead zones. A HAB in Lake Erie in 2014 resulted in unsafe drinking water for 400,000 residents for several days due to toxins caused by the HAB.

Since then, HABs continue to challenge water resource managers in the Great Lakes and waters around the US as nutrient pollution persists and changing weather patterns provide favorable conditions for their formation. Nutrient pollution from the Mississippi River basin, which spans 31 states in the US, has a large dead zone in the Gulf of Mexico that cannot support aquatic life.

Wastewater 2012 - 2022

Much like drinking water, many of the challenges on the wastewater side

continue today, such as driving efficiency in the wastewater process and meeting National Pollutant Discharge Elimination System (NDPES) permits. Over the last 10 years, NPDES permits have seen tighter discharge limits, driving utilities to look at advanced treatment and nutrient management.

While reclamation has been around for decades, indirect potable reuse and direct potable reuse is now a fixture in wastewater treatment plant (WwTP) rehabilitation, expansion and new facilities.
Ten years ago, it was still early days for automation of process control combined with efficient aeration technology. While many utilities are still on this journey - this has been the biggest shift of technology adoption in the last decade.

There was a significant boost 10 years ago when energy service companies (ESCOs) were a fast-growing means of project delivery, although this approach has more recently lost steam. However, Isle predicts there will be an uptick with the latest federal funding initiative.

In addition, increasing tipping fees, tightening regulations and limiting options for disposal of biosolids are driving more investment and regional partnerships today. This is an exciting space for the sector in terms of WwTPs truly becoming resource recovery facilities and playing a role in the circular economy.

Big issues for the next decade in water

Looking ahead to the next 10 years, the team at Isle expect comprehensive and long-term approaches to community-based water management to become the norm, with resource recovery and the One Water movement - a collaborative cross-sector platform that brings together utility managers, sustainability directors, planners, community leaders, environmental advocates, business leaders, researchers, and others who are driving a movement towards One Water management. This is set to be the key transformational area that will increase resilience and reliability for communities, and better protect our previous environmental ecosystem and public health.

In part due to the high-profile coverage of issues such as the Flint crisis, water-users in the US are more engaged than ever. Understanding around the need for conservation measures and adoption of domestic water-saving devices is far more prevalent than it was ten years ago and we expect this to continue as technology and communications improve.

The public is clearly more engaged and knowledgeable and conscious of their water systems and mobile apps are widely used today for billings, payments and customer support functions, which were non-existent in 2012. On the utilities side, the vast majority are starting to move more data into cloud-based systems, and will be putting increasing time and resources into cybersecurity measures to tackle the increasing threat of cyber-attacks.

While many of the innovative technologies that are helping the water sector tackle issues such as asset management and water security are coming from Europe and Israel, the US is also developing plenty of exciting innovations, especially around data aggregation and visualization platforms, AMI, pipelining and asset locating. Isle Americas' analysts predict US technologies will play an even greater role over the next decade, both at home and across the world.





Cristina Ahmadpour is a consultancy executive specializing in emerging technologies and innovative best practices in the water sector. While most of her career has been working with utilities and technologists, Ms Ahmadpour has managed projects from inception to delivery that required collaboration with contractors, engineering consultants, treatment plant operators, manufacturer sales representatives, electric utility representatives and industry associations.

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THE NEW WAY TO USE WATER IN AGRICULTURE

Mukesh Kumar

Stress on water is high in this country and its is high time we make use of systems like drip irrigation, so that we use water more efficiently when farming.

Considering that agriculture is a largely dependent on ground water, due to a host of factors and that groundwater table has been going down at an alarming rate, in many states. The Government of India is committed to accord high priority to water conservation and its management, more so in agriculture. Towards this end the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) has been formulated with the vision of extending the coverage of irrigation 'Har Khet ko pani' and improving water use efficiency 'More crop per drop' in a focused manner with end to end solution on source creation, distribution, management, field application and extension activities. Use of drip irrigation is one of the initiatives in this regard that the Government has been trying to promote among farmers. To know what Drip irrigation is and what why it makes sense to make it an integral part of our farming activities, read on.

What is drip irrigation. We would all agree that water is essential for farming activities. The fact that agriculture, in the country, is largely dependant on the water that is extracted from the ground cannot be denied. (here we will not dwell on why agriculture is dependant on ground water but spend more time on what is drip irrigation and why one needs to adopt it.) There are two main ways in which water is provided in agricultural fields. First is flood irrigation and the second method is drip irrigation.

- **Flood irrigation:** it is the traditional way that is employed to irrigate crops and provide water to agricultural fields. It is believed that the first humans started using this method of irrigation when they started doing agriculture. This method is in still in use in most areas of the country. Under this method water is channelled to the agricultural fields or farmlands either through a ditch, pipe, channels or some other means which allows water to reach the agriculture field. While this is the traditional way to irrigate agricultural fields, this is not that most efficient way. It is also believed that employing this method only ensures that of the total amount of water used to irrigate the crops, only half of it does the actual job. Most of the water is lost either by way of evaporation, irrigating weeds, flowing into undesired areas and so on. Also under this method, typically gravity is used to transport water, typically spots that are typically high, in the field, either do not get enough water or they remain dry. In simple words, water use efficiency by employing this method is low. In simple words, this is water use efficiency is low by using this method.
- **Drip irrigation:** This is an efficient way of applying precise quantity of water drop by drop just above the roots of each plant with a network of pipes & emitters or drippers with low pressure.

Components of drip irrigation. Under drip irrigation water is supplied through a network of pipes and some of the components that are employed to set up an efficient system are as follows.

1. Water source	9. Main line	17. Joiner
2. Non return valve	10. Sub- main line	18. Lateral valve
3. Fertigation unit	11. Lateral	19. Tee
4. Filtration unit	12. Dripper/ Emitter	20. Elbow
5. Pressure gauge	13. End cap	21. Male threaded adopter
6. Air release valve	14. Flush valve	22. Female threaded adopter
7. Water meter	15. Grommet	
8. Control valve	16. Take off	

The pros. There are a couple of reason why one should make use of this system an integral part of one's farming activities. Firstly, this method of irrigation saves 70% to 80% water as compared to flood irrigation. Second, This method of irrigation prevents disease by minimizing water contact with the leaves stems and fruits of the plants. Third, this method of irrigation allows the rows, in the field, to remain dry between plants, which helps in reducing growth of weeds that helps indirectly to save money and time.

The cons. There are however, some disadvantageous of using this system and they largely stem from the fact that it is a more sophisticated system of irrigation compared to flood irrigation. First, the initial investment of deploying the system, in the field is high. This would however, also depend on the area of your field but compared to the traditional method, it is costly. Since water is supplied through pipes to individual crops, it may so happen, that over a period of time, the pipes supplying water may get clogged. Lastly considering, it a more sophisticated method of irrigation, a high level of skill set is required to run it and for water management.

Types of drip irrigation. Its not that under drip irrigation, water is simply



provided through a drip. There are largely two ways of drip irrigation that can be employed to irrigate crops. The first method is online drip irrigation system. This system is used typically for wide spaced crops. Under this system the dripper/emitter is fitted on the lateral as per the plan spacing. The second method is inline drip irrigation system. This system is used for low spaced crops. Under this system the drip tubing is manufactured by inserting the drip emitter directly into the tubing at evenly spaced intervals during the manufacturing process.

Methods of drip irrigation. There are three ways in which drip irrigation systems that can be used. These are manual drip irrigation system, semi-automatic drip irrigation system and automatic drip irrigation system. Manual drip irrigation system is suitable for small-scale farming or gardening that one does in their backyard. These systems are easy to handle, require less or no technical equipment and are this generally cheap. In the semi-automatic drip irrigation system, only pumping/ lifting of water would be done by manually operating the electric motor or through the generator. Al other operations, under this system, would be controlled manually. In the automatic drip irrigation system, all functions are controlled by a controller, as per the programme se in the controller. The cost of the automatic drip irrigation system is high and it requires a skilled person to operate the system.

Cost of setting the system. Cost of the drip irrigation system depends on the requirements of the farmer. The cost varies according to row spacing and plant to plant spacing, It also varies according to methods of drip irrigation system that one needs to make use of. For a semi-automatic drip irrigation system, the cost of drip irrigation systems for 1 acre of farmland varies between INR 25,000 to INR 120,000. This also depends on the plant and row spacing.

Subsidy for drip irrigation. To promote use of drip irrigation among farmers different state Governments have come up with their own schemes. To give an idea, to reduce use of flood irrigation systems and to arrest the decline of groundwater, the Government of Haryana provides 85% to 100% (100 % only for selected areas only) subsidy on the basic cost of semi-automatic drip irrigation system to the farmer. Farmers need to pay only 15% of the basic cost of material + 12% GST and in some selected areas farmers need to pay only 12% GST under the central scheme PMKSY (Pradhan Mantri Krishi Sinchayee Yojana) with the motto of "Har Khet Ko Paani". Farmers need to submit below mentioned documents to get this subsidy.

1. Farm (Land record)
2. Land map
3. Patwari report
4. Photo copy of Aadhar card
5. Photo copy of bank copy
6. Photo copy of Family ID
7. Photo of farmer



> *This method of irrigation allows the rows, in the field, to remain dry between plants, which helps in reducing growth of weeds that helps indirectly to save money and time.*

Crops for which drip irrigation cane be used. Drip irrigation can be used to irrigate different types of crops. To give an idea, online drip irrigation is used mainly for wide spaced fruits plants like mango, guava, pomegranate, various citrus fruits (oranges, lemon, kinnow and so on), peach, plum, pear, litchi, sapota, olive, datepalm and so on. On the other hand inline drip Irrigation is used for less spaced crops like chillies, tomato, cucumber, potato, cabbage, cauliflower, onion, sugarcane, banana, cotton, bajra, wheat, mustard, bottle gourd, bringal, bitter gourd, capsicum, radish, carrot, corn and so on.



The necessary maintenance. Once you have installed a drip irrigation system in your farmland, you also need to do maintenance of the same at regular intervals, so that the system functions properly. Some of the tasks that you need to do, so that the system functions efficiently are as follows.

- Clean the filters before starting the pump.
- Check if the control valve is open in which irrigation to be performed.
- Set the pressure of water which should be between 1.0 Kg/cm2 at the last drip line.
- Open flush valve of sub main line for 5 minutes for cleaning the sub main line and then close the flush valve.
- Check the leakage of drip line in the field.



- Check the position of drip line.
- Clean the sand filter once in 15 days with back wash system.
- Flush all laterals once in a month by opening end cap of the lateral lines.
- Clean the laterals with acid or chlorine treatment once in six months according to the quality of water.

In the present day when stress on water is high and ground water level is also on the decline, in some places reaching down to alarming levels, it time we start adopting new technologies, that use water in a more judicious way, especially in irrigation. For now drip irrigation is one of them and the Government is also promoting the use of them. Go ahead and make the most of it.



Mukesh Kumar graduated in Agricultural Engineering from Chaudhary Charan Singh Haryana Agricultural University, Hissar and had been associated with Jain Irrigation Systems ltd, Centre of Excellence for Fruits Mangiana (Sirsa) and Centre of Excellence for Sub Tropical fruits Ladwa (Kurukshetra) and as a Horticulture Development Officer (Micro Irrigation) with Horticulture Department Haryana . At present he is working as an Engineer with Rungta Irrigation Ltd.

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SMART TECHNOLOGIES LIKE ML & AI HELPING THE WATER SECTOR

Amit Vaidya

Artificial intelligence algorithms and big data analytics have the power to maximize information and the available data that will in turn help water utilities in taking better decisions.

With the increasing demand, for water, due to population rise and economic development, coupled with the shrinking supply due to over-exploitation and pollution, providing clean water is today the greatest challenge for mankind. We can call water abundant thanks to it covering two-thirds of our planet, and even say that it is a renewable as well as a natural resource. However, we do know that only a small percent of water is actually available for human use…that is less than 1%! The rest, of the water that is available on this earth, is either salt water found in oceans or is fresh water that is frozen in the polar ice caps, or water that is not accessible for human usage. We must understand that supply will always remain the same even if the population and demand on freshwater resources increase. Even though the water cycle endlessly returns water to the planet, we know that it is not always necessarily returned to the same place and in the same quantity and quality.

Status check in India. When we talk about Water Stress, India is one of the most water-stressed countries in the world. Though India is home to 18% of the population of the world, sadly it has only 4% of the water resources that are there on this planet. A NITI Aayog report, in 2019, even mentioned how India is suffering from its worst water crisis in history as about 600 million of the country's population are water-deprived. In the same report, there was a list of 21 cities that included Bengaluru, Delhi, Hyderabad and Chennai, that would have perhaps exhausted their groundwater resources last year.

If we look at consumption patterns of water in India, agriculture is the main consumer of water. Groundwater is the major source of water in rural India as about 80–90% of drinking water comes from there. There has been a huge decline in in the levels of groundwater, in the last few years, due to overuse and other factors. Be it the country's erratic monsoon patterns, or the loss of water before reaching the consumers, Indians face high to extreme water stress. However, in India, as a result of development, the demand for water is increasing both in urban and rural areas. India's water demand is expected to double the available supply by 2030. This means that there will be severe water scarcity for hundreds of millions of people and this will lead to an ensuing 6% loss to the country's GDP. Climate change is one more factor contributing to the country's water issues.

With the aging water infrastructure, increasing operational costs, and reducing water revenue, water utilities will soon find it difficult to balance the demand and supply of water in cities without newer means to combat it. The emerging scarcity of water also raises multitude of issues related to sustainability of the present form of economic development, sustained water supply, equity and social justice, water financing, pricing, governance and management.

NEED FOR EFFECTIVE WATER MANAGEMENT

Mismanagement and misuse of water are largely responsible for water crisis in India. As a country, we lay more emphasis on developing water resources rather than their proper management. Water management is the key when we look at the future, especially considering the present water situation that exists the world over. Though in India, the authorities lay a lot of stress on the supply of water – be it for domestic use or even for agriculture and industries – the focus on the actual demand as well as the operative management is far from ideal. There is a lot lacking in the effective management of water. Without proper management of water crisis that is hitting the nation can never be solved.

USING ARTIFICIAL INTELLIGENCE FOR SMART WATER MANAGEMENT SYSTEMS

Real productivity leads to gain in water - this is what technology can give us. For a smart water cycle to work, there must exist a reliable and robust data delivered through a smart network of water utility.

Data-driven intelligent applications have disrupted our daily lives and water is not an exception. The digital technology revolution can help



Indian water utilities to improve their performance. Artificial intelligence (AI) algorithms and big data analytics also have the power to maximize information and the available data will in turn help water utilities in making better decisions while enhancing their customer service and also reducing costs in the long run.

A United Nations 2016 World Water Development report estimates that about 30% of water is being lost through leakages, all over the world. However, in India, this could be as high as 40-50%. We call this NRW or Non-Revenue Water. The sources of non-revenue water include main leaks and storage tank overflows, unauthorized use (theft and tampering), unbilled consumption and meter inaccuracy, unmetered consumption, leak adjustments and bad debt. It can stem from a leak that is not detected by the utility over time or a burst pipe that causes major damage to the infrastructure. Due to low accuracy of water meters in place, utilities are also not able to bill the water that has been produced and does not reach the end consumers.

You can imagine how much water can be saved if NRW is properly dealt with. And this will also reduce the demand for water, which will reduce the stress on water. Smart technologies can aid in this.

AI is a branch of computer science that deals with the simulation of intelligent behaviour in computers. In the context of delivering efficient water supply, AI or ML (machine learning) is mainly applied to decision intelligence and decision-making tasks. This includes a multitude of aspects in the water sector like how water utilities can maximize information and data that is available, to them, which enables them to make better decisions while enhancing service delivery. Availability of necessary information will also lead to financially sound operations for the utility.

Before applying information and communications technology (ICT) into their operations, water utilities must understand the underlying assumptions and implications.

OPTIMIZED WATER NETWORK PERFORMANCE

For water utilities to realise their true potential and unlock their capabilities, digital solutions are a must. The unity of technology, expertise and global water leadership is the future. This is what future water utilities will be



made of and this is what we, at Xylem, are doing today.

Our approach is to optimize the existing systems based on continuously updated network data. Our Decision Intelligence enables water utilities to leverage the system's unique data sets. This provides them with real-time and historical operational insights. Utilities are now able to quickly and more accurately determine the root cause of network issues, and validate the impact of their actions.

Water Utilities are expected to manage the drinking water distribution efficiently. Nevertheless, they often lack the much-needed visibility into their systems to aid them in making decisions that are data-driven and data-informed. What this means for utilities is that there are a real-time as well as long term risks when it comes to the environment, community management and last but not the least the actual operations and spending of the utility. Utilities are facing the need to optimize the performance of the network hydraulics, not just the access to the available data but with the right tools for the right decision intelligence.

OFFERING A DIFFERENT PERSPECTIVE WITH HYDROINFORMATICS

Water utilities are constantly under pressure to increase their operational and financial resilience. With help of digital technologies, utilities are able to deliver safe, compliant, reliable, and affordable water to their consumers. In order to make this a reality and to maximize results, there is a need for support to simplify this journey. This is where hydroinformatics, and our digital platform Xylem Vue, comes in, where we look at problems from a different perspective.

To calibrate and optimize an existing hydraulic model, Xylem's Water Network Optimization uses hydroinformatics by using a mixture of algorithms and ML. With this we can create a network digital twin that helps us to visualize the actual operating conditions even in areas where there are no sensors. This will help water utilities uncover critical insights and realize better and transformative results. For example, a utility can correct issues related to water distribution in real time. They can thus manage the water distribution properly. Utilities can also get a clear understanding of water age (refers to the time it takes for water to travel from it's source to consumers), pressure and plant mix, through a single application that combines multiple data sources for maximum visibility.

Usage of predicted pressure throughout the network that is even beyond sensing locations helps to reduce high- and low-pressure issues, thus making it possible for water utilities to manage water pressure effectively. Through the monitoring and managing of water age throughout the network, utilities can also ensure that the water age is managed. Utilities can also confirm that corrective actions are taken at the correct plant when water quality issues occur for multiple treatment plant utilities, thus aiding in determining plant sources.
Our global team of experts from diverse backgrounds and the broadest

of skillsets be it software and analytics or even applied civil and environmental engineering practices allows us to see water from a new perspective and this also helps our clients to follow suit. Water utilities have plenty of data, but the problem is making sense of it to ensure proper usage for their benefit. Smart technologies help utilities leverage that data to the maximum by developing thousands of potential scenarios at scale. This will ensure critical insights and recommendations for the utilities.

SMART WATER MANAGEMENT AND SMART METERING

Smart water is more than just measuring the water flow from storage to consumption. It's more than remote meter reads. It spans every part of the water cycle from sourcing to treatment to delivery to consumption to reclamation. With continuous innovation in advanced measurement and monitoring technologies, at Xylem, we enable measurement of pressure, temperature, level, flow, status and more across the water cycle networks. Our innovative technologies and solutions help mitigate water scarcity, reduce water losses and optimize water system assets to improve water affordability.

For utilities and policy makers to make the right decisions, data and analytics are key factors. With smart water management, utility operators can get immediate feedback on water consumption. Utilities can also make smart decisions when it comes to water supply by increasing supply at a time when its relevant as per the data received and lower the supply depending on the requirement. Differential pricing can also be introduced to ensure effective usage by consumers.

For water management in India, we need realistic and effective solutions for smart water management, which cuts down water wastage, provides real-time data and high-quality analytics to the water utilities and in turn to the government.

To help address water issues, Xylem offers smart metering programs that include a range of metering, measurement, communications and analytics solutions. We help remotely identify sources of non-revenue water and through Sensus software, provide revenue assurance with accurate billing and enable proactive customer service, alert utility via alarms to potential acts of unauthorized use, identify areas to reduce flow rate for water leaks and bursts with pressure management and enable and bolster regulatory compliance and water loss programs.

TAKING CONTROL OF WATER DISTRIBUTION

An integral part of a Smart Water network is the Cordonel® Static Flow Meter that easily integrates with a range of communication options. This is a high-performance bulk meter that enables utilities to manage their distribution networks much more efficiently. Cordonel® provides accurate and reliable data no matter what the installation and environmental conditions are. For India, with its diverse landscape and environmental features, this is a big win.

Cordonel® is a commercial and industrial meter that has no moving parts or obstruction to the flow and is maintenance free over its operational lifetime. It gathers precise low and high flow data in real-time. The combination of advanced ultrasonic technology and integrated communications makes it a great meter for both Automatic Meter Reading (AMR) and Advanced Metering Infrastructure (AMI) with support for a variety of radio communications technologies.

With the sturdy and reliable meter, water consumption, flow, temperature and pressure can be accurately captured and measured.

THE DIGITAL JOURNEY

With water utilities undergoing a digital transformation that is driven by the internet, big data, and AI algorithms, in order to remain competitive and improve customer service delivery, India needs to move beyond the traditional operations. Smart water management solutions are the future. AI algorithms help the water sector into turning more data-efficient. A blend of AI numerical tools and human operational skills can transform information into a leaner operation and boost data driven decision making.

For this to materialise sooner, India needs a new set of national and sector policies as the use of AI in water supply has several policy implications to improve the performance of water utilities and the quality of service delivery. There is protection of personal and financial data from consumers, and technical and financial data from water utilities. Also, benchmarking, since NRW is one of the key operational parameters to determine the efficiency of a water utility in reducing both physical losses (e.g., water leaks and pipe bursts) and commercial losses (such as illegal connection and metering errors).

It is important for India to understand, adopt, and retrieve the benefit of digital water infrastructure. Water industry leaders have already developed readily-available tools and technologies such as advanced metering infrastructure, real-time decision support systems, and digital asset management to help utilities with most accurate data and insights, empowering them to arrive at better decision making. However, in order to deploy them in Indian cities, the government will have to take the initiative needed in equipping the old pipeline networks and distribution systems.

Even though India's digital journey of water is gaining momentum, there is still is a very obvious need for more productive efforts and widespread collaboration among water industry stakeholders to quicken this transformation, mitigate NRW concerns on the ground and create a more sustainable environment for present and future generations.

Remember, it is only with the right data at right time that we can make the right decisions to optimize our water systems ■



Amit Vaidya is Director, India - Metrology Business, Xylem. Mr Vaidya has over 20 years of experience in the energy and utility sector, with significant proficiency in implementing smart metering, AMI and utilities IT related solutions. In these areas, he has provided leadership and contributed to several successful multi-million dollar programmes and has worked extensively with the senior management of several utility majors.

SOLVING WATER LOSSES IN ZAGREB

Sandra Di Matteo

Using Bentley's integrated modeling and analysis technology, Hidroing accelerated the generation and implementation of the calibrated hydraulic model for water loss reduction by 16 months.

2021 Going Digital Awards: Nominee - Water, Wastewater, and Stormwater Networks

Project Summary

Managing an Over Century-old Water Supply Network

Originally constructed in 1878, the 144-year-old Zagreb water supply system is one of the oldest functioning water networks in the world. At that time, Croatia's capital of Zagreb had about 30,000 inhabitants, with 11,150 people connected to a 4-kilometer water supply network having a capacity of 53.2 liters per second. The population has since grown, requiring water services for more than 900,000 people covering 800 square kilometers via an expanded network spanning 3,500 kilometers and a daily water intake of 310,000 cubic meters. Because water losses grew significantly over the past two decades and sharply worsened after the occurrence of the 2020 earthquakes, ViO Zagreb, the public water supply and sewerage company, tasked Hidroing with digitalizing the system to better manage the network.

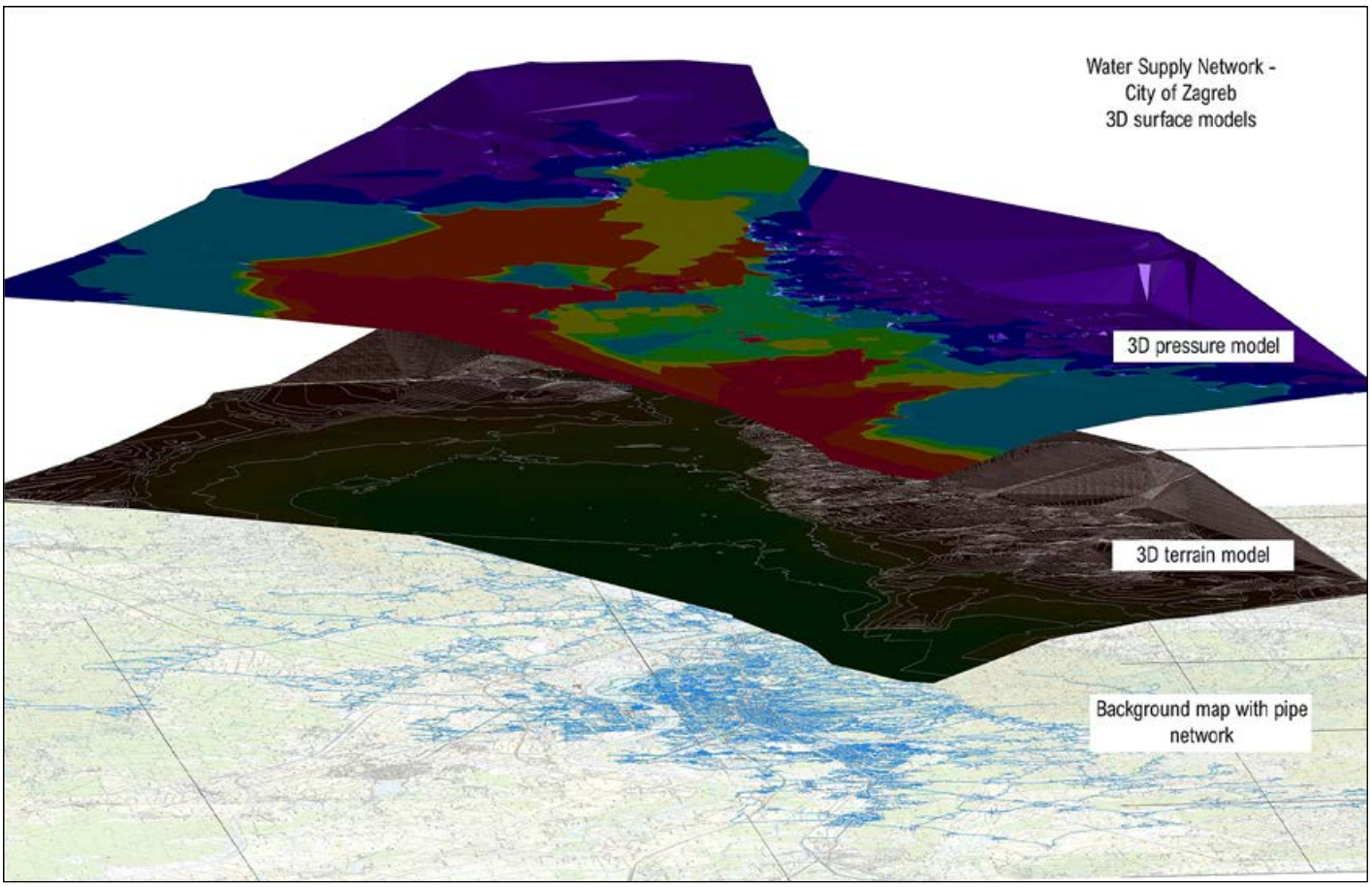
Developing a Digital Supply System

ViO expected Hidroing to deliver a detailed master plan and water loss programme for the network's next 30 years of operation. The EUR 1 million project required Hidroing to develop a detailed hydraulic model based on an updated GIS model that enabled water loss analysis and detailed diagnosis of the supply system, including district meter area (DMA) zoning and numerous measurement points. However, Hidroing faced significant data collection challenges and difficulties measuring flow, pressure, and chlorine levels. To meet the owner's expectations digitalizing the water supply network, they realized that they needed an integrated hydraulic modeling solution to facilitate smart water management.

Bentley Applications Provide Hydraulic Modeling Solution

After considering their options, Hidroing selected Bentley's OpenFlows and OpenUtilities applications for GIS development, 3D modeling, hydraulic modeling, and on-site operations and facility management. They modeled 3,000 measurement points, 144 DMA zones with individual scenarios,





and 3,500 kilometers of pipeline, creating and calibrating a hydraulic model of the entire network. Using Bentley's advanced technology, they shared statistical data between the model and the GIS platform, creating a seamless link for data integration. The hydraulic modeling solution facilitated development of one of the largest digital twin models in Eastern Europe.

Digital Twin Drives Smart Water Management

Using Bentley's integrated modeling and analysis technology, Hidroing accelerated the generation and implementation of the calibrated hydraulic model for water loss reduction by 16 months. They originally estimated 36 months to develop the GIS platform and create and calibrate the model. However, using OpenFlows and OpenUtilities, they delivered a finalized model and digital twin, pinpointing over 50 actions to reduce water loss, in just 20 months. The digital twin solution brings direct savings in water loss and minimizes environmental impact by reducing water intake and electricity usage. Using the digital twin, the owner can make their own decisions regarding network development, operational processes, and future planning, based on smart water system management.

Project Playbook: ContextCapture, MicroStation, OpenFlows HAMMER, OpenFlows WaterGEMS, OpenFlows WaterOPS, OpenUtilities

Outcome/Facts:

- Hidroing was tasked with developing a GIS system and hydraulic model of one of the world's oldest water supply systems.
- Using OpenFlows and OpenUtilities, they finalized the hydraulic model in just 20 months instead of the expected 36 months.
- The digital twin provides a single source of truth for the owner, improving decision-making and driving smart water management over the next 30 years.

Quote: "Bentley products helped us in reducing [resource] hours, which directly increased the speed of final product implementation and the usage of the hydraulic model for water loss reduction." - Igor Dundovic, Project Manager, Hidroing d.o.o.



Sandra DiMatteo is the Industry Marketing Director, Water Infrastructure at Bentley Systems. She has more than 25 years of experience in reliability and asset performance management software, asset lifecycle information management, and is an expert in digital twin cloud solutions in the water and wastewater, energy and process industries.

HOW MUCH WOULD YOU PAY FOR A BOTTLE OF WATER?

Team EverythingAboutWater

With luxury water being available now, the price for a bottle of water could cost you as high as INR 65 lakh. Are you ready to pay that much for a bottle of water?

If you happen to go for a family dinner with your family or friends, at most times even before you place your order, the waiter who would serve you the food, typically asks you, "sir, should I get you normal water or bottled water?" In most cases, many of us ask for bottled water, caring little about its price knowing fully that we can afford that water. Mineral water more commonly known as bottled water, sold in bottles of one litre, typically cost you INR 20. The higher priced ones, too will typically not cost you not more than INR 50 a bottle. But what if the bottle of water costs you INR 65 lakh, would you order for it without thing twice. Welcome to world of luxury water and yes they are available in the country now.

Top of the pack. The Beverly Hills 90H2o is the among the costliest bottles of water that is available, in the country. However, to have a sip of that water you will need to shell out close to INR 65 lakh. The high price of this bottled water could be could also be justified because it is diamond embossed and the fact that the bottle has around 600 white diamonds and 250 black diamonds. The price of this water will certainly make even the well-heeled think twice but there are many water brands that are moderately priced that the Beverly Hills 90H2o but even they will surely make you think twice, before you order one for yourself. Then there is also Kona Deep, costs around INR 27,000. And as the name suggests, water for this brand is sourced from Kona, in Hawai and that too from 3,000 below the surface. Hence Kona Deep has ocean minerals and electrolytes and is more hydrating than natural spring water.

Form our own backyard. It is not that only foreign brands sell water, sell water that costs so dearly in India. There are examples in India, as well, of bottled water being priced more than what it normally costs but certainly much less that how much foreign luxury brands cost. There is Aava Alkaline Natural Mineral Water, in the country and water for this brand is sourced from the Aravalli hills. The water has a natural alkaline pH value of 8+, it is 100% natural, organic and vegan. That's not all the water is free from RO, UV, Ionization, Ozonization and chemicals and bottles are 100% recyclable and BPA-free. These bottles are available online at https://www.aavawater.com/. As what the price of the bottle that's reflected on the website, the more you order, the lesser per price per bottle you will need to pay. On the other hand, the lesser you order, higher the price per bottle that you need to pay. To give an example if you order one bottle (of 1 litre each), then price bottle for you would be INR 99.75. Also, no discount will be given to you on your purchase. However, if you order 120 bottles (of 1 litre each) you get a 54% discount you total order and hence you need to pay INR 45.82.

Then you have the Himalayan Natural Mineral Water which is sold in bottles of 1 litre and 500 ml at https://www.tatanutrikorner.com/. A pack of the 12 bottles of 1 litre each will cost you INR 840, thereby costing you INR 70 per bottle. There is also an option of buying a pack of 30 bottles, which will cost you INR 1,200, thereby each bottle will cost you INR 40. There is also a reason why the Himalayan Natural Mineral Water costs more than the normal bottled water. Some of the reasons which justify its comparatively higher price, which are listed its website, are as follow. It took nature 20 years to create this water. The water is sourced directly from the mighty Himalayas. Also this water is sheltered away from any form of contamination, the water settles in a double layered aquifer beyond the reach of human hands. The water is untouched an unprocessed.

What justifies the high price. Experts are of the view that regular bottled water that one drinks are typically devoid of any minerals. They are of the view that whatever minerals they may have contained was washed away during the cleaning process water. So the water which typically costs more than the regular bottled water, contains the natural minerals that the body requires and is hence considered better.

The new trend. A very common trend, especially among the well-heeled is paring the right kind of wine with the right kind of food to go with it. To give an example, red wine goes best with a certain kind of food. To be more precise Sangiovese, the Italian red grape goes well with rich meat sauces on pasta. One can also try it with a pepperoni pizza, at home or in a restaurant. A similar trend of pairing a certain kind of food with a certain kind of water, read luxury water, was also witnessed. This is something that has been seen in the overseas market, you never know something like could become a trend in the Indian market as well, in the future ■



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Reclassification of Pseudomonas strains has allowed laboratory technicians to identify those resistant strains individually and to design more stringent disinfection methods to ensure total eradication of these gram negative bacteria. Knowing them and some of their characteristics could be useful.

Sphingomonas paucimobilis

Pseudomonas Gram Negative: variety renamed now. Found in environment especially soil Susceptible but contact time not known. Ability of S. paucimobilis to pass through the 0.2 µm filters. In one Japanese hospital, water obtained from a reverse osmosis system, as well as from an ultra-filtration unit tested positive for S. paucimobilis, and the level of contamination was higher than that in tap water from the same hospital (indicating that it passes thorgh UF and RO and proliferates in system loops

Methylobacterium species Gram Negative: They include bacteria previously grouped in the Pseudomonas genus. The ability to form biofilms and to develop tolerance to disinfecting agents, high temperatures, and drying may explain the frequent occurrence and colonization of Methylobacterium . Opportunistic bacteria also found in biofilms and likely to resist disinfection hiding within biofilms

Elizabethkingia meningoseptica Gram Negative: It has been isolated in the hospital environment in water supplies, disinfectants, and medical devices. Isolation of this organism in handwash sink and water is a significant finding as they have been reported to survive in chlorinated water. Environmental studies have revealed that the organism can survive in chlorine-treated municipal water supplies, often colonizing sink basins and taps, intubation tubes, humidifiers, incubators for newborns, ice chests and syringes, and has become a potential reservoir for infections in the hospital environment. Active infection control measures like regularly inspecting the hospital water tanks, water surveillance, and hyper chlorinating the water might be required for controlling infection with this challenging bacterium.



Oligella ureolytica is a commensal of the GU tract, and most clinical isolates are from the urine, predominantly from men. From origin the source in water could be contamination of municipal water through sewage

Aeromonas salmonicida Gram Negative In the past, Aeromonas species were placed alongside Vibrio species and Plesiomonas shigelloides in the family Vibrionaceae .The major route of contamination is poor water quality. The bacterium's optimal growth temperature is between 22 and 25°C. The maximum temperature that it can grow at is 34.5°C. it is widely distributed in aquatic environments since their genus is made up of psychrophiles and mesophiles from soil and aquatic environments. Aeromonas species have the inherent capability to grow in water distribution systems, especially in biofilms, where they may be resistant to chlorination



Acinetobacter ursingii & Acinetobacter lowffii species belonging to the Acinetobacter genus are widely distributed in nature since they are found frequently in soil, water, and dry environments Due to their ability for long-term survival on inanimate surfaces, they are commonly isolated from the hospital environment Since they are they are regularly recovered from urinary tract, their presence in water could be contamination through sewage or soil

Roseomonas gilardii Gram Negative The natural reservoir for Roseomonas infection is unknown although it has been isolated from water supplies. it may also exist as a commensal in humans. Not much has been reported about the disinfection of these species We have studied the information, including the likely source, the habitat that would provide us some idea on ozone's effects on them. Not many studies have been reported on the effects of Chlorine/ozone on these bacteria

The use of ozone could provide a reliable solution but many of them require higher doses and probably longer contact times. Thumb rules don't normally work



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CONFERENCE AGENDA

Day 1, 4th August, 2022 (Thursday)

09:00 Hrs - 10:00 Hrs	Delegate And Speaker Registration
10:00 Hrs - 11:30 Hrs	Inauguration Ceremony - Lamp Lighting By Key Dignitaries
11:30 Hrs - 12:00 Hrs	Networking Tea / Coffee Break
12:00 Hrs – 13:30 Hrs	**SESSION 1: INDIA - ISRAEL SESSION ON WATER SECTOR**
	Dr. Lior Asaf, Water Attache, Embassy Of Israel, New Delhi
	Ms. Natasha Zangin, Counselor, Head Of Economic & Commercial Mission, Embassy Of Israel, New Delhi
	Ms. Sally Levy, CEO, Meniv Rishon Ltd, Israel
	Ms. Tahel Brandes, Adv., Senior Deputy Legal Adviser, The Governmental Authority For Water And Sewage (IWA), Israel
	Professor Hadas Mamane, Head, Environmental Engineering Program And The Water-Energy (We) Lab, School Of Mechanical Engineering, Tel Aviv University, Israel
13:30.Hrs – 14:30 Hrs	Networking Lunch
14:30 Hrs – 16:00 Hrs	**SESSION 2: ADVANCED TECHNOLOGIES AND BEST PRACTICES IN WATER DISTRIBUTION SUPPLY NETWORK**
	Sustainable Pipelines For Water Transport Mr. Chanchal Dasgupta, Manager – Application Marketing (Infra), Borouge (India) Pvt. Ltd.
	Sustainable Water By Design Mr. Des Ceronio, Account Executive, Innovyze, An Autodesk Company
	Sustainable PE Piping Systems For Water & Wastewater Applications Dr. Madhusudan D. Chaudhari, Senior Vice President: Business Development & Projects, Jain Irrigation Systems Limited
	Presentation by Mr. Laxmikant Pathak, Head Water BU, Zetwerk
	Transforming India's Water Loss To Water Source Mr. Benshenkar, CEO, Curapipe System
16:00 Hrs – 16:30 Hrs	Networking Tea / Coffee Break
16:30 Hrs – 18:00 Hrs	**SESSION 3: INNOVATIVE TECHNOLOGIES IN WATER & WASTE WATER TREATMENT**
	Vermifiltration: An Innovative And Sustainable Paradigm For Waste Water Treatment Ms. Aditi Agarwal, Partner, Organic Solutions

	Sustainable Wastewater Treatment With Indian Microbial Technology Mr. Sanjay Bahl, General Manager, Superweld
	LTE® - A Revolutionary Technology For Waste Water Treatment Mr. Vimarsh Verma, Team Lead, Spray Engineering Devices Limited
	Innovative Technologies For Wastewater Treatment Mr. Anupam Pathak, Process Engineer(Innovation And Technology Group), Thermax Ltd. (WWS)
	Paper On HOD UV Technology Mr. Santosh Shetty, Country Manager – India, Atlantuim

Day 2, 5th August, 2022 (Friday)

09:00 Hrs - 10:00 Hrs	Delegate And Speaker Registration
10:00 Hrs - 12:00 Hrs	**SESSION 4: MUNICIPAL WATER FORUM**
	Presentation By Dr Ajit Salvi, Dy. Chief Engineer, Municipal Corporation of Greater Mumbai
	Achieving Water Sustainability Thru Advanced Wastewater Recycling Technologies – Perspective And Case Studies Mr. Himanshu Gupta, Sales Director, South Asia, SUEZ Water Technologies & Solutions
	Presentation By Mr. Snehalkumar Bokare, Regional Director, Bentley Systems
	Introduction To Water Treatment Mr. Tal Abdan, Solutions Manager, IDE
	Water Leakage in DJB Chief Engineer, Delhi Jal Board
	Water Control Solutions For Municipal Networks And Lift Irrigation Mr. Sharon Ben Basat, General Manager, Bermad India
12:00 Hrs – 12:15 Hrs	Networking Tea/Coffee
12:15 Hrs – 13:45 Hrs	**SESSION 5: WASTE WATER MANAGEMENT TECHNOLOGIES FOR INDUSTRIES AND MUNICIPALITIES**
	Sustainable Pipelines For Sewage Transport Mr. Chanchal Dasgupta, Manager – Application Marketing (Infra), Borouge (India) Pvt. Ltd.

	Presentation by Mr. Laxmikant Pathak, Head Water BU, Zetwerk
	A Novel Boiler Free Approach To ZLD Mr. Vimarsh Verma, Team Lead, Spray Engineering Devices Limited
	Innovation In Water Treatment For Recycling And Reuse Miki Kedem, CEO and Rohan Vyas - STP Product Manager, Huliot Pipes & Fittings Pvt. Ltd.
13:45 Hrs- 14:30 Hrs	Networking Lunch
14:30 Hrs – 16:00 Hrs	**SESSION 6: DIGITALIZATION IN WATER SECTOR**
	Optimising Drainage Design Workflows Mr. Matthew Piggott, Water Resources Solutions Engineer, Innovyze, An Autodesk Company
	Presentation By Mr. Dilip Sharma, Sr. Advancement Manager, Water, Bentley Systems
	Presentation By Reali (Israel)
	Modernizing Wastewater Treatment Plants With Automation And Digitization Mr. Devendra Fonia, Chief Marketing Officer, Bio Petro Clean
16:00 Hrs – 16:30 Hrs	Networking Tea/Coffee
16:30 Hrs – 18:00 Hrs	**SESSION 7: ADVANCED PRODUCTS FOR THE WATER SECTOR**
	Energy Efficient Automation Solutions For The Water Industry Mr. Vijay Rajamani, Engineer - BD, ACR, Danfoss
	Presentation By Initiative Engineering
	A Sustainable Solution To India's Drinking Water Crisis Mr. Maayan Mulla, CEO, Watergen India
	SUPPLYING ENERGY WHERE IT'S NEEDED MOST Mr. David Danino, CEO Tamuz

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A1 Blowers	A10	Level & Flow Industrial Automation (opc) Pvt. Ltd.	B31
Advance global Industries	B 25, B26	LifeStraw	B14
Amrit Filtration Equipments	A17	Maxwell Additives Pvt. Ltd.	A1
Atlantium Technologies Ltd	C30	Medio	B22
Automat Industries Private Limited	A9, B19	Meniv Rishon Ltd	NA
Axis Solutions Pvt Ltd	B12	Metsi Enviro Tech Private Limited	A2
Bentley Systems India Private Limited	A23	Mini Dose Solution Pumps	B16
BERMAD	C30	Municipal Corporation of Greater Mumbai	NA
Bio Petro Clean India Private Limited	B1	Neerway Projects Private Limited	B4
Biorock	B 25, B26	Nolta	B 25, B26
Borouge (India) Pvt Ltd	NA	Organic Solutions	B6
Clear air industries	B 25, B26	Ozone Engineers	A8
Cori Engineers Pvt Ltd	A15	Pinakin Technology Solutions	A11, A12
Cri Pumps Private Limited	B8, B9	Potence Control	B 25, B26
Curapipe System	C30	PP Aquatech	B24
Danfoss Industries Pvt Ltd	A3, A4	Reali Technologies Ltd.	C30
DeltaPure Water India Ltd	B10, B11	Roth Specialities India Pvt Ltd	C19,C20
DNP International Pvt Ltd	B15	Sahara Industry	B2, B3
Donaldson	B 25, B26	Sapcon Instruments Pvt. Ltd.	A20
Doshion Polyscience Pvt. Ltd.	A6, A7	School Of Mechanical Engineering, Tel Aviv University	NA
Drexel Electronics And Engineering Products Pvt. Ltd.	A5	Silicon	NA
Embassy of Israel	C30	Spray Engineering Devices Limited	A18
Enbio Green Solutions Pvt. Ltd.	B21	Suez	NA
Engineering And Environmental Solutions Private Limited	C32	Superweld Eco-Solutions	A24
Enki Water & Environment Co. Pvt. Ltd	B28	Tamuz Solar Technologies	C30
Enviro care	B32	The Governmental Authority for Water and Sewage (IWA	NA
Grundfos.	B 25, B26	Thermax Limited	A16
Hanna Instruments Inc.	A14	Toshniwal Instruments Mfg. Pvt. Ltd.	B20
Harvel Azud	B23	Trade 4 india	B 5
Havells	B 25, B26	Triveni Engineering & Industries Limited	C2,C3
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IDE Technologies	C30	Watergen	C30
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Booth No. B12

Profile

Perfect mixture of Analytical, Automation & IIOT Products & Solutions. For the comprehensive range of Systems and Products and from complex measurement and analytical technology to automation, control, communication & IIOT products and system, Axis Solutions Pvt Ltd is a market leader as a diversified solution provider. The R & D department at Axis Solutions strives to develop world-class innovative solutions to cope with the demands and the challenges of designing systems and products for hazardous locations.

Founded in 1999, under the visionary leadership of Mr. Bijal Sanghvi, AXIS started with analytical and analyzer system solutions like CEMS, SWAS, GAS, Purge Panels, HVAC, Analyser Shelter, TOC, COD, and EQMS Analysers. The aim was to cater to oil & gas, petrochemical, refineries, power plants, coal & mining, chemical and other engineering verticals in India, SAARC countries, Europe, the Middle East and Africa, and other countries of the EMEA region.

Axis Solutions Pvt. Ltd. has adopted an ISO 9001 quality management and SAP (System Application and Product) systems to deliver the best in class system solutions, as well as products that are ATEX certified.

Axis Solutions Pvt. Ltd. collaborates with over 14 well-renowned global brands like Knick, Brix, Thermo Fisher, ADFWeb, Seneca, Stego, and others, to increase the product-based solutions in specific industries. Another purpose is to strengthen ASPL in industrial automation, communication, and networking, data acquisition, IIOT, remote monitoring & Industry 4.0.

Headquartered in Ahmedabad in Gujarat, India, ASPL has a sales office spanning 3000 ft². Additionally, ASPL has three facilities spanning about 70,000 ft² for manufacturing, integration, testing, and inventory.

As the world stands at the edge of and industrial transformation, our team & infrastructure are ready for what the future holds for us.

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A1 BLOWERS INDIA PVT LTD

Booth No. A10

Profile

A1 BLOWERS commenced manufacturing of centrifugal blowers way back in 2006. After Looking over the upcoming demand of market, to start manufacturing of twin lobe Rotary Air Blowers way back in 2013. we are an able and agile Team of Mechanical Engineers dedicated to launching their Product with a brand name A1 Blower.

We are having a well settled team having an experience of 40+ years in the Field of Roots Type Blowers & Boosters. A1 launches an innovative blower with superior Quality, Higher reliability factor with very competitive Price

Since then the company has add Product line including Twin Lobe & Tri-lobe Rotary air Blowers Bio Gas Blowers, Acoustic hoods, Aqua culture Blowers & Industrial Vacuum Boosters, Ring Blower || Turbine Blowers

Product

Twin Lobe Air Cooled Blowers
Twin Lobe Water Cooled Blowers
Ring Blowers/ Turbine Blowers
Acoustic Hoods | Enclosures
Bio Gas Blowers
Vacuum Blowers and All Spare Part

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BENTLEY SYSTEMS INDIA PVT. LTD.

Booth No. A23

Profile

Bentley Systems (Nasdaq: BSY) is the infrastructure engineering software company. We provide innovative software to advance the world's infrastructure – sustaining both the global economy and environment. Our industry-leading software solutions are used by professionals, and organizations of every size, for the design, construction, and operations of roads and bridges, rail and transit, water and wastewater, public works and utilities, buildings and campuses, mining, and industrial facilities.

Product

OpenFlows WaterSight, the water infrastructure digital twin application, brings SCADA, GIS, hydraulic modeling, client information, and historical failure data into a connected data environment to deliver cost-effective, real-time operations strategies.A scalable environment provides your entire utility access to critical system and individual asset performance along with risk information, which enhances operations, maintenance, and capital planning decisions. The application alerts you to nonperforming assets or anomalous network conditions, and provides efficient analysis of present, historic, and forecasted performance for all assets to better support the evaluation of the expected benefits and consequences of operational and maintenance actions. Additionally, OpenFlows WaterSight allows you to perform multiple "what-if," risk, and planning scenarios with the goal of improving service levels and performance while minimizing risk.

OpenFlows WaterGEMS is a comprehensive and easy-to-use decision-support capability for water professionals who design, plan, and operate water distribution systems.

OpenFlows SewerGEMS streamlines the modeling process, so that you have more time for solving wastewater engineering problems, such as improving capacity and limiting sewer overflows, which ultimately enable utilities to comply with sewer regulations set by regulatory agencies.

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BIO PETRO CLEAN INDIA PRIVATE LIMITED

Booth No. B1

Profile

BioPetroClean (BPC) is a wastewater treatment company founded in Israel in 2007, and BPC India is a fully owned subsidiary of BPC Israel. BPC has been developing cutting-edge technology in the field of wastewater treatment and these technologies and solutions are extremely competent in addressing the complex challenges faced in the effluent treatment processes.

Some of the processes and technologies developed by BPC include Automatic Chemostat Treatment (ACT) bioreactor, Automatic Sampling and Control system, Chemical Dosing Automation, Pure BI SaaS, and Oil Water Separation Automation. All of these technologies are proven to be beneficial in different ETPs throughout the world. ACT developed by BPC is highly effective in the treatment of problematic streams, and renders high-quality output while minimizing the volume of sludge generation. ACT's sequential mode of operation is capable of absorbing high shock loads at the inlet without affecting the performance of the bioreactors to yield stable output parameters. Likewise, the chemical dosing automation system enables the accurate dosing of the required chemicals based on the control algorithm that calculates the optimal dosing according to the value of the input parameters. Pure BI is a business intelligence software for wastewater treatment plants with integrated machine learning and artificial intelligence. It enables wastewater treatment plant supervisors to gain actionable insights for improved operation.

Oil-water separation automation is another technology developed by BPC for improving the oil recovery at refineries.

Product

ACT Bioreactor: A bioreactor with integrated automation that is able to perform at TDS as high as 35000 ppm. It is capable of handling 100% fluctuations in shock-loads. It is a low MLSS bioreactor that generates much lower sludge when compared to conventional high MLSS bioreactors.

Automatic sampling and control system: A PLC-based dosing automation system that ensures precise dosing of the required chemicals thereby increasing OPEX savings by avoiding excess chemicals dosing. Chemical dosing automation also minimizes the generation of excessive chemical sludge.

Pure BI: It converts wastewater treatment data into valuable management information for better operational control and optimization. With time, integrated artificial intelligence and machine learning systems can make decisions based on the interpretation of historic data. Eventually leading to the reduced overhead expenses.

Oil-water separator automation: It has been mainly designed for improving the oil recovery in refineries. The automation also offsets the manual intervention at hazardous units of the industries.

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CORI ENGINEERS PRIVATE LIMITED

Booth No. A15

Profile

Cori Engineers Pvt. Ltd is an associate company of IGP Engineers Pvt. Ltd. We are an ISO 9001:2015 company certified by Det Norske Veritas. We are in the field of Rubber products and Services activities for over 35 Years.

Product

Rubber Expansion Joints and Bellow ranging from 25NB to 3300NB and Rectangular, Square, Reducer & other shapes. Rubber Moulded Components – Rubber Blocks, Anti Vibration Mounts, Metal bond Rubber Components. Rubber lining Sheets Built up Rubber House ranging from 4"NB to 48"NB Dog bone Expansion joints PIPE repair Clamps Spring mounts

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CRI PUMPS PRIVATE LIMITED

Booth No. B8, B9

Profile

Commitment Reliability Innovation – C.R.I. ranks high among the world's fastest-growing fluid management solution providers with a wide global presence.C.R.I. offers Pumps, Motors, Valves, IoT Drives & Controllers, Pipes, Wires & Cables, and Solar Pumping Systems. C.R.I. Group has a diversified range of 9,000 products in its portfolio and is among the few to manufacture 100 percent stainless steel pumps in the world. The company has 21 manufacturing facilities across the globe and has made acquisitions in U.K. and Italy. The R&D division - "Fludyn Advanced Technology Centre" is recognized by the Ministry of Science & Technology, Govt of India. India's top exporter; winner of EEPC (Engineering Export Promotion Council) award 15 times and also won National Energy Conservation (NEC) award from the Government of India for six times.

C.R.I. Fluid Systems products cater to diverse segments such as: Chemical & Process, Power, Water & Waste Water, Oil & Gas, Pharma, Sugar & Distilleries, Paper & Pulp, Marine & Defence, Metal & Mining, Food & Beverage, Petrochemical & Refineries, Solar, Building, HVAC, Fire Fighting, Agriculture & Residential.

Product

C.R.I has five decades of expertise and experience in developing and manufacturing a wide range of pump sets. From the typical surface pumps to deep well submersible pumps, from high pressure pumps to small booster pumps, from domestic usage pumps to large distribution and lift pumps, C.R.I is known for its quality products with its customers worldwide.

Borewell Submersible Pumps, Openwell Submersible Pumps, Centrifugal Monoblock Pumps

Regenerative Selfpriming Monoset Pumps,Centrifugal Jet Selfpriming Pumps,Compressor Pumps

Deepwell Centrifugal Jet Pumps, I-Smart Pumps, Mini Pumps ,Pressure Booster System

Swimming Pool Pumps, Waste Water Pumps, Vertical Multistage Inline Pumps, Horizontal Multistage Pumps

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DANFOSS INDUSTRIES PVT.

Booth No. A3, A4

Profile

Energy efficient technologies empower smart communities and industries to create healthier and more comfortable climates in our buildings and homes and to supply more food with less waste.

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DELTAPURE WATER INDIA LTD

Booth No. B10, B11

Profile

Incorporated in 1997

Pioneer of Reverse Osmosis Technology based water vending machines in India

The largest base of rental of water and waste water treatment equipment
A team of 106 professionals

2 manufacturing facilities in New Delhi and Pune
17 Service centres covering over 70 cities

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DOSHION POLYSCIENCE PVT LTD

Booth No. A6, A7

Profile

Incorporated more than 45 years ago as a Cation and Anion Exchange Resin manufacturing unit, today Doshion is a leading solution provider with a wide gamut of Water Management Services. Doshion's Ion Exchange Resins have been used across the world for a wide variety of applications. With an experience of executing and running 3000+ Water and Wastewater treatment projects, Doshion produces a wide range of chemicals to improve the performance of such plants by protecting and improving the performance of the plant's heart – Membranes. A lot of Doshion's Active Pharmaceutical Ingredients (APIs) as well as Excipients (like Taste masking, Tablet Disintegration, Sustained Release, etc) are used by Pharma companies across the globe. Special pharmaceutical applications like, Calcium Polystyrene Sulphonate JP/ BP, Cholestyramine, Vitamin C Purification, Protein Purification, Nicotine Sustain Release, Taste Masking of bitter drugs, etc. are some of the highest selling productions of Doshion's Pharma Division

Product

Doshion has been a pioneer in Ion Exchange Resin manufacturing since the last 45+ years. Ion Exchange Resin is a polymer with an insoluble matrix structure in the form of microbeads, fabricated from an organic polymer substrate. These beads are typically porous and provide a large surface area on the inside for trapping specific ions while releasing other ions Ion Exchange resins are widely used in different separation processes like water purification, water treatment, water softening deionization, demineralization, distillation, as well as drinking water purification. Ion Exchange resins are also used for special applications like Vitamin C purification, Protein Purification, Arsenic Removal, Fluoride Removal, Iron Removal etc.

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DREXEL ELECTRONICS & ENGINEERING PRODUCTS PVT. LTD.

Booth No. A5

Profile

Drexel Group established in 1992 was one of the renowned Manufacturer, Supplier and Service Providers for CNC application, Plant Instrumentation, Industrial Automation Products and Industrial Lasers. Further we have extended our services for Online Pollution Monitoring Systems & Bio medical waste management software. We have a team of highly qualified personnel including engineers, technicians & online services customer care executives in order to provide prompt after sales services since last seven year.

Product

Drexel group is one of the eminent brand who follows the 'Make in India' policy for their products and Online Effluent Quality Monitoring System is one of the top product of Drexel Group. Our company has two types of OEQMS based on the working technology which are as follows:-

1. OEQMS with Extractive technology for STP/ETP.
2. OEQMS with Optical Probe for STP/ETP.
3. OEQMS SONDE System for River Monitoring

OEQMS with Extractive type :
We Provide complete Engineered Panel with all electronics for monitoring parameters including
Standard Parameters: BOD, COD, TSS, pH

Optional Parameters:
DO (Dissolved Oxygen),
ORP (Oxidation Reduction Potential),
Conductivity
Turbidity
Ammonical Nitrogen
TDS
Nitrate Ion
Coli form (Total Coli form, e-coli & Faecal Coli)
Orthophosphate
Polyphosphate & Organic Phosphate.

OEQMS with Optical Probe :

Online effluent system based on optical probe is designed to measure the water parameter like BOD, COD & TSS and the measuring principal employed in this instrument is Dual Beam UV-Vis absorption method with complete 200 -900nm spectral wavelength.

OEQMS SONDE System for River Monitoring

Multiparameter SONDE is the next generation Water Quality measurement instrument. SONDE system is used to monitor the various simple & complex River, Lake Surveys. By deployment of Multiparameter probe system (SONDE) and large range of sensors, it is able to monitor each & every parameter of water with satisfactory and reliable results.

Applications

Pharmaceutical Industries
Textiles
Sugar industries
Pickling Industries
Paint booths
Food Industries
Fertilizers plants
Distilleries
Paper Mills
Chemical Industries
Dairy Industries

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ENBIO GREEN SOLUTIONS PVT.LTD;

Booth No. B21

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ENKI WATER PVT LTD

Booth No. B28

Profile

Founded with a vision of continuous quality improvement in water and wastewater industry, ENKI WATER is an entrepreneurial venture of passionate water professionals with more than two decades of experience. Headquartered in New Delhi, India ENKI WATER provides Engineering, Procurement, Construction and Project Management Services to variety of Industrial, Commercial and Hospitality sectors in India and Overseas.

ENKI WATER PVT LTD is backed up by the rich experience of its core team members who have successfully managed businesses in national and international arena. ENKI WATER'S know how is enriched by experience of design and execution of more than 200 operating plants by its core team members. We design and build customized solutions for our clients. We commit deliverable of projects on scheduled timeline within allocated budget. We are best positioned to supply affordable state-of-the-art technologies to the world. Uncompromising customer dedication makes ENKI "YOUR RELIABLE AND PREFERRED PARTNER". Our activities include: Design, Construction and Supervision of water and waste water distribution facilities, process water facilities, storm water and water recycling facilities, Industrial liquid waste management facilities, municipal liquid waste management facilities and water handling facilities.

Product

Segments we serve: Hospitality, industrial, Residential

Our activities includes:
Design, Construction and Supervision of water and waste water distribution facilities
Design, construction and supervision of process water facilities

Design, construction and supervision of Strom water and water Recycling facilities
Design, construction and supervision of Municipal liquid waste management facilities
Design, construction and supervision of water handling facilities

OUR SPECIALIZATIONS

Industrial, Hospitality and Commercial water Distribution on high side and low side plumbing including pump room piping.
Process water treatment
Drinking water treatment
Water treatment facility for Residential, commercial and hospitality sector
Liquid waste treatment for industrial and municipal waste
Water recycling &sludge handling
Pressure boosting systems

IN HOUSE Well Experienced process Design Team to Design Water distribution, Firefighting and Waste Water Treatment plants to meet the customer's requirements

With the help of our well developed in-house design unit and modern machinery equipment, we strive towards meeting varied application requirements of our clients

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HANNA EQUIPMENTS (INDIA) PVT. LTD.

Booth No. A14

Profile

HANNA Instruments is a world leader in the manufacture of analytical instrumentation. Headquartered in USA, HANNA has a global presence with 60 offices in 47 countries, Hanna strives to be a worldwide leader in service and selection, offering more than 3,500 products to a wide range of industries. Our products include pH meters, Checkers, Refractometers, ORP meters, Titrators, Photometers, COD Meters and many more. These products are useful in all the major industries like agriculture, aquaculture, Food & Dairy, Water Treatment etc.

Perpetual Innovation.

HANNA's research and development teams continuously challenge themselves to improve existing technologies and invent new testing techniques. These efforts have led to HANNA revolutionizing the world of testing.

- World's first tablet size multiparameter for pH/EC/DO analysis
- World's first pH electrode HALO with Bluetooth Technology
- World's first single parameter line of auto titrators.

Hanna Equipments (India) Pvt. Ltd. is the local face of Hanna Instruments in the INDIA. It operates from its Navi Mumbai headquarters to foster better relationships with its Indian customers and offer expert local support. HANNA Equipment's' mission is to supply its customers with practical, affordable solutions for their testing needs.

Product
Hanna manufactures Chemical Test Kits,Checkers, Chemical Oxygen Demand Meters, Conductivity, Dissolved Oxygen, pH/ISE, Titration, Magnetic Stirrers, Multiparameter Meters, Photometers, Relative Humidity, Refractometers, Temperature, Turbidity, Mini Controllers, Process Instrumentation, Electrodes, Solutions, Reagents & accessories.

Our Instruments caters to Research scholars, hobbyists, Quality analysts, Bakers, Farmers, Growers, Professors & Industrialists.

We believe in controlling the quality of our products from their inception to delivery. For this reason, we manufacture all the products we bring to the market including meters, electrodes, chemical reagents and buffer solutions. Each of our manufacturing facilities is specialized in a product family to ensure stability and greater quality.

All Hanna products are in compliance with international standards and our production facilities are ISO 9001 :2000 certified.

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INNOVYZE, AN AUTODESK COMPANY

Booth No.

Profile

Autodesk is a global leader in design and make technology. With expertise across architecture, engineering, construction, design, manufacturing, water infrastructure and entertainment, we help innovators everywhere

solve today's pressing challenges.

Innovyze's, an Autodesk company, software help you solve the most impactful and significant water challenges. Overflowing sewers can expose you to regulatory pressure, fines and bad headlines as customers complain. Design, modelling, and asset infrastructure analysis can show you the best way forward. Leaks, bursts, and other non-revenue water are enduring problems, but tracking them down and addressing them is now easier than ever, with powerful data analytics and modelling to show the best repair options. How good is your water quality? We'll help you model, monitor, and analyze your metrics.
Extreme weather is one of the greatest challenges the water industry faces. With our live and offline modelling throughout your catchments, watersheds and networks, drainage and sustainable drainage design, risk assessments and dashboards, you will be prepared and able to act.

Globally, the largest utilities to the smallest consultancies, local authorities, municipalities and utilities, use our software to optimize their work.

Product

Innovyze's An Autodesk company, industry-leading software supports you in managing water, from source to outfall:

- Design drainage, including green/sustainable drainage (SuDS, WSuDS, LIDs)
- Design and model sewerage and wastewater systems
- Model catchments and watersheds, integrating rural, urban, and river, with 1D and 2D hydraulics, and industry-leading flood models
- Model and optimize clean water distribution
- Carry out live modeling, forecasting, and analytics, for better, more informed decision-making as events unfold
- Manage and maintain water infrastructure assets effectively

Working with Innovyze, an Autodesk company, will help you and your clients to efficiently deliver essential services in water and wastewater, support resilient provision of essential services, manage and maximize the value of assets, and enhance the environment.

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LEVEL & FLOW INDUSTRIAL AUTOMATION PVT. LTD.

Booth No. B31

Profile

Level & Flow Industrial Automation is a professional company which manufactures automation instruments & related settings, our instruments are industrialized & automated, we also engaged in design, search, manufacture, selling & service.

The main manufacturing products are Electromagnetic Flow meter, Turbine Flow meter, all types of Level Gauges, All types of Level switches, all types of Level Transmitter, All types of Temperature Sensors / Transmitters / Thermocouples.

The company has been through ISO 9001: 2015, and always high quality products, thoughtful service, reasonable price, honest & trustworthy business philosophy, providing the most satisfactory products and the best quality service for the users.

The company sold products on the uniform implementation three guarantees & to establish a set of pre-sale, sale, aftersales service system. Aim to start with the customers' requirements, finally customer satisfaction.

The customer's requirement is our goal: we sincerely hope that customers at home & abroad to build effective cooperation. We sincerely invite new & old customers coming & guidance.

Product

We deal in process instruments like Level Switches, Level Transmitter, Level Gauges, Flow Meters, Temp. & Pressure Transmitters.

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MAXWELL ADDITIVES PRIVATE LIMITED

Booth No. A1

Profile

Maxwell Additives Pvt. Ltd. formerly Manhar Specialities is an Indian manufacturer of oil & gas products, corrosion inhibitors, polymers, quaternary ammonium compounds, water treatment chemicals, sugar processing additives, Phosphonates and general hygiene & disinfection products since 1988.

Product

MAXWELL ADDITIVES PVT. LTD. develops, produces and distributes eight brands: OLKLIN, KLINMAN, DEBAC, POLYMAN, SUJAL, PHOSPHOMAN, EZYKLIN & EZYGARD

Brands OLKLIN, KLINMAN, DEBAC, EZYKLIN & EZYGARD are mainly dedicated to professional cleaning, hygiene & disinfection in the fields of catering, food industries, clinics & hospitals, industries & institutes. SUJAL, PHOSPHOMAN, POLYMAN are specialized in oil & gas products, water treatment chemicals, Phosphonates & polymers.
Maxwell Additives Pvt. Ltd. is capable to answer practically all cleaning, hygiene & disinfection needs in wide range of industries.

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MEDIO

Booth No. B22

Profile

DMI-65®, with infusion technology, is an advanced oxidation catalytic media for the removal of iron and manganese, and has been used in a wide variety of applications in 65 countries worldwide for over 20 years. It is manufactured exclusively in Western Australia by Quantum Filtration Medium Pty Ltd.

Medio Industries Pvt Ltd is the sole Indian distributor of DMI65 and other propitiatory products from Quantum Filtration Medium Pty Ltd. Australia. MEDIO Offers technical support for project and retail supply for DMI65, and keep adequate inventory for supply chain management

Best to remove : Iron,Manganese, Arsenic, Aluminum, Copper, Lead, Zinc, Nickel, phosphorous and heavy metals

Product

DMI-65- Australian make product. Iron Reduction Media

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METSI ENVIRO TECH PVT LTD

Booth No. A2

Profile

Metsi Enviro Tech has a track record of over two decades of experience and is an international supplier of innovative technological products in the environmental space.

Our Products caters to the verticals of Water Treatment, Waste Water Recycling, Air Treatment, Energy Savings, Solid Waste Conversion

We deal with various segments like Original Equipment Manufacturers (OEMs), Engineering, Procurement & Contracting (EPC) & Mechanical Electrical Plumbing (MEP) Architects, Safety, Health & Environment (SHE) professionals, Consultants of various disciplines, Non-Government Organizations (NGO's)

Product
Claire Fontaine Air infusion system in collaboration with Hiblow, Japan.

Saves upto 90% of power.Hiblow air linear pump replaces raw sewage pumps, aeration , sludge circulation and decanting.

Mapro ,Italy Trilobe blowers, which saves power upto 50% do not require any stand -by and are super-efficient.

Philos Claire Fontaine, South Korea for UF /MBR.Tensile strength- 61 kgs/ fibre are from the stable of the inventors of UF technology

Claire Fontaine Organic Waste transformer is approved by Pollution Control Board under an evaluation directed by National Green Tribunal. The composting system follows the science of composting was developed in association with GKVK, University of Agricultural Sciences, Bangalore and an impending MOU with IIT.

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MINI DOSE SOLUTION PUMPS

Booth No. B16

Profile

MINI DOSE SOLUTION PUMPS manufactures various

types of chemical dosing pumps. It is a chemical dose diaphragm metering pump which works as solenoid pushes the diaphragm which in turn pushes the liquid to system. It has two controls for desired accuracy of dosing. Our unique selling proposition is to deliver great quality product. With nearly 2 decades of experience, our company has emerged as a trusted manufacturer and supplier of impeccable quality range of chemical dosing pumps. We are the first manufacturers of dosing pumps in delhi. All of the major products manufactured by the company include electronic dosing pumps,plunger pumps,screw pumps and several more.

Product

All Type Chemical Dosing Pumps Manufacturers

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NEERWAY PROJECTS PRIVATE LIMITED

Booth No. B4

Profile

Neerway Projects Private Limited (NPPL) are leading EPC Company and importer & Exporter of state-of-art technological water products in overseas market for advancement in water infra management. We have developed in-house resources with key competencies to deliver a project from conceptualization to completion that includes our design and engineering, manufacturing. Since the beginning, NEERWAY has produced and offered broadest range of water & irrigation products to industries, municipal water, farms, golf courses, commercial developments and homes globally. The NEERWAY range is market driven, where constant advancement in technology constrain us to develop new and improved products. We always serve our client advance technologies specifically suiting to projects' and clients' requirements effectively. Our experience & commitment is unparalleled in the industry in terms of quality, timely delivery & close monitoring of projects for the total satisfaction of our clients.

We are ISO 9001: 2015, 14001:2015, 45001:2018 Certified Company.

Product

- Y-Typer Disc Screen Filter
- T-Type Disc/Screen Filter(Size 2", 2.5" , 3")
- H-Type Disc/Screen Filter(Size: 3" & 4")
- Semi Automatic Disc Filter (Size: 2" & 3")
- Semi Automatic Screen Filter(Size: 2" & 3")
- Automatic Disc Filter(Capcity: 07M3/Hr to 500M3/Hr)
- Self Cleaning Screen Filter(Size: 5M3/hr-1000m3/hr)
- Hi Tech Glass Media
- Activated Corban Media
- Anthrasite
- Sand Media
- Green Sand
- Fine Bubble Disc Diffuser
- Coarse Bubble Diffuser
- Fine Bubble Tubular Diffuser
- MBBR Media
- Tube Dec Media
- Dosing Pump
- Agitator
- Pressure Gauge
- uPVC Butter Fly Valve
- Filter Press
- RO Membraine
- Ball Valve
- MNO2.
- Gravity Drum Screen Filter
- Slug Dry Bag System
- Wall Mounted Roof Top Rainwater Filter-200Micron
- Coarse Screening Filter 200 Micron
- Hydro Nutrient Gel

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ORGANIC SOLUTIONS

Booth No. B6

Profile

We provide nature based solutions for closed loop recycling of water thereby reducing the burden on fresh water resources and enabling water sustainability for living communities, establishments, cities and off-grid establishments. 40+ systems setup across India that provides high quality water for reuse to 40,000 people. Clients range from village communities, to off-grid establishments like armed forces campuses, educational institutes and even some on-grid communities/establishments that are keen on saving and recycling water. Another innovative project has been setting up small scale systems in public parks where waste water is tapped

from nearby sewer line, treated on site in the parks and the treated water is used to irrigate the parks making them completely self sustainable even in peak summer months, reducing the burden on authorities to provide fresh water.

Product

The Advanced Eco Reactor (AER)TM Sewage Treatment Process is revolutionary and completely disrupts the current approach towards waste water management. It mimics the mechanism of healthy soil to treat waste water and convert it into high quality water that can be used for non-potable purposes like flushing, irrigation, construction, industrial use, car washing etc. AER STP uses up to 70 per cent lower power and has lower lifecycle costs as compared to conventional systems. An ecological and economical win – win.

We also provide in-situ bioremediation for water bodies like lakes and ponds using floating wetlands. The Floating Wetlands (EcoIslesTM) are fitted with water purifying plants and engineered media for growth of biofilm that restores the ecosystem of the water body. Low power aeration and enzyme treatment further enhances the treatment process.

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OZONE ENGINEERS

Booth No. A8

Profile

OZONE ENGINEERS is emerging as the leading manufacturer and exporters of Ozone Generators, Oxygen Concentrator and allied products from Coimbatore, Tamilnadu. Our goal is to be the worldwide best ozone system manufacturer by focusing on the continuous improvement of engineering research, customer satisfaction, top quality products and clean manufacturing practices. We manufacture the lowest cost, highest quality ozone products by utilizing diverse application expertise to serve multiple markets while maintaining the optimum balance of innovation, quality, cost, safety and ozone efficiency.

Ozone Engineers manufacture Ozonator wide ranges from 500 mg/hr to 2kg/hr ozone capacity by air and oxygen as a feed gas.

Ozone Generator Ranges :

- IAE Series - Built-in Oil free Air Compressor,2gm/hr to 5gm/hr with Added Features
- EO Series - Oxygen Source, 5 gm/hr to 30 gm/hr, Air Cooled System
- WO Series -Oxygen source, 10 gm/hr to 1 kg/hr , Water Cooled System
- SD Series- Skid System, Integrated Ozonator, Oxygen, Ozone Injection
- System with Ozone Contact Tank
- OEM Series - Ranges from 5 gm/hr to 20 gm/hr, Air & Water cooled
- MOS Series - Multipurpose Ozone Sterilizer for House hold multi usage
- OAS Series -Ozone Air Sterilizer for Air Treatment
- Oxygen Plant – Oxygen Plant for Medical purpose, Hospital Use
- Ozone Monitor- Ozone Monitor & Controller for measuring ozone level in
- Ambient & Water
- ONG Series - Oxygen Concentrator for Ozone Feed Gas System

Ozone Accessories :
Ozone Destructor
Ozone Test Meter & Comparator
Ozone Monitor
Venturi Injector
Static Mixer, Flow Meter
Teflon Tube & Pressure Gauge etc.,

Product

Manufacturers & exporter of Ozone generator oxygen concentrator oxygen plant & Accessories

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PINAKIN TECHNOLOGY SOLUTIONS

Booth No. A11, A12

Profile

We are Pinakin Technology Solutions – Effluent waste management & Environmental Solutions Company. With our tagline of "Let's work for an Environment", we are providing sustainable solutions for daily waste generated in Chemical Industries.

Pinakin Technology Solutions is a Global Leader in the Manufacturer and Exporter of highly engineered and customized systems of waste water treatment plant industry. We are the only global company with a

full- line product portfolio that includes waste water treatment turnkey project solutions in India. We maintain strong market positions across these products, as well as leading positions in waste water. Our strategy is to deliver highly customized equipment, components and service to our customers throughout the lifecycle of their waste water treatment systems.

Pinakin Technology Solutions majorly focusing on Air Pollution Control System, Water Pollution Control System & Solid Pollution Control System by using Innovative Technologies.

We have in depth 18 Years of Experience of India West Water Versatile Solution of Waste Water in Various Industries. We have in depth Knowledge of Indian waste water problems from various industries like,

- Agrochemical Industries
- Chemical Industries
- Steel Industries
- RO Reject Water
- Dyes Industries
- Milk Processing
- Starch derivatives
- Herbal Extract
- Distillery
- Solvent Evaporation
- Caustic Recovery
- Pharmaceutical Industries
- Textile
- Edible Oil Industries
- Food Industries
- Tanning Agent
- Fertilizer Industries
- Effluent
- Common ETP
- Auto Mobile
- Metal and Mining
- Glycerin Concentration

Product

Pinakin Technology Solution Evaporation systems has set its niche in the world of Concentrating Solutions.

Our evaporation systems developed a unique identity by producing the ultimate solutions for recovering water from the Effluents, Waste Water (RO Reject), etc and also product recovery solutions like Sodium Sulphate, Ammonium Nitrate, Herbal Extracts, etc. The range of evaporators supplied by us is Forced Circulation, Falling Film, Combination type & OSLO Crystallizers.

We install the highly efficient Stripping System prior to the Evaporation system to recover the solvents that blend up the effluents.

We also provide solutions towards Zero Liquid Discharge by integrating the Agitated Thin Film Dryer System as a post process to the Evaporation System to produce Dry powder as Output

Scrubber Systems Types

Jet Venturi Fume Scrubber : Effective at removing noxious gases, particulates, odors, fumes and dusts from gas streams and are better able to cope with the high temperatures and heavy contaminant loads, than other scrubbers – no fan usually needed.

Vent Gas Scrubber System : Compact, light-weight and easy-to-install unit designed for economical and effective control of pollution from low volume sources.

High Energy Venturi Scrubber System : Designed to remove fine micron and submicron particulate from industrial and commercial effluent gases.

Packed Tower Gas Scrubber : Provides most efficient removal and absorption of noxious gases, performs best when gases to be handled are free of particles.

Packaged Scrubber : Includes recycle pump, instruments, piping as required to suit customer's needs, eliminating the burden of system design.

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ROTH SPECIALITIES INDIA PVT. LTD.

Booth No. C19,C20

Profile

Roth Specialities is a global provider of Water Treatment Chemicals, Laboratory Chemicals, Speciality Proprietary Blends - Phosphonates, Industrial Enzymes, Plastic & Polymer Additives & Metal Working Fluids. We offer an extensive product portfolio, and smart solutions to a broad variety of industries in need of a raw material supplier. It reaches a diversity of sectors such as: Pharmaceuticals, Electronics & Chemicals, Textiles, Food & Breweries, Sugar & Distilleries, Cosmetics & Detergents and among many others.

We are recognized as an innovative company which constantly renovates with the support of cutting-edge technology. Majority of our water treatment is based on green chemistry i.e., Non-Toxic- Organic Treatment.

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SAHARA INDUSTRY

Booth No. B2, B3

Profile

It is a professionally managed organization established in 2001 with the idea of providing best solutions to water treatment industry. With a team of management professionals and dedicated engineers helping in research and development to design and manufacturing the most recognized and trusted components in water filtration including state-of-the-art RO Plants, the company is able to provide its products at very reasonable prices to customers for their utmost satisfaction.

The company has a history of over three decades of parent organization's inception in the field with producing and supplying Submersible Pumps and related products. The deep knowledge of the group and advancement of technology has helped us doing better research as per changing market dynamics in water treatment industry and we developed products that not only caters the need, but also provide best possible results within the limitation of resources. Today, we have a vast range of products being produced indigenously in our modern manufacturing facilities spread across 32,000 square meters near Hyderabad.

Our group companies are manufacturing best quality components like FRP Membrane Housing, FRP Pressure Vessels/Tanks, Multiport Valves, Flow-meters, Distribution System, Multi-Cartridge Filter, Pressure Switches, U V Sterilization Systems, Ozonators and Reverse Osmosis (RO) plants among other efficient, cost effective and user friendly products. Apart from our own products, we are also the official distributor of several international brands of Membranes, Pressure Pumps, and Filters.

We at SAHARA INDUSTRY appreciate this opportunity to introduce our company and services to you and we are eager to be associated with you to provide the best possible solutions. We look forward to have your response soon.

Product

FPR MEMBRANE HOUSING, FRP PRESSURE VESSEL, FRP BAG FILTER HOUSING, FRP MULTICATRAGE FILTER HOUSING, FLOW METERS, OZONATORS, PRESSURE SWITCH, MEMBRANES, ION EXCHAGE RESINE, FILTER MEDIA, RO SYSTEMS, ULTRA PURE SYSTEMS, DM PLANTS, WATER TREATMENT CHEMICALS and OTHER FILTER MEDIA

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SPRAY ENGINEERING DEVICES LIMITED

Booth No. A18

Profile

Spray Engineering Devices Limited (SED) is ''Innovative Technological Solutions'' providing company for Sugar & Allied Industries for last nearly three decades, specialized in Vaporization, Condensation, Evaporation and Crystallization. SED has revolutionized in the water sector by providing most efficient high quality clean water recovery and recycling solutions from any type of wastewater in single step through "Low Temperature Evaporation Technology based on Mechanical Vapour Compression / Recompression System" without use of heat generation & rejection units and chemical at lower cost and minimal footprint. SED has also established Boiler Free Jaggery (solid, semi-solid, powder, cake) Production Unit for 100% bagasse saving which is commercially available for a sustainable technological solution assuring profitable business proposition. SED is an Engineering Company, focused on designing/redesigning and engineering of processes, equipment manufacturing along with complete automation ensuring highest energy efficiencies since 1992. The Company today has established its existence in more than 40 countries by providing energy efficient products and cost-effective solutions for sugar and allied industries. SED has emerged as one of the fastest growing technology driven company, striving to provide world class integrated energy efficient equipment and innovative solutions across the globe.

Product

This technology is capable of treating effluents/wastewater from all market sectors of industry as
Dyeing & Textile
Paper & Pulp
Electroplating
Automobiles
Food & beverage
Sugar
Dairy
Chemical
Pharmaceutical
Leather/Tannery
Sewage

All kind of CETPs/STPs
Distillery
Refinery
Power plant
Saline water etc.

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SUPERWELD TECHNOLOGIES

Booth No. A24

Profile

We specialize in biological innovations to treat effluent better, we provide technical support as well for improvements in wastewater treatment. We have our own state of the art R and D Lab and highly experienced wastewater engineers. Among our star products are names like SUPER 24 and OXYSUPER which have become the most sought-after products by wastewater professionals today, Our products can treat the most toxic wastewaters and are known to have the most economical dosages and the fastest results across the industry. Be it odour control, high COD, BOD Reduction, Handling shock loads, Meeting stringent discharge norms and performance under short relation times our microbial products always save the day. Hotels, residential societies, industries like paper, textiles, chemicals and CETPS, Municipal STPs are using our innovations regularly.

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TETHYS INSTRUMENTS

Booth No.B15

Profile

Tethys Instruments is a manufacturer of gas and water on-line analysers for environmental and process applications. Our technology based on UV spectroscopy offers unparalleled reliability and very low operating cost. Headquartered in Grenoble (France), we provide top-class service and instrumentation for environmental and process online monitoring.

Product

Tethys manufactures various measurement technologies for water quality measurements such as UV Spectroscopy, UV Spectroscopy after gas stripping, UV Fluorescence, Colorimetric, Nephelometric, Electrochemical Sensors. Tethys offers unique modular concept wherein multiple measurement technologies can be integrated in one analyser. Thanks to the Tethys R&D team who invented innovative modular concept for online water analysers which allows measurement of various parameters - even if it follows different measurement technology – in one analyser. For example, Tethys can offer in one analyser – measurements like COD (UV Spectroscopy), Ammonia - NH4 (UV Spectroscopy after gas stripping), Oil-in-water (UV Fluorescence), Phosphate (Colorimetric), Turbidity (Nephelometric), pH, DO, TSS (External Sensor attachment).

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TRIVENI ENGINEERING & INDUSTRIES LTD.

Booth No. C2, C3

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LIFESTRAW

Booth No. B14

Profile

Vestergaard is a Swiss MNC with Asia Regional HQ in New Delhi, India. Established in 1996, LifeStraw (the water technology division of Vestergaard), has been pioneering development & manufacturing water purification systems. Our water purification systems are unique with little

to no competition in India or Internationally & are independently tested-recommended by World Health Organization. We are present in over 60 countries globally & launch new products each year.

Product

LifeStraw Community (launch in 2014) has been globally the most successful water purification system for public health projects across Asia, Africa & Latin America. With over 100,000 distinct footprints the purifier has provided access to safe water to millions in both emergency & development settings.

The product is heavily field / lab tested & is a 3 Star Rated product in the Point-of-Use Water Filtration report by World Health Organization. It is highly recommended by several large Non-Profits, Governments & Corporates for Public Health Projects & like every product ever made – LifeStraw Community had feedback from several implemented projects over the years. The culmination of the feedback gave birth to the LifeStraw MAX: World's most compact, sustainable high-capacity water purifier (200 LPH) with negligible wastage of water & no need for electricity or chemicals.

It removes virus, bacteria, parasites, microplastics and includes an advanced carbon filter that reduces lead, chlorine, cobalt, chromium, pesticides, improves taste & odour.
LifeStraw has purifiers/filters for an individual, a family, a small community & even large communities (>500 people)

All our purifiers are US EPA compliant on microbial efficacy, NSF on chemical efficacy (contaminants mentioned above), US FDA for material safety & are rated "3 star" by World Health Organization

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THERMAX

Booth No. A16

Profile

Thermax Group is an INR 4,899 Cr. (661 Million US$) company headquartered in Pune, India. Its business portfolio includes products for heating, cooling, water and waste management, and specialty chemicals. The company also designs, builds and commissions large boilers for steam and power generation, turnkey power plants, industrial and municipal wastewater treatment plants, waste heat recovery systems and air pollution control projects.

The systems, products and services developed by Thermax help industry achieve better resource productivity and improve bottom lines, while maintaining a cleaner environment. Even as we convert costs to profits, we help to protect the environment in our own limited ways. A win-win for industry and the society at large.

We operate globally through 29 international offices and 14 manufacturing facilities – 10 of which are in India and 4 overseas.
Our presence spans 88 countries and supports customers through an extensive sales & service network spread over Asia, South East Asia, Middle East, Africa, Europe and the Americas. The group consists of 7 wholly owned domestic subsidiaries and 21 wholly owned overseas subsidiaries.

Product

We provide water treatment, wastewater treatment/ recycle and Zero Liquid Discharge solutions, sewage treatment/recycle and desalination plants. The domain expertise and experience garnered over the past four decades gives us an edge over competition in providing a one-stop solution to our customers to help them reduce, reuse or recycle water and wastewater.

Thermax chemicals, a flagship division of Thermax Limited, with proven expertise of over four decades, offers gamut of "Specialty Water and Fuel Management Solutions" encompassing

¡ Polyelectrolytes
¡ RO Membrane Treatment Chemicals
¡ Boiler Water Treatment Chemicals
¡ Cooling Water Treatment Chemicals
¡ Fuel and Fire Side Additives
¡ Sugar Process Chemicals

With ever increasing concern on availability of water, fossil fuels and environment regulations, our products and monitoring techniques provide eco-friendly solutions to improve efficiency and performance, conserve energy and preserve the environment.

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INTEGRO ENGINEERS PVT.

Booth No. B27

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TOSHNIWAL INSTRUMENTS MANUFACTURING PVT. LTD.

Booth No. B20

Profile

TOSHCON is a leading manufacturer of reliable, sophisticated and high-quality customisable products like Analytical Sensors/ Electrodes & Lab Instruments, Online Water Quality Analysers/ Online Sensors, Process Control Instruments (Thyristors & PID Controllers), Metering Products (Turnkey Gas & Electro Chlorination & Dosing systems).

TOSHCON's more than 43 years long noteworthy existence in itself is a proof of continued satisfaction of their customers. Our commitment to continuous R&D, foreign collaborations, upgradation of technologies enables us to offer World's most innovative and advanced solutions.

Our marketing and servicing network, spread strategically all across India, is backed up by its robust service team for prompt & efficient lifetime after sales services. TOSHCON is an ISO 9001:2015 company with a team of over 275 people.

Product

TOSHCON-TOSHNIWAL is the Asia largest Swiss Quality manufacturer of pH, Redox& Conductivity Sensors and Meters with European know–how for Laboratory/ Industrial on line applications for water/ waste water parameters like pH, Conductivity, TDS, TSS, Dissolve Oxygen, Turbidity, Chlorine & Ions and covering National/ International market like Germany, Italy, France, USA, Spain etc.

Dealing with:
*Analytical * Process Control *Metering Products: Gas Chlorinators, Dosing Pumps & Systems

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THE ECONOMIC & COMMERCIAL MISSION - EMBASSY OF ISRAEL, NEW DELHI

The Economic & Commercial Mission at the Embassy of Israel in New Delhi, headed by Natasha Zangin, Counselor for Economic & Trade, carries out a wide variety of critical functions and work with a broad spectrum of government and private sector organizations to articulate, develop and enhance the commercial, economic and investment relations between India and Israel.

The main focus of the Israeli Economic & Trade Mission in Delhi is strengthening the trade and investment cooperation between the Israeli vibrant and innovative industry and the fastest growing economy of India. We are here to assist you with:

- Scouting of Technology/product companies in Israel
- Information regarding Tradeshow & Exhibitions in Israel
- Establishing connections with Governmental & Academic institutes in Israel
- Building the agenda for your next business visit to Israel
- Investment Opportunities in Israel
- Building agenda and organizing inbound/outbound delegations

Our Goal:

- To promote the Israeli industry by deepening its activity in overseas markets
- To Accompany and support the individual exporter in marketing activities abroad
- To initiate and apply new and existing international trade agreements
- To raise investments and locate strategic collaboration opportunities

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ISRAEL EXPORT INSTITUTE

The Israel Export & International Cooperation Institute, supported by member firms, private sector bodies and the government of Israel, advances business relationships between Israeli exporters and overseas businesses and organizations. By providing a wide range of export-oriented services to Israeli companies and complementary services to the international business community, the Institute helps build successful joint ventures, strategic alliances and trade partnerships.

The IEICI's Water sector is matching companies in the Israeli Water tech industry and worldwide business partners at all levels. It has proven ability

to identify and match suitable potential business partners, organizes one-on-one business meetings, and is a focal point for contacts with the government as well as with the industry.

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ATLANTIUM TECHNOLOGIES LTD

Booth No. C30

Profile

Atlantium Technologies was established in 2003 to provide the world with safe and sustainable water Disinfection treatment solutions, delivering water biosecurity, peace of mind and the safest best quality water to our partners. Atlantium is a fast-growing private company whose HOD UV systems are field-proven globally with Fortune-500 companies among its loyal customers. The company's team of scientists and engineers designed an innovative solution based on UV (ultraviolet) disinfection, fiber-optics and hydraulics. Atlantium solutions are third-party validated to strict U.S. FDA and EPA regulations.

Atlantium cares about the environment and the impact we have on the future of our world. We are intensely passionate about what we do and know the journey is just as important as our destination.

Product

Filtration & Purification Water Security

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BERMAD

Booth No. C30

Profile

BERMAD is a global leader in Water control solutions with 14 subsidiaries around the world and 60 years of experience. We Design, Manufacture, implement and service hydraulic control valves, metering equipment, and digital control solutions, assisting our customers to Optimize their water networks.

BERMAD INDIA with its main office & Logistic center in Pune and presence across India provides water control solutions for the irrigation and water supply sectors.

BERMAD India is designing, implementing and providing O&M services to our regional EPC's / Departments / customers.

Our systems are successfully installed and working satisfactorily in many lift irrigation projects, Drinking water supply projects and large-scale farms across India.

Product

Control & Communication

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CURAPIPE SYSTEM

Booth No. C30

Profile

Curapipe is a pioneering developer of a breakthrough trenchless leak curing solution for urban water distribution networks that have many leaks resulting in a high percent of leakage in total. By uniquely repairing these multiple leaks, bulk reduction of leakage is now made possible with minimal disruption and rapid deployment as a low-cost alternative to water mains replacement /renewal.

Product

Leak Detection

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IDE TECHNOLOGIES

Booth No. C30

Profile

IDE Technologies specializes in the development, engineering, construction, and operation of enhanced small to mega-sized seawater and brackish-water desalination solutions, industrial water treatment, and water reuse solutions. IDE has completed multiple large-scale membrane and thermal desalination projects and provides high-quality water to a wide range of customers, including municipalities, refineries, and power stations, as well as customers in the mining, oil, and gas industries.

Product

Consultancy/ Desalination & Brackish Water/ Developers & Projects Companies /Water Management

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REALI TECHNOLOGIES LTD.

Booth No. C30

Profile

RealiteQ is the new generation of IIoT and cloud SCADA – "all in one" (Hardware, cloud Software & User Interface) agnostic remote control & data management & operational platform. RealiteQ is much more than "Just a SCADA" RealiteQ is the most advanced Smart Water Network solution available today. RealiteQ is a Holistic solution, from the infrastructure level (gateway & telemetry) through the ICT & SCADA level up to the Cybersecurity & data analytics level. RealiteQ gathers and remotely controls critical & operational data, in real time, from a single device (sensors, analysers ,PLC) up to the entire network.
RealiteQ contributes for better safer & more efficient management of water & wastewater facilities and networks.

Product

Control & Communication

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TAMUZ SOLAR TECHNOLOGIES

Booth No. C30

Profile

Tamuz Solar Technologies provides an all-in-one efficient, off-grid energy source for agriculture, precision farming, water technologies, smart cities, autonomous systems, rural and remote areas, security & defense, IoT, and other applications. Tamuz Solar's off-grid maintenance-free solar systems are a must-have whether monitoring and controlling farming processes, monitoring environmental factors (weather, soil, water), or ensuring flawless connectivity with and within remote areas. SUSTAINABLE! COST-EFFECTIVE! EASY TO INSTALL AND OPERATE!

Efficient, compact, innovative, long-life solar energy source.

A high-performance system, making it possible to use digital IoT & technological devices at any location and for a wide range of applications. Tamuz solar provides decentralized highly efficient and innovated Off-Grid energy systems - Solving critical energy needs in Rural areas, Agriculture & Smart cities applications.

Product

Control & Communication / Water Management

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- Website: www.tamuzsolar.com

WATERGEN

Booth No. C30

Profile

Watergen is a pioneering Israeli company that has become the global leader in the Atmospheric Water Generators (AWG) market, that create drinking water from the humidity in the air. The company's solutions are among the most effective and economical to solve the pressing issue of drinking water scarcity in any location. Watergen's game-changing water-from-air solution is based on its proprietary, patented GENius technology.

Product

Water Emergency & Security

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- Website: www.watergen.com

HULIOT PIPES & FITTINGS PVT LTD

Booth No. B29, B30

Profile

Huliot Group is a global leader in advanced flow systems for commercial and residential buildings, bringing complete solutions that cover water supply, wastewater, and infrastructure.

The company's offering includes a comprehensive range of products that are driven by patented technology and state-of-the-art manufacturing techniques.

- Products include pipes, fittings, and manholes
- Materials include various plastics such as PP, PVC, PE- X, PERT, ML, PPR and STP
- Product size includes each of the standard size and diameter options

The Huliot Group is a leader in the green construction movement, leveraging environmentally friendly production technologies that include improved acoustics in plumbing systems and the use of recycled materials, among others

Product

ClearBlackTM is a modular wastewater treatment solution.

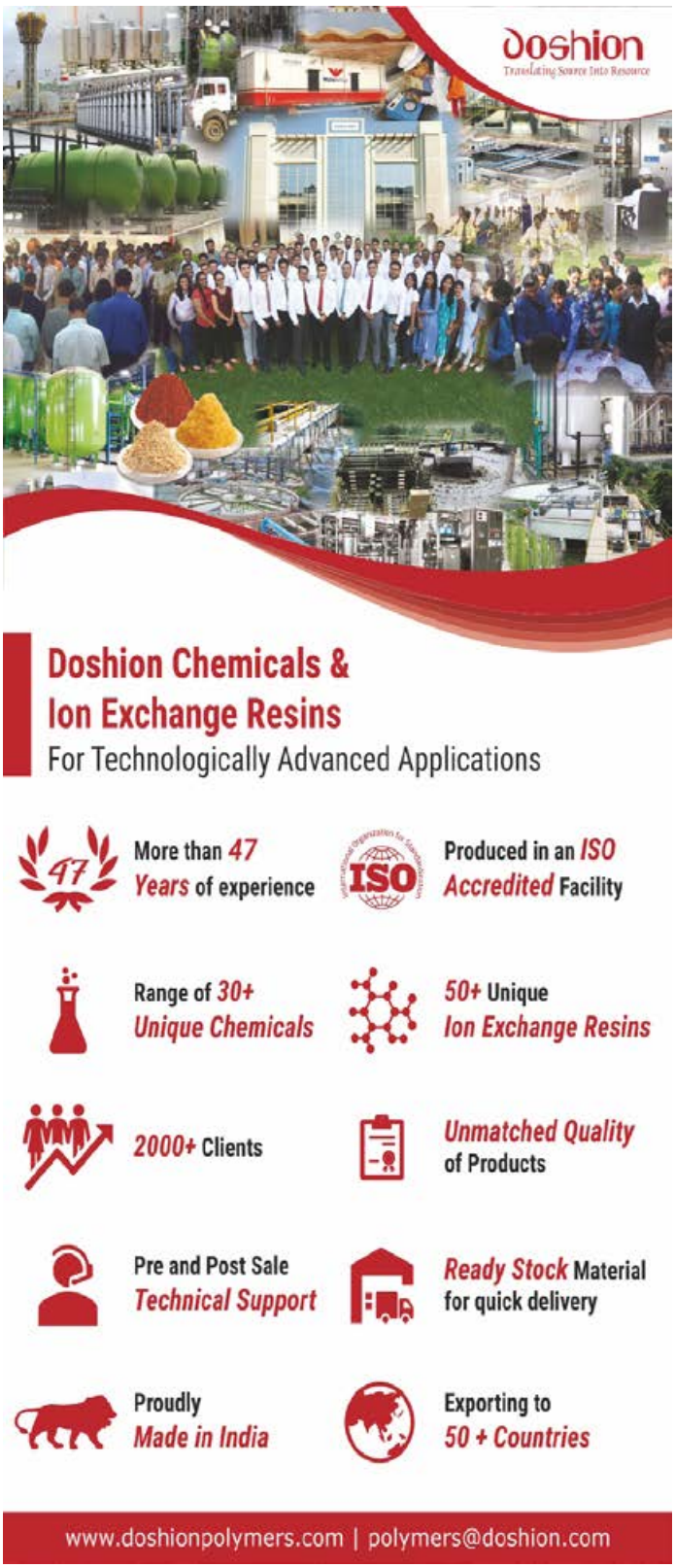
MBR- Membrane Bio Reactor, combines biological and membrane technologies into one operating unit.

MBR processes can produce steady effluent of high quality to be discharged to coastal, surface or waterways or to be reclaimed for urban irrigation.

Smaller Footprint

ClearBlackTM MBR is significantly more compact than conventional treatment technologies. No need for large clarifiers or additional filters. A smaller tank, housing the membrane modules, replaces the clarifier. In addition, the membrane allows higher sludge concentration in the bioreactor (MLSS). All this, together, with our smart engineering, makes ClearBlack™ the most compact packaged treatment system in the market.

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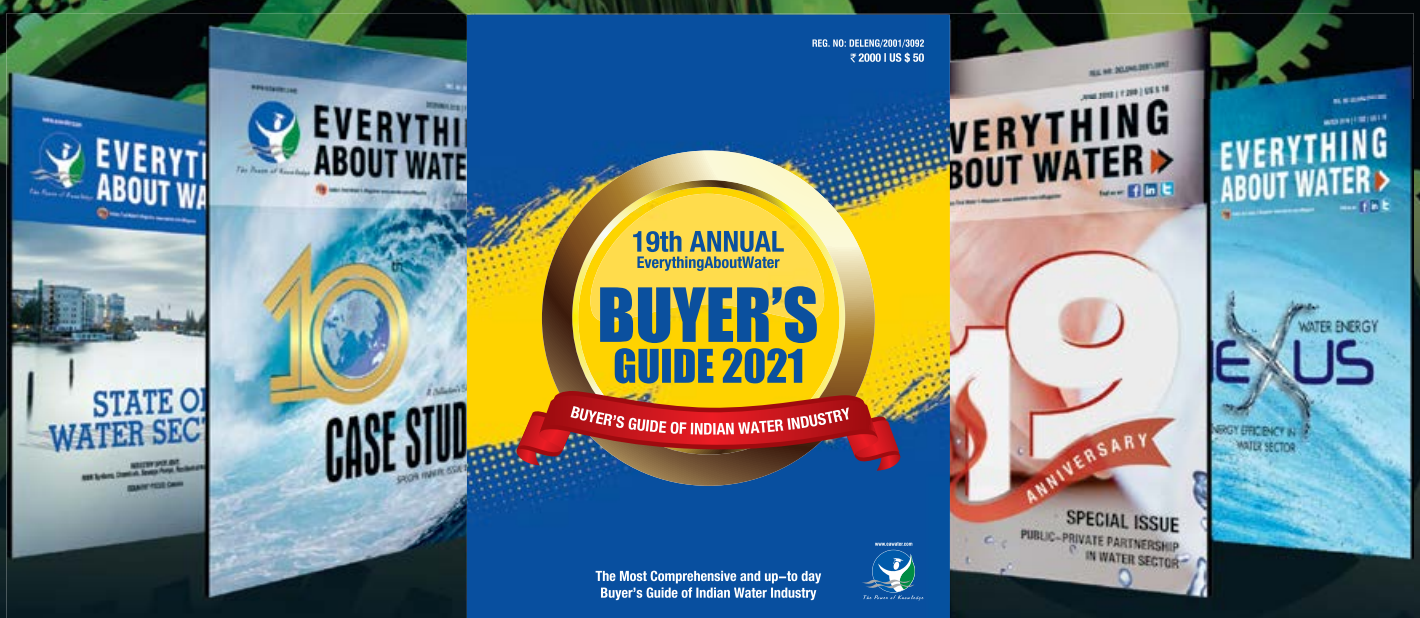
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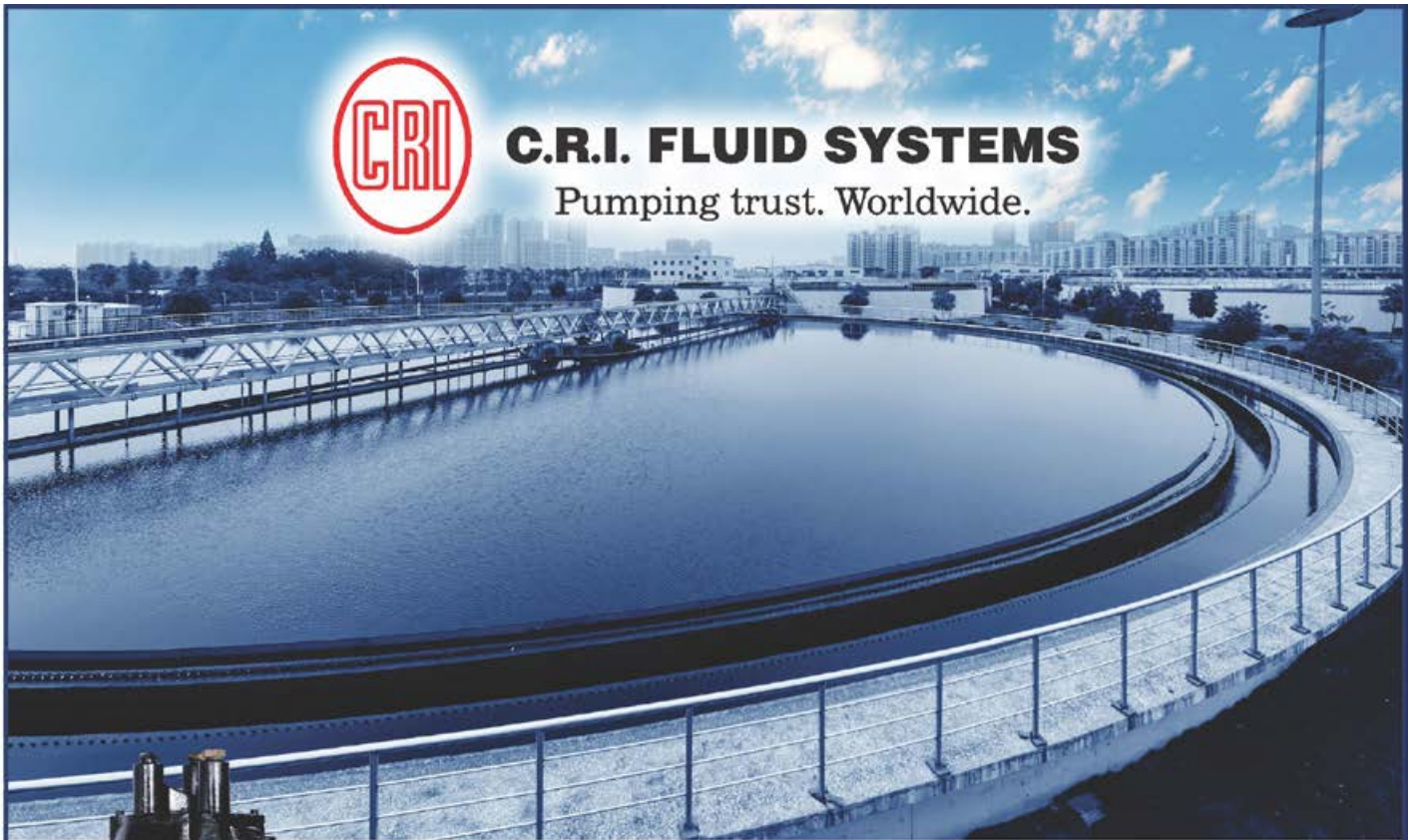
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