India's Water Magazine

WaterAge

Your knowledge and information partner

February 2023 ₹ 300 | US $ 15

water

RECYCLE & REUSE

Initiative of

SHUDH JAL FOUNDATION
JAL AAJ AUR KAL

Find us on:

www.waterage.in

OPTIMUS ENVIROPRO

Nurturing The Mother Nature

Optimizing the use of
Earth's Precious Resource i.e. Water

RAW WATER TREATMENT

- Dual Media Filters
- Multi Grade Filters
- Activated Carbon Filters
- Iron Removal Filter
- Water Softeners
- Demineralisation Plants
- Ultra-Filtration Plants
- Nano-Filtration Plants
- Reverse Osmosis Plants

WASTEWATER TREATMENT

Water Reuse & Regulatory Compliances

- Sewage Treatment Plants (SBR, MBR, MBBR)
- Effluent Treatment Plants
- Zero-liquid Discharge Systems (ZLD)
- Automation and Process Control
- Online Monitoring System

Water & Wastewater Treatment Solutions

WATER TREATMENT

Removal of Surface & Ground Water Pollutants

WASTEWATER TREATMENT

Sewage, Effluent, Sullage Treatment and Recycling

Optimus Enviropro Pvt. Ltd. **(Approved OEM of Military Engineer Services)**

CORPORATE OFFICE:
605, Bhikaji Cama Bhawan,
New Delhi-110066.
Ph: +91 11 41551444

HEAD OFFICE:
SCO 146-147, IIIrd Floor,
Sector-34A, Chandigarh-160022.
Ph: +91 172-5275055, 4012755

WORKS:
Plot No.286, HSIIDC Industrial Estate -I,
Barwala, Panchkula, Haryana- 134 118.
Ph: +91 1733 258455

Email: sales@optimusenviro.pro | Website: www.optimusenviro.pro

AADYS
COMPONENTS PVT. LTD.

One-stop-shop for Components

Ensuring smooth running for your Water & Wastewater Plants

The components from Aadys Components are rapidly getting approvals in municipal water and wastewater treatment as well as in industrial process applications across all industries and strongly recommended by water treatment specialists. Aadys Components provides a wide of range of components for water & wastewater treatment plants which are offered either as individual item, equipment, skid mounted packages or fully integrated systems. All components are sourced from world class manufacturers and industry leaders in their respective fields. The company continually strives to improve its capabilities and performance in order to provide the highest quality and technologically advanced products available in the industry.

COMPONENTS

- FRP Vessels
- RO Membranes
- RO Membrane Housings
- Dosing Pumps
- Sludge Dewatering Screw Press
- Filter Media
- Resins
- On-line Monitoring System
- Instruments
- RO Anti0scalants
- Iron Removal Media
- Valves etc.

SEGMENTS SERVED

- OEMs
- Industries
- Hospitals/Hotels/Malls
- SEZs
- Defence
- Institutions
- Public Health Departments
- Public Sector Undertakings (PSUs) etc.

AADYS COMPONENTS PVT. LTD.

CORPORATE OFFICE:
605, Bhikaji Cama Bhawan,
New Delhi-110066.
Ph: +91 11 41551444

HEAD OFFICE:
SCO 146-147, IIIrd Floor, Sector-34A,
Chandigarh-160022.
Ph: +91 172-5275055, 4012755

E-mail: sales@aadys.co.in

www.aadys.co.in

MANAGEMENT

FOUNDER	:	Sanjiv Chaudhary
GROUP EDITOR	:	Yogesh Tomar
EDITOR–IN–CHIEF	:	Renu Tomar
ASSISTANT EDITOR	:	Manisha Singh
DESIGN & GRAPHICS	:	Virender Kumar
MARKETING & OPERATION	:	Poonam Singh

PRINTER
Fine Art: D–7 /3, Okhla Industrial Area, Phase 2, New Delhi 110 020

PRINTED AT
Fine Art:
D–7 /3, Okhla Industrial Area, Phase 2, New Delhi 110 020

PUBLISHER
WaterAge
Initiative of SHUDH JAL FOUNDATION
605, Bhikaji Cama Bhawan, Bhikaji Cama Place, New Delhi – 110 066

EDITOR
Renu Tomar
#4048, B 5 & 6, Vasant Kunj, New Delhi – 110 070

For editorial contributions / press releases, write to: **editor@waterage.in**
For advertising enquiries, write to: **info@waterage.in**
For magazine & e–newsletter subscription, write to: **enquiry@waterage.in**
For support and feedback, write to: **enquiry@waterage.in**

Published by **WaterAge** (Initiative of SHUDH JAL FOUNDATION) :
605, Bhikaji Cama Bhawan, Bhikaji Cama Place, New Delhi – 110 066, **E–mail: enquiry@waterage.in**

RENU TOMAR
(Editor-in-Chief)

WATER REUSE AND RECYCLE: BENEFITS, OPPORTUNITIES, AND CHALLENGES

Water reuse and recycling are emerging trends in the water industry that offer many benefits to communities, businesses, and the environment. The increasing demand for freshwater resources, coupled with climate change and population growth, has led to a growing interest in using treated wastewater for non-potable and potable purposes.

One of the key benefits of water reuse and recycling is water conservation. By recycling and reusing water, communities can reduce their reliance on freshwater sources, which are becoming increasingly scarce in many regions of the world. This can help to preserve water resources and protect ecosystems that rely on them.

Water reuse and recycling can also be cost-effective for communities and businesses. Compared to sourcing and treating freshwater from distant sources, recycling, and reusing water can be a more affordable solution. This is especially true in areas where freshwater resources are limited, and the cost of transporting water is high.

Another benefit of water reuse and recycling is the positive environmental impact. By reducing the demand for freshwater, these practices can help to minimize the impact of water use on the environment. This can benefit aquatic ecosystems, which are often impacted by water withdrawals and discharges.

There are also many opportunities for water reuse and recycling in various industries. For example, greywater and blackwater recycling can be used in homes and buildings to reduce the demand for freshwater, while industrial wastewater recycling can help to reduce the water footprint of manufacturing processes. Potable water reuse can also be used in areas where freshwater sources are limited or contaminated, providing a sustainable source of drinking water.

Despite the benefits, there are also challenges associated with water reuse and recycling. One of the biggest challenges is public perception, as some people may be reluctant to drink recycled wastewater. However, advancements in treatment technologies have made it possible to produce high-quality drinking water from treated wastewater, which can help to overcome this challenge.

Overall, water reuse and recycling offer many benefits and opportunities for communities and businesses. As freshwater resources become increasingly scarce, these practices will become more important in ensuring a sustainable future for our water resources.

WaterAge

E-MAGAZINE BENEFITS

- Easy Access to Content
- Instantaneous Access
- Portable and Convenient
- Global Presence
- Interactivity
- Cost-Efficient
- Analytics
- Sustainability
- Monetization
- Easy to Update

NO MORE WAITING

for the print copy to arrive

WaterAge E-magazine is now LIVE!

SHUDH JAL FOUNDATION
JAL AAJ AUR KAL

To Read & Subscribe for FREE visit

www.waterage.in/e-magazine

Constructions

Building Confidence

Triveni Constructions

Engineers • Planers • Contractors

Established in 1999

MES Enlisted 'S' Class EPC

Civil Engineering Works
- Building and Roads
- Water Supply and Sewage Disposal
- Pre Engineered Buildings

Electrical Engineering works
- Low Tensin Electric Works (upto 1100 Volts)
- High Tension Electric Works (excluding 33 kV)
- Solar Panel

Electrical/Mechanical Engineering Services
- Water and Sewage Treatment






Constructions

Triveni Constructions

Engineers • Planers • Contractors

Established in 1999

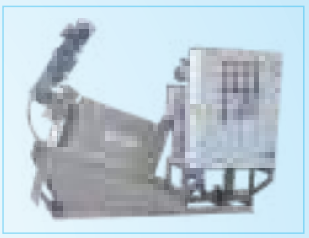
Head Office: College Road, Pathankot-145 001 (Punjab)
E-mail: standard.bedi@gmail.com
Branch Office: E-08 Wave Estate, Sector-85, Mohali S.A.S Nagar-140 308 (Punjab)
M.: +91 98143 21749, +91 98141 32026, **T.:** +91 172 4039 981
E-mail: triveni_anand@yahoo.com, triveniconstructions.mohali@gmail.com,

AKASH Blowers Pvt. Ltd.

Air Blower

Acoustic Enclosures

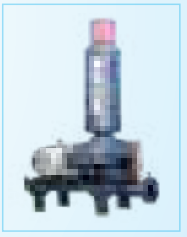
Ring Blowers



Sludge Dewatering Machine

Centrifugal Blowers

Vacuum Booster



Aqua Culture Blowers

Water Cooled Blowers

PRODUCT RANGE:

- Twin & Tri – Lobe Roots Blowers
- Gas Blowers
- Water Cooled Blowers
- Vacuum Boosters
- Acoustic Enclosures
- Aqua Culture Blowers
- Blowers Spares
- Ring Blowers
- Sludge Dewatering Machine

Regd. Office & Factory
1710/1712/1713, M.I.E.,
Part – B, Bahadurgarh, Distt. Jhajjar,
Haryana – 124507, INDIA

+91–702 702 9009

info@akashblowers.com

www.akashblowers.com

Water treatment facility with a 40MLD nod likely

The Periyar River water treatment facility of Kinfra, which is planned to be built at Aluva along the Periyar River, is likely to receive approval from the major irrigation department authorities.

The proposal had previously been rejected by department officials, who cited the river's dramatically reduced capability for transporting water following the 2018 floods as their justification. Nonetheless, it is understood that the department will take into account approving the proposal in a meeting that industry minister P Rajeev will call shortly.

The idea has already drawn opposition from environmentalists who claim that using a lot of water for industrial reasons would mean the river's demise. The minister decided to call a meeting as a result of a disagreement between the irrigation authority and the industrial department on the project.

Sources from Kinfra said that a recent research report based on the river's water level in 2021 reveals that there is enough water in the river, even after a flood, and that there are no practical challenges for the irrigation department officials to approve the plant.

The insider continued, "We have previously committed to the government that the first water intake would be just 10 MLD and will only increase to its maximum of 45 MLD by 2050.

24.35 Lakh Additional Irrigation Potential Created Under PMKSY During 2016–2022

After the launch of the umbrella scheme Pradhan Mantri Krishi Sinchayee Yojana (PMKSY) in 2016, 99 ongoing major/medium irrigation projects, along with 7 phases, were taken for partial financial assistance under PMKSY–Accelerated Irrigation Benefit Programme (AIBP), with pari passu implementation of Command Area Development & Water Management (CAD&WM). Out of these, 50 projects have been reported to be completed so far. Further, 23 of the remaining projects have physical progress of more than 90%, while another 14 projects have physical progress between 80% to 90%. Against a target of 34.64 lakh hectares of additional irrigation, during 2016–2022 an additional irrigation potential of 24.35 lakh hectares has been created through these projects.

Further, the inclusion of projects other than the 99 prioritized projects has been permitted for the implementation of PMKSY–AIBP during 2021–2026. Given the same, six additional projects have been included under PMKSY–AIBP, in which an additional irrigation potential of 0.12 lakh hectares has been created during 2021–22.

As seen from the above, PMKSY–AIBP continues to perform satisfactorily in assisting the States to complete the advanced–stage irrigation projects held up due to financial constraints, to provide irrigation benefits to the farmers.

PMKSY was launched during the year 2015–16, to enhance physical access to water on farms and expand cultivable areas under assured irrigation, improve on–farm water use efficiency, introduce sustainable water conservation practices, etc.

With the inclusion of AIBP under PMKSY in 2016, a paradigm shift was made in the implementation of the program. During 2016–17, 99 ongoing major/medium irrigation projects were prioritized in consultation with States and included under PMKSY–AIBP, for completion in mission mode, along with their Command Area Development & Water Management (CADWM) works. The funding mechanism through NABARD was approved by the Government for both Central and State shares.

Thus, the strategy was devised for the completion of the identified priority irrigation projects, which the States chose to be completed in mission mode, with assured funding through NABARD.

Further, based on the experience gained during 2016–2021, the strategy for implementation of PMKSY–AIBP during the period 2021–2026 has been partially modified, by adding other projects through liberalized inclusion criteria and funding through budgetary resources.

Development Monitoring and Evaluation Office (DMEO) under NITI Ayog has carried out the evaluation of PMKSY for the period 2015–2020. AIBP has been graded as 'satisfactory' (highest category) in parameters such as relevance, efficiency, impact, and equity. Further, grading for effectiveness has been determined as 'average' (second best category), while sustainability of the program has been graded as 'needs improvement'.

The government of India reviews its schemes, including PMKSY–AIBP, from time to time, and the requisite changes are brought about to make the implementation more effective. Further, the State Governments are mandated to monitor the implementation of irrigation projects under PMKSY–AIBP and ensure their proper operation and maintenance. In addition, such projects are regularly monitored by the Central Water Commission, as well as by a dedicated Project Management Unit (PMU) under the Ministry of Jal Shakti. The physical and financial progress of these projects is also monitored through a dedicated dashboard, backed by a management information system maintained by this Ministry.

JICA Forms Funding Contracts with India for Projects in Rajasthan and West Bengal

The Rajasthan Water Sector Livelihood Improvement Project will get a loan from the Japan International Cooperation Agency (JICA) in the sum of Rs 1,056 crore, according to a loan agreement the agency claimed it had signed with India (II). Through increasing water usage effectiveness and agricultural production, the project seeks to improve farmers' quality of life and advance gender mainstreaming in the irrigation and agriculture sectors in the state of Rajasthan. According to the statement, the project would help the state's socioeconomic growth by encouraging female farmers to participate in agricultural operations, which will boost output and enhance access to markets.

The Rajasthan Water Sector Livelihood Improvement Project (II) is 2nd tranche of The Rajasthan Water Sector Livelihood Improvement Project (I) which was signed on March 31, 2017. The project is a continuation of the "Rajasthan Minor Irrigation Improvement Project (RAJAMIIP)" from 2005 to 2015 under Japanese ODA loan. In a separate statement, JICA said it has signed a loan agreement with India to provide Japanese ODA loan amounting to Rs 520 crore for the Project for Forest and Biodiversity Conservation for Climate Change Response in West Bengal (WB–FBCCCR). The objective of the project is to mitigate and adapt to climate change and conserve and restore ecosystems by adopting ecosystem–based climate change measures, biodiversity conservation, livelihood improvement activities and institutional strengthening, thereby contributing to the sustainable socioeconomic development in West Bengal.

India will present conventional water management methods at the G20 summit

At the G20 environment and climate sustainability working group, which will be convened in Ahmedabad next week, India will demonstrate its traditional water management methods and its capacity to construct large–scale water projects.

India requested that G20 members share their best practises for managing water in order to promote cross–learning and information sharing while it held the G20 leadership.

According to Union Jal Shakti Ministry Special Secretary Debashree Mukherjee, who briefed reporters on the meeting, the technical sessions during the three–day meeting, which starts on Monday, will concentrate on five areas: resource efficiency and the circular economy, water sanitation and hygiene, climate change mitigation, and climate–resilient infrastructure.

The historic Adalaj Stepwell will host the G20 delegates to display conventional water gathering methods.

Also, they will go to the Narmada canal syphon on the Sabarmati River, which is proof of India's ability to carry out large–scale water projects.

The Jal Jeevan Mission, which seeks to provide 193 million homes with functional tap water connections by 2024, is one of India's accomplishments in the water sector that will also be highlighted.

NGT has proposed guidelines to reduce water waste in metro rail projects

The Central Pollution Control Board (CPCB), the Ministry of Jal Shakti (MoJS), and the Metro Rail Corporation were asked to form a joint committee to take the necessary "remedial measures" after the National Green Tribunal (NGT) heard a petition about water waste during metro rail construction in various states.

In order to guarantee proper water usage, the green bench requested that the committee "set down required SOPs (standard operating

procedures)". The committee was instructed to produce an action taken report within three months and requested to build rainwater collection equipment.

According to the NGT, the secretary of the MoJS would act as the central point of contact for coordination and compliance.
It was said that the committee may convene within a week, have discussions with the relevant authorities and stakeholders, and assess the real situation before creating and carrying out an action plan for the necessary corrective steps.

All states have been declared parties to the dispute, including Uttarakhand, whose capital city's metro train construction is slated to begin soon. Prem Chand Aggarwal, the finance minister, announced the state budget for 2023–2024 on March 15 and stated that the government is "dedicated to providing a speedier transportation system" by allocating Rs 101 crore for the preparation of a detailed project report (DPR) for the metro in Dehradun.

11.49 Crore (59%) Rural Households Have Access to Tap Water

From August 2019, the Indian government has been working with state governments to execute the Jal Jeevan Mission (JJM)–Har Ghar Jal, which aims to provide every rural home in the nation with a reliable source of drinkable water via a tap connection.

3.23 Crore (17%) of rural homes were reported to have tap water connections at the time of the Jal Jeevan Mission announcement in August 2019. As of 20.03.2023, 8.26 Crore more rural homes have received tap water connections under JJM, according to reports from the States and UTs. Thus, as of 20.03.2023, out of 19.43 Crore rural households in the country, around 11.49 Crore (59%) households are reported to have a tap water supply in their homes. State/ UT–wise and year–wise details are annexed.

So far, as reported, 5 States viz. Goa, Gujarat, Haryana, Punjab & Telangana, and 3 UTs viz. A&N Islands, Puducherry, and Dadra Nagar Haveli & Daman Diu have become 'Har Ghar Jal' States and UTs respectively. The remaining States/ UTs have been advised to provide tap water connections by 2024.

Water being a State subject, it is the States who plan, design, implement, and approve the water supply projects. The government of India supplements the efforts of the State Government by providing financial and technical assistance. As such, the operation and maintenance of water supply infrastructure created under the Mission fall under the ambit of respective State Governments. Accordingly, grievances/ complaints, etc. inter alia including issues of disruptions in water supply and poor water quality are handled and disposed of at State/ UT level.

Such matters/ representations thus received in this Department so far have been forwarded to the respective State Government for taking necessary action.

Further, to assess the functionality of the tap water connection provided under the mission, the Department of Drinking Water & Sanitation undertakes annual assessments through an independent third–party agency, based on standard statistical sampling. During the functionality assessment conducted from February 2022 to April 2022, it was found that 86% of households had working tap connections.

Out of these, 85% were getting water in adequate quantity, 80% were getting water regularly as per the schedule of water supply for their piped water supply scheme, and 87% of households were receiving water as per the prescribed water quality standards.

Mayor Hakim inaugurates a drinking water project facility at Chandannagar

Mayor Firad Hakim officially opened a drinking water supply project plant at Boraichanditala in Chandannagar, which would provide continuous access to drinking water for all 33 wards of the municipality.

At a cost of Rs 60 crores, the national and state governments collaborated

to build the drinking water project over 114 kathas of land.Another drinking water supply project was established to address the demand for drinking water as a result of the development of apartment complexes, high–rise structures, and population growth.

Prior to this, high–rise buildings and flats had been told not to sink their own borewells. This drinking water project will ensure a high–pressure water supply to the high–rise apartments, said Ram Chatterjee, the mayor of Chandannagar.

Hakim, the Minister of Urban Development and Municipal Affairs and Housing said state chief minister Mamata Banerjee has given first priority to ensuring a supply of drinking water to every household, and in 12 years, 104 drinking water supply projects have been set up. With the launch of this drinking water supply project all the 33 wards of Chandannagar corporation will enjoy non–interrupted drinking water supply, he said.

Hakim added that state minister Indranil Sen who is also the MLA of Chandannagar is doing a wonderful job. He is doing his best to serve the people of his constituency.

He added that the people of the state have blessed Mamata Banerjee for her tireless efforts to take beneficiary schemes to every doorstep.

The unnecessary hue and cry raised by the opposition parties will have no effect on the common people since the people want to progress and develop. The TMC Maa Maati Manush government is the symbol of progress and development, he said.

Pune's Rs 1,300 billion water project will also reach outlying regions

Residents of Pune never had to be concerned about the availability or quality of water for decades when Pune was still a tiny city.

The quality of life is being negatively impacted from the core Peth districts to the amalgamated localities as a result of the city's expansion to incorporate 34 outlying villages due to acute shortages, insufficient supplies, low quality, and interruptions.

Vikram Kumar, a municipal commissioner and administrator, put a strong emphasis on water supply projects in his budget presentation. He allotted Rs. 1,300 crore and announced that this year, initiatives for the old city regions and the periphery will be prioritised.

In addition to expanding it to the combined regions, where inhabitants suffer every day and rely heavily on tankers for most of the year, the city administration will consider finishing a 24x7 equitable water supply project. During the Covid–19 epidemic, the project slowed down but picked up speed the previous year. 55% of the work has been completed thus far.

Abhijeet Suresh Ghone
Graduated from IIT Roorkee with a Master of Technology (M. Tech)

About the author:

Abhijeet Suresh Ghone graduated from IIT Roorkee with a Master of Technology (M. Tech) in "Environmental Management of Rivers and Lakes" in 2015. Since then, he has been working towards a career in sustainability. He has undergone roles in fields of water–wastewater design and engineering, pollution abatement of rivers and lakes, environmental management, water stewardship and sustainability topics such as water, carbon, environment, energy and life cycle assessments in different sectors globally. Currently, he is working in ESG research domain where he engages in an analysis of ESG performance of corporates. The water and sustainability are an area of passion to him.

WATER RECYCLING AND REUSE

Water Recycling and Reuse

The treatment of waste water, greywater, or other types of used water to make it usable for alternative uses is referred to as water recycling and reuse. Reusing and recycling water can contribute with resource conservation, water bill reduction, and environmental protection.

Figure 1: Water – Waste to Resource

Reusing treated wastewater is especially appealing in arid regions, those where demand is expected to increase, and those where there is a water shortage.

Why wastewater treatment is important?

According to the IWA, around 80% of all wastewater now is released into waterways around the world, where it poses risks to human health, the ecosystem, and the climate. According to estimates, the capacity to treat wastewater is now only 8% in low–income nations and 70% of the wastewater created in high–income countries.

According to the IWA, urbanisation also makes this problem worse by increasing wastewater creation and using more of the planet's diminishing resources.

In addition to eutrophication and dangers to human health, the release of untreated wastewater into water bodies greatly increases the amount of greenhouse gas (GHG) emissions in the form of nitrous oxide and methane. The amount of emissions from untreated sewage is three times that of standard wastewater treatment.

Even when treatment coverage is still insufficient, particularly in numerous new cities, the emissions from untreated sewage can account for a sizeable portion of cities' overall emissions.

In order to maintain hygiene and avoid disease, adequate sewage systems and wastewater treatment are crucial. Creating a mechanism to manage sewage and wastewater from local communities is essential. If not, wastewater can contaminate the area's drinking water supply and environment, which raises the risk of disease transmission.

Globally access to clean water, sufficient sanitation, and hygiene education can lower illness and disease–related deaths, improving health, reducing poverty, and fostering socioeconomic growth.

Unfortunately, due to a lack of funding, infrastructure, technology, and capacity, many

Figure 2: SDG 6 and Targets

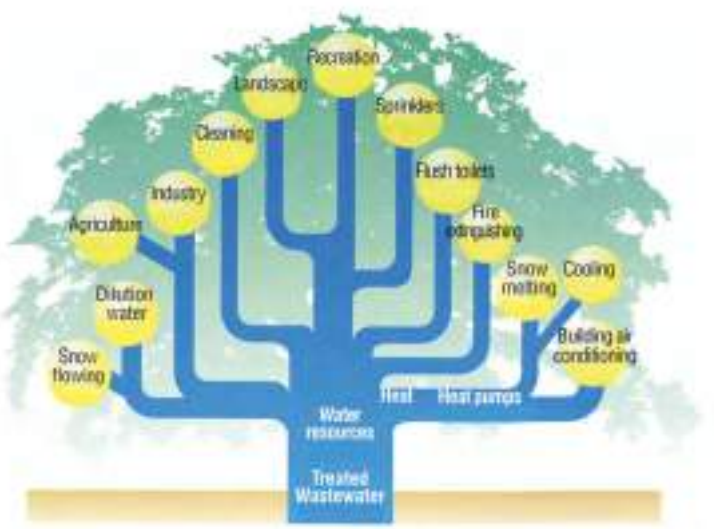


Figure 3: Water Resources Recycling Tree

More freshwater can be set aside for purposes that demand higher quality, like drinking, helping to promote more sustainable resource use.

nations do not practise proper wastewater treatment. Several nations struggle to deliver these essentials to their citizens, putting people at risk for diseases associated to water, sanitation, and hygiene (WASH).

Target 6 of the 2030 Agenda for Sustainable Development aims to ensure equitable access to and sustainable management of water and sanitation by 2030.

Methods of water recycling and reuse

Water recycling and reuse strategies include the following:

Greywater reuse	The wastewater produced by sinks, showers, and washing machines is known as greywater. Treated greywater can be used for flushing the toilet or irrigation.
Blackwater reuse	Blackwater is the wastewater produced by sinks and toilets. It is possible to treat blackwater and reuse it for irrigation or toilet flushing, however this requires more extensive and advanced treatment than greywater does.
Industrial water reuse	In order to reduce their water demand and wastewater output, industrial establishments can recycle and reuse water for their operations.
Direct potable reuse	In order to make wastewater suitable for drinking, it must be treated first with relevant stages of treatment.
Indirect potable reuse	In this method, wastewater is first treated before being discharged into a river or groundwater aquifer, then it is allowed to naturally filter through the environment before being abstracted and treated once more for drinking water.

Reusing and recycling water can alleviate water shortage problems and reduce the demand on natural resources. To prevent the spread of disease and contamination, recycled water must be treated properly and disinfected.

Requirements for Wastewater Reuse

Reusing wastewater has a variety of positive applications, including irrigation for agriculture, industrial processes, groundwater recharge, and, after extensive treatment, potable water supply. The following conditions must be met to achieve sustainable and effective wastewater reuse applications:

- Wastewater reuse's potential impact on public health is assessed and reduced;
- The particular uses for water reuse fulfill the specifications for water quality.

Prior to applying the wastewater for reuse, it must be treated to remove any contaminants and disinfected to the proper pathogen–controlling level.

Basic Principles of Wastewater Treatment

Raw wastewater must be treated to fulfil specific needs and public safety in order to be reused. This section provides some basic terminology explanations and information on wastewater treatment technology.

The three types of wastewater treatment processes are as follows:

Physical process	Screening, sedimentation, filtration, flotation, absorption or adsorption or both, and centrifugation are used to physically remove contaminants;
Chemical process	Chemical processes like as coagulation, absorption, oxidation–reduction, disinfection, and ion exchange are used to remove contaminants;
Biological process:	biological processes such as photosynthetic activity, aerobic treatment, and anaerobic treatment are used to eliminate contaminants (oxidation pond)

Categories of Wastewater Reuse

Category of reuse	Examples of applications
Urban use	
• Unrestricted	Snow melting and landscape irrigation for parks, playgrounds, school yards, golf courses, cemeteries, and residential areas
• Restricted	irrigation in remote regions with limited access
• Other	Construction, disaster preparedness, and fire protection
Agricultural	
• Food crops	irrigation for crops raised for human use
• Non–food crops and crops consumed after processing	irrigation for pastures, commercial nurseries, sod farms, fibre, flowers, seed crops, and fodder
Recreational use	Recreational fishing, boating, and other non–contact sports
• Unrestricted	Physical contact is not prohibited in lakes, swimming pools, or snowmaking
• Restricted	Recreational boating, fishing, and other contact–free activities
Environmental enhancement	creation of artificial wetlands, improvement of natural wetlands, and stream flow

Figure 4: Water Reuse – Solution to Water Scarcity

Groundwater recharge	replenishing groundwater supplies for drinking water, preventing salt water intrusion, and managing subsidence
Industrial reuse	Toilets, laundry, construction wash–down water, boiler feed water, cooling system water, process water, and air conditioning
Residential use	toilet, laundry, cleaning, and air conditioning
Potable reuse	Piped water supply blending with municipal water supply

Benefits of Water and Wastewater Reuse

Water and wastewater reuse has various benefits.

The benefits of recycling wastewater include the following:

can act as a more dependable water source and contains chemicals that are beneficial in some applications:

For instance, because droughts and other climatic factors tend to have a less significant impact on wastewater creation, the quantity and quality of wastewater may be more stable than freshwater. Wastewater can be sufficiently treated to serve a variety of needs and functions, including cooling water use and toilet flushing. Reusing treated wastewater is especially appealing in arid regions, those where demand is expected to increase, and those where there is a water shortage. Other beneficial components found in some wastewater streams include organic carbon and nutrients like nitrogen and phosphorus. Applications of fertiliser may be reduced or eliminated as a result of using nutrient–rich water for landscaping and agriculture.

Reduces the need for water treatment and consumption, resulting in cost reductions:

Reusing wastewater often results in lower costs than using freshwater since it uses less water overall, requires less further wastewater treatment, and is less expensive to comply with regulations. Advanced water and wastewater treatment may also require less infrastructure.

The amount of water consumed, both on a per capita and overall basis, has increased in many locations with ample water supplies and a growing metropolitan population. It is frequently necessary to expand the construction of substantial water resources and related infrastructure in order to meet this expanding demand.

A portion of the water demand can be met by reusing wastewater and increasing efficiency, which can also help to lessen or perhaps even eliminate the need for additional infrastructure and its associated financial and environmental costs.

More freshwater can be set aside for purposes that demand higher quality, like drinking, helping to promote more sustainable resource use.

Water reuse as an emerging solution

In regions with a water scarcity, treated wastewater offers a substitute supply of water. Wastewater that has been properly treated can replenish water supplies and close the demand/availability gap for agriculture, industry, and potable supply.

The practise of using wastewater to irrigate crops is expanding throughout Europe (Fig. 5), and it is especially well–established in Mediterranean nations like Spain, Italy, Cyprus, and Greece.

By preventing discharge to the sea, water recycling helps islands and coastal areas to utilise freshwater for longer and more efficiently. Water recycling can provide a significant contribution to supplying agricultural water needs.

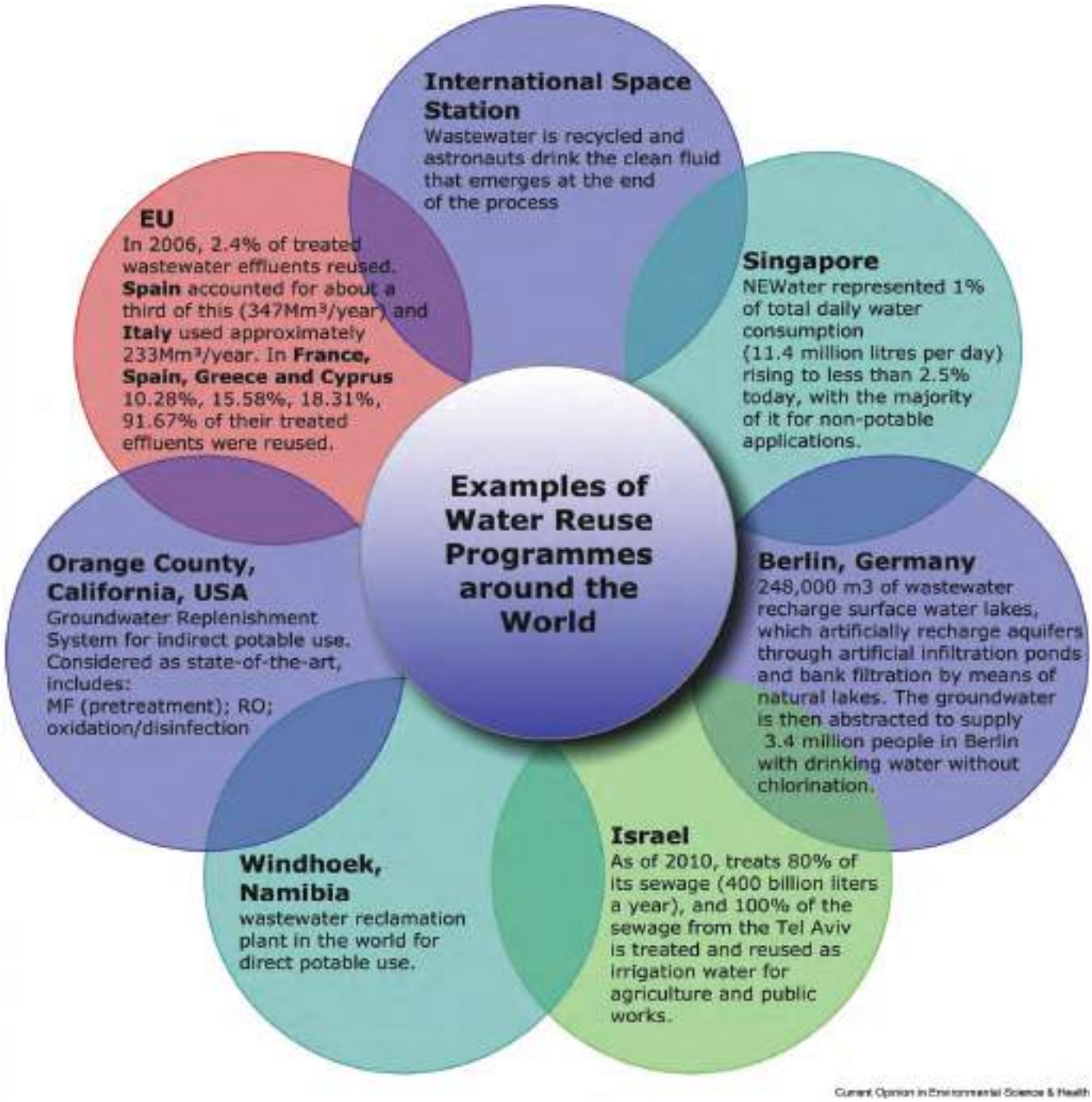


Figure 5: Water Reuse Programmes Around the World

References:

- https://innoveox.eu/contributing–to–the–un–sustainable–development–goal–6–clean–water–and–sanitation/
- WATER AND WASTEWATER REUSE: An Environmentally Sound Approach for Sustainable Urban Water Management, https://wedocs.unep.org/bitstream/handle/20.500.11822/8390/–Water%20and%20Wastewater%20Reuse_%20An%20Environmentally%20Sound%20Approach%20for%20Sustainable%20Urban%20Water%20Management–20043596.pdf?sequence=3&amp%3BisAllowed=
- https://www.worldbank.org/en/topic/water/publication/wastewater–initiative
- https://www.aquatechtrade.com/news/wastewater/wastewater–essential–guide/
- https://www.sciencedirect.com/science/article/pii/S2468584417300193

Liquiclear™
NATURALLY PURE

MEET THE
NEXT-GENERATION TECHNOLOGY
THAT INNOVATIVELY PURIFIES AND SOFTENS WATER FOR YOU.

An **advanced water purifier that retains natural minerals** essential for your body and removes harmful ions.
It helps you **save water more than ordinary purifying** systems and requires nearly no maintenance.

- **RETAINS ESSENTIAL MIERALS**
- **SAVES WATER**
- **ENERGY EFFICIENT**

A cutting-edge electric water **softener that ensures your water is chemical-free. It prevents your appliances from gathering of calcium deposits,** making them last longer, while being maintenance-free.

- **FULLY AUTOMATIC**
- **SAVES WATER**
- **REMOVES HARDNESS WITHOUT RESIN & SALT**

For more details, please contact **+91 88009 42942**
or visit www.liquiclear.in or write to us at info@liquiclear.in

Follow us :

*Terms & conditions apply

Jitendra Katre

About the author:

Jitendra Katre has been working in the development sector for various firms for more than 10 years. He has years of experience in both the government and private sectors and has led several highly esteemed Projects in different Bilateral organizations. Jitendra holds a Bachelor's degree in Civil Engineering from the University of RTMNU and is skilled in team building, strategic planning, project management, DPR preparation, Proposal Writing, Infrastructure planning, technical monitoring, and evaluation. In his career performed a variety of tasks including the design and implementation of Water supply Projects, Water Resource Developments projects, the Implementation of a holistic WASH approach in Ashramsalas, and wastewater management and Faecal Sludge management project in various geographic areas. Jitendra has a magnetic presence in the workplace and uses her positive attitude and energy to encourage others to work tirelessly toward success.

BASELINE CLUSTER APPROACH FSM STUDY FOR FIVE GPS, CHHATTISGARH

About

Fecal Sludge Treatment or Septage Management is increasingly being recognized as an effective and appropriate method to scale rural sanitation systems to achieve safe sanitation, particularly in peri–urban areas and small towns. As implementation progresses, data–based evidence is emerging, highlighting the challenges faced on the ground, and the requisite planning necessary to address them. This paper presents the findings, challenges, and possible ways ahead from a study conducted to provide data for Fecal Sludge Management (FSM) planning for a peri–urban area in the state of Chhattisgarh. With the objective of understanding the nature of containment structures and on–ground desludging practices, 2,803 households and 57% of establishments were studied in Patora Cluster, a non–sewered rural Panchayat in Durg District, Chhattisgarh, to provide evidence for effective decision–making. The study showed wide variations in the sizing and design of the containment systems, which, when combined with the irregular frequency of desludging, has implications for FSM planning by panchayat bodies. This study also highlights the methodological difficulties in studying containment systems, and the report captures the sanitation baseline information of five villages in the Durg district, Chhattisgarh. Decision–making inputs are summarized at end of this report in terms of treatment, desludging, and recommended regulations.

Introduction

Safely managed sanitation highlights the need to go beyond toilets and look into the sanitation chain, i.e. containment, emptying, transport, treatment, and reuse or disposal of fecal waste. In rural India, where sewerage systems are practically non–existent, there is a need to focus on the safe management of fecal waste generated from on–site containment systems. Some technologies, such as twin leach pits, provide on–site treatment, and if correctly constructed and operated, these can be safely emptied and reused at the household level. Other technologies, such as single pits, septic tanks (and other septic tank–like containment structures), require services for emptying and transportation of the fecal sludge to the treatment facilities for its subsequent reuse or disposal.

The indicator for measuring progress against Sustainable Development Goal 6.2 (universal access to sanitation by 2030) is the 'percentage of the population using safely managed sanitation services'. This emphasizes the need to look beyond toilets and to ensure that fecal pathogens are prevented from re–entering the environment and posing a health risk. One common pathway for re–entering fecal pathogens in the environment is the contamination of water bodies and groundwater, by means of overflow and seepage from poorly built sanitation systems. This has a strong negative impact on human health.

It is in this context that a strong case for organized fecal sludge management (FSM) services in rural areas needs to be considered. Critical factors which should be taken into account while planning and implementing FSM services include sanitation technologies deployed, the diversity of rural habitations, and the potential risk of an increase in caste–based manual scavenging.

Findings

- 93% say yes to annual payment for scheduled desludging services (and the rest 7% are mostly from the un–lined tank user group)
- 70% + respondents were willing to pay more than 250 as annual fees with a mean willing payment of INR 470.
- 62 % of new toilets were exclusively built under the SBM scheme whereas an additional 20% were a mix of SBM+ individual contribution
- Gram panchayat does not own any desludging truck and operation is currently totally demand–driven and served by the remotely located operator, resulting in substantial charges paid on serving every request
- Around 60 % of families are engaged in farming (as a primary or secondary source) and own animal livestock. This indicates a good market opportunity for co–composting along with processed sludge.
- Patora Gram panchayat has one of the good revenue collection records as compared to other GPs of the state in the last five years. This makes them more eligible towards taking care of efficient treatment technology with limited fund reliance.

Result and Discussion

Components	Description	Service Gaps	Action Area
Capture	After the successful implementation of the SBM scheme in the project area; a significant number of houses had built/ upgraded their toilet by either completely relying on Gov. funding support or adding their contribution to upgrade the existing tank. 62% of the toilet were built and upgraded under SBM.	Everyone has access to the toilet. This is achieved. **Status – Very Good.**	Awareness would need to be continued towards making suitable tanks in every new construction.
Storage	Around 43 % houses of in the project area are using unlined tanks whereas 57 % use lined tanks. Only 29% of houses are using the septic tank as containment. The mapping of individual containment types and size are presented in section 3.1	Around 43 % of toilets are still unlined and need considerable effort to convert them into the lined tank. Around 26 % of lined toilet also needs to be converted into septic /Balram tank with tank partition. **Status – Good**	All unlined tank needs to be eventually converted into the lined tank. All such conversions should ensure partition in the tank to make this equivalent to a septic tank to better serve the purpose. Similarly, all existing lined tank also needs upgrade with a partition wall.
Transportations	Transportation is currently completely demand–driven and works as on–call requests to the private operators and Utai Nagar panchayat. However, the survey result highlights huge willingness i.e. around 93% of houses towards scheduled desludging services. More than 70% were also in the opinion to pay more than 250 INR as annual FSM cess. This is a good sign to adopt this in form of regulatory reforms and implement this for the entire project area.	Currently, this is limited to around 7–8 requests per month. Around 2500 per trip is being charged for tank cleaning. Longer commuting distances and limited demands are the main reasons for charging higher tariffs. Desludging tariffs need to be significantly reduced with local/nearby service providers for the promptness in action. **Status – Average**	Patora gram panchayat needs to have a 3.5 KLD truck to serve the proposed scheduled desludging operation. Regulation needs to be also approved by Gram panchayat to ensure the legal enforcement of yearly cess of FSM and cleaning of the tank every 3–4 years.
Treatment	There isn't any existing sludge treatment practice, and this is currently being dumped in the outskirts/outer drain and sometime in farmland on individual request.	Treatment is completely unserved and would need urgent consideration in this regard. **Status –Poor**	FST plant needs to be set up at identified land parcel. It would be good to give consideration to co–treatment and limited manpower requirements of plant operations.
Safe disposal/ Re–use	This is currently not in practice because of the complete absence of treatment coverage in the sanitation chain. Mostly this is being dumped at the main drain of B.S.P and sometimes at the designed dumping yard in Utai panchayat.	From the survey result it was found that around 24 % family are using organic manure as part of their various uses and around 60% have families have shown a willingness to buy the organic manure produced from an FSTP plant (combined processed from sludge + organic waste) **Status – Poor**	The proposed FSTP should have the option of co–treatment. Phulera rural set–up would help to get the required organic waste from farm crops leftover, livestock, and household segregated food waste. A solid organic waste collection tricycle can be also clubbed with plant operations.

Conclusion

The outcome of the study would be to assess the current sanitation and propose interventions that are appropriate and contextual that can bridge the gaps, especially in fecal sludge treatment and reuse.

The learnings from the study point to a series of checks and steps that need to be taken to achieve and sustain SDG 6. Providing access to toilets, which government programs such as Swacch Bharat Mission have kickstarted, and inculcating/ensuring their use which has been emphasized earlier as well, is only the beginning.

The wider mandate of the SDGs, which includes the treatment of wastewater, requires practitioners, planners, and administrators to broaden the scope of sanitation.

This paper highlights the need to pay more attention to containment systems, a part of the chain often ignored. More work needs to be done to devise methods and practices to ensure that new containments are built to a standard, and those old ones are retrofitted. Further, it is necessary to understand the implications of containment systems for FSM planning to avoid over–estimation of capacities.

The report findings are expected to serve as the basis for detailed design solutions for the efficient treatment coverage of the study area.

Acknowledgements

I would like to express my heartfelt gratitude to my academic advisor, Dr. Vaishali Pendse, and Dr. Debabrata Mukhopadhyay who encouraged and motivated me to develop this project and provided constant guidance throughout its development.

References

- Strande, L., Ronteltap, M., Brdjanovic, D. Faecal Sludge Management (FSM) books– system Approach for implementation, (Eds.) (2014).
- Reeba Devaraj and Rajiv k. Raman, Planning Faecal Sludge Management Systems: Challenges Observed in a small town in Southern India Research, vol. 281, 2021, pp. 111811.
- BIS 2470, 1985a. Indian Standard Code of Practice for Installation of Septic Tanks. Government of India.
- BIS 2470, 1985b. Code of Practice for Installation of Septic Tanks Part II– Secondary Treatment and Disposal of Septic Tank Effluent. Bureau of Indian Standards, New Delhi.
- CPHEEO, 2013. Manual on Sewerage and Sewage Treatment. Ministry of Housing and Urban Affairs, Government of India.
- Schedule VI, for discharge of effluent in the public sewer. cpcb. nic. in (online)
- A Baseline Study to Assess Faecal Sludge Management of Residential Premises in Selected Southern Cities of Bangladesh, 2014. www.snvworld.org/bangladesh

Dave Purkiss

Vice President, NSF International

Dave Purkiss currently leads NSF International's Global Water Systems providing testing, inspection and certification services.

Marcos Bensoussan

Director Water Division – LATAM – NSF

Marcos Bensoussan has been working on the water theme for over 48 years. Specialist in water treatment, industrial processes, automation and people management.

Vincent Boks

Managing Director EMEA, Water Division, NSF

Vincent Boks is responsible for the EMEA Water operations; building and leading high–performing teams; meeting customers' needs; identifying growth opportunities and acquisition targets; contributing to the development of divisional strategic plans; developing regional NSF programmes; etc.

HOW THE WATER INDUSTRY CAN ACCELERATE CHANGE

Globally, we are on a tight schedule to get our planet moving in the right direction regarding the climate crisis. While the COP (Conference of the Parties) meetings are working to collaborate and design a plan to contain the threats at hand, we still lack major negotiating deadlines. With World Water Day 2023 coming up on March 22 with the theme of "Accelerating Change", the day urges individuals to recognize how they consume and manage water in their lives and make necessary changes to help utilize it better.

The water industry has an opportunity to play a leading role in reducing waste and contributing to water reuse while our global leaders continue to work out a plan. Proactive changes can help improve a utility's environmental footprint and prove its commitment to sustainability to stakeholders. Ranging from embracing recent technology, reducing the resources they use, and recycling water, water utilities can decrease their carbon footprint to help improve the climate.

Reducing Energy Consumption

According to Huber Technology, recycling heat energy from wastewater can reduce heating and cooling costs by up to 80%. Most sewer systems maintain a temperature between 10 and 20°C throughout the year which can be used with a heat exchanger and heat pump to provide heat in the winter and cooling in the summer.

In addition to using geothermal systems, companies can also reduce their energy consumption by generating their own renewable energy, such as solar, wind, and hydropower. This sustainable technology requires low maintenance costs, which is a double win for plant operations. With water utilities being a main component of our critical infrastructure, it is imperative that they are energy independent. Providing clean drinking water to communities is mission–critical, especially if the infrastructure is threatened by any outside source. These allow utilities to better control the quality and availability of water to their communities.

"With the way that we are moving globally towards more sustainable energy options, the water industry should lead the way by reducing reliance on fossil fuels," states Dr. John Shan, Senior Director of NSF China. "The amount of energy and money saved through these options only compounds over time."

Utilizing Water Sensors

According to Usbr.gov, only 0.5% of the earth's water is fresh water. By installing leak detection solutions, municipal water companies can operate more efficiently and reduce their water use. This concept is exemplified by a water utility in Utah that installed a leak detector and saved 100 gallons of water per minute by identifying seven pipe leaks. In addition to the imperative water savings of leak NSF Confidential detections, it helps reduce the considerable amount of time and energy to effectively turn water into potable water for communities.

Dave Purkiss, Vice President of NSF's Global Water Division, states, "Water is our most precious resource. Considering the massive amounts of water our industry works with daily, and according to the EPA, an average water loss of around 16% in the US, it is our responsibility as an industry to be on top of leaks to help conserve water and energy wherever we can."

Recycling Water

Water reuse systems treat grey water from sinks and washing machines so they can be reused for applications that don't require drinking water such as flushing toilets or watering gardens. Many systems are available for use in homes and in commercial businesses. Using grey water for non–potable uses can be a lot cheaper than purchasing potable water. This is due to the reduced energy consumption required to transport water, especially to drought areas, on top of reducing the time and treatment needed to run through the drinking water distribution system again.

"There are many areas not only in Latin America but around the world that are experiencing extreme droughts," states Marcos Bensoussan, Senior Manager of LATAM Water, NSF. "While water reuse may seem to many people a new idea right now, in a few years, it will be as common as recycling paper and bottles. We will wonder why we were not doing it sooner."

Water Reduction Education

The water industry has a credible and trusted voice in guiding the public to adjust their water use to help positively impact our water usage. Things like watering the lawn in the morning or evening, fixing household leaks, and composting food waste instead of using garbage disposal are all simple things we can educate the public on. While it may seem that minor changes like these will not make a massive impact, they do. For example, the EPA (Environmental Protection Agency) states that the average American's shower lasts eight minutes on average, using 2.1 gallons per minute. That is over one trillion gallons of water across the U.S. used each year. If everyone cut down their shower by half, we could save approximately 91,000 Olympic–sized swimming pools of water per year!

Vincent Boks, Director of EMEA Water, NSF states, "This concept really goes back to the idea of changes compounding impact over time. Fixing the water crisis is a global effort that we are all responsible for." World Water Day is an important day to recognize what we can all do as we continue working towards a sustainable future. Promoting the idea of sustainable living to our communities will help us make meaningful progress towards reducing water use and make a significant contribution to the health of our planet. Now is not the time to wait for politicians to solve the crisis but rather to act and help "Accelerate Change." Find out how you and your organization can get involved by visiting WorldWaterDay.org.

JAI MAA ASSOCIATES
ENGINEERS & CONTRACTORS

JAI MAA ASSOCIATES Engineers & Contractors providing services to Military Engineering Services for last two decades

Pre-Engineered Building & Infrastructure	Electro-mechanical utility services
Water & Wastewater Treatment Projects	Low Tension Electric Works
Sewage Disposal and Water Distribution Network	Incinerators

JAI MAA ASSOCIATES
ENGINEERS & CONTRACTORS

JAI MAA ASSOCIATES

Shop No. 33 Gopinath Bazar, Delhi Cantt - 110 010
M.: +91 98111 88819, Fax: +91 11 2568 2346, E.: jaimaaassociatesdelhi@gmail.com, jaimaa98@gmail.com, info@jaimaaassociates.in

Anil Sethi
Chairman, Pump Academy Private Limited

About the author:

Anil Sethi is the Founder Chairman of Pump Academy Private Limited. With deep knowledge of water sector, he has established the company to provide innovative solution to water utilities for making pumping stations technologically advance, automated and responsive with robust processes. He is a well–recognised industry captain, conferred with numerous awards for his significant contribution towards nation building.

SMART PUMPING TO SECURE WATER SUSTAINABILITY

Globally, over 2 billion people lack access to safely managed drinking water at home. The latest data from WHO and UNICEF on access to clean water, adequate sanitation, and hygiene also reveal that 8 out 10 people who continue to lack basic drinking water services live in rural areas. In 2015, the world leaders committed to United Nations' Sustainable Development Goal–6 that envisages creating facilities for safely managed water and sanitation for everyone by the year 2030. Clean water and sanitation is integral to achieve a safer world which was reinforced further by the coronavirus pandemic. Almost halfway mark on the SDG–6 commitment, the target is tracked and found that the governments must work on average four times faster in the remaining half period to meet this goal on time.

Inadequate management of urban water supply with run down machineries and distribution networks significantly compromises the drinking–water facilities of hundreds of millions of people with dangerously contaminated water. When water comes from improved sources of smartly managed water supply system, people spend less time and effort in collecting it, meaning they can be productive in other ways. This can also result in greater personal safety and improved economic activity. Better water sources also mean less expenditure on health, as people are less likely to fall ill and incur medical costs and are better able to remain economically productive.

The theme of World Water Day this year highlights a different aspect of freshwater. UN has suggested a theme – "Accelerating the change to solve the water and sanitation crisis" for World Water Day 2023. It places the focus on working expeditiously to make safely managed drinking water from an improved water source that is located on premises, available when needed, and free from faecal and other contamination. This task needed an approach which is smart and intelligent embedded with technological intervention in creating sustainable water infrastructure while making the existing water resource and supply system robust and resilient. Pumping system, an essential part of the water supply scheme plays an important role towards water sustainability.

Pumping Infrastructure

Pumping system is an integral part of water infrastructure that enables the utilities to achieve and maintain compliance with safe drinking water while limiting water losses in the distribution network. Smart pumping system improves security, scalability, and longevity of water infrastructure. Water utilities are actively looking for technological support for smart management as inefficiency of pumping systems has become a big concern.

Growing population and rapid urbanization combined with increasing economic development in India, has given rise to the demand for pumps and pumping systems across different sectors. The use of pumping systems is widespread, ranging from municipal

Similarly, they help in pumping sewage and regulating the process of sewage treatment and management. There are instances of focussed development in advance pumping system installation and management in Indian cities.

Water Pumping Station

It converts the dynamic performance of machines into running parameters by linking electrical, mechanical, and hydraulic factors.

Water Pumping Station

Water Pumping System for Drinking Water Supply

water and wastewater management to sectors such as power, chemicals, pharmaceuticals, textiles, and oil and gas. Pumping systems not only ensure the smooth functioning of operations but also accelerate and enhance processes by improving pressure and filtration.

With ever increasing demand of safe water and higher productivity, the need for technological intervention in water distribution network including pumping systems is expected to grow. To ensure efficiency and keep up with changes, it is essential that water utilities in India should remain updated with technological advancements while maintaining sustainability.

In the water and wastewater sectors, pumps provide a regulated supply by pumping water from low levels to high levels. Similarly, they help in pumping sewage and regulating the process of sewage treatment and management. There are instances of focussed development in advance pumping system installation and management in Indian cities. In order to develop sewage collection and treatment facilities as well as drainage and water supply

systems in Tamil Nadu, in December 2022 the central government has signed an agreement with the Asian Development Bank for a loan worth $125 million. This loan will provide support for the development of two sewage treatment plants in Coimbatore and also include the installation of 14 pumps and lift stations, laying of 529 km of sewage collection pipeline and the construction of 14 km–long sewage pumping mains.

Government of Punjab has also sought financial assistance from the centre under PM–KUSUM scheme to facilitate solar–enabled agricultural pumps of up to 15 horsepower capacity in the state.

Technological Intervention

The Covid–19 pandemic has changed the entire landscape of business activities. Companies are forced to implement digital technologies and adopt relevant strategies in order to be more acceptable and remotely manageable. Adapting to the digital transformation will be an important factor for the sustainability in the post–Covid era.

India has been witnessing high level of industrial and infrastructure growth in the past few years due to special focus of the government with matching policies and investment. The massive growth in infrastructure development, many sectors such as domestic buildings, commercial buildings, industries and water utilities are becoming highly dependent on water pumping systems in their daily operations. For routine activities, pumps need to be resistant to failure with high capacity for smooth and fast functioning. Traditional pump systems are often prone to leakages and require human intervention.

In order to ensure higher efficiency in operations, there is a need to integrate advance technologies into pump solutions that can help operators' measure pump performance. This will help in improving productivity, saving energy and delivering the desired output. Internet of things (IoT) is an emerging digital solution in the smart infrastructure sector. The integration of IoT in pump solutions has helped in developing a human–machine interface that allows the operation of pumps

Water Pumping System

in real time with reduced human effort. Smart sensors that integrate embedded sensors and external sensor arrays are an example of this technology. IoT's interconnectivity facilitates the creation of a network of devices equipped with smart solutions, thus enabling an ecosystem of wireless connections across a facility.

iPUMPNET

After comprehensive research and development, Pump Academy Private Limited has introduced a smart pumping solution based on IoT frameworks called iPUMPNET, which aims to increase energy efficiency and overall improvement in pumping stations management. This technologically advance and complete automated system facilitates water utilities with real time monitoring through an intuitive dashboard interface accessible on website and mobile applications.

It helps streamline processes and improves efficiency of pumping stations with seamless connections between applications, legacy data, analytics and functional reporting with centralized monitoring system that helps authorities with deep insights and remote evaluation. It converts the dynamic performance of machines into running parameters by linking electrical, mechanical, and hydraulic factors. It also gathers real–time pump health data and issue alerts to predict and detect potential risks and pump failure.

Benefits of iPUMPNET:

- It improve pumps operational efficiency by 35%, reduce energy cost by 40%, extend the life of pumping systems by 50%, reduce life cycle cost (LCC) of pumping stations by 40%
- It practically eliminates unscheduled breakdowns and maintenance
- The return on investment on iPUMPNET can happen within a year
- Provide vital insights about maintenance, repairs, and upgrades, ensuring the pumps always operating at its best
- It helps in environmental sustainability by reducing carbon footprint of a pumping station
- It enhances worker safety by reducing risk of accidents
- Estimated 5 GW of energy could be saved if iPUMPNET is implemented across all water pumping stations in India, among other significant deliverables.

Way Forward

Pumps are essential components that facilitate operations in almost every industry. With ever increasing demand of safe water and enhanced productivity, the need for technological intervention especially use of IoT technology in pumping system is expected to grow. To ensure efficiency and keep up with changes, it is essential that water utilities in India should remain updated with technical advancements while maintaining sustainability.

Concept Of Water Budgeting

Sarang Kulkarni

Subject Matter Expert (Water Resources), Bharatiya Jain Sanghatana (Bjs)

Backdrop:

On account of climate change effects, increasing population, and increasing demand for water from different sectors, water resources are becoming more vulnerable. The mindset of people towards ownership of the water is again a serious issue, where most people think that water is their private property. The water is being used without any control. The supply–side approach is used extensively while planning and implementing soil and water harvesting interventions. Against this backdrop, the wise management of available water resources with the supply side and demand side management of the water resources has become the need of time.

Water Budget:

The water budget mostly works on the principles of operating the Saving Bank Account opened in any bank. In bank accounts, we save amounts whenever possible and we withdraw the amounts as per requirement. However, while doing so, we generally consider our present and future needs and then withdraw the amount. But, in no case, we can withdraw an amount more than our total savings in the account. The more amount we save in the bank account the more interest we can earn. A zero balance in the bank account means zero interest in the bank. The water we get every year through rainfall/ precipitation in the form of runoff, groundwater and surface water, and soil moisture are worked like our savings and the water required for drinking, domestic use, agricultural use, commercial use, industrial use, etc. work as our withdrawals from the water bank.

A water budget is a measure of the amount of water entering and the amount of water leaving a hydrological system/cycle for a set period. It is the process that mainly assesses the volume of available water in the form of surface water, groundwater recharge, and soil moisture. It also calculates the water required for different needs like humans, livestock, and agriculture throughout the year and finally, action plans are developed to recover the deficit of water if there is a gap between the water available and the water required. In short, the water budgeting tool helps communities to understand the amount of water available for different uses and plan their water needs, mainly drinking water and cropping patterns, within the available amount of water in the watershed area/villages.

Water budgets commonly go well beyond the quantification of available water and identification of its locations in the watershed/ village. Understanding the flow dynamics of water in the watershed/village is a key aspect of the water Budget. The origin, the movement, and the interactions between soil moisture, surface water, and groundwater are studied in water budgeting. The water cycle, evapotranspiration, groundwater, surface water flows, and inter–basin transfers (import and exports), etc. are taken into account while preparing the water budget.

Need of Water Budget:

- To know the availability or shortage of water for drinking/ domestic/agriculture/ industrial/ ecological purposes and to plan accordingly.
- To create awareness among the water users about water availability, water requirement, and ways of effective and efficient use of water for different purposes.
- To plan and develop water resources within watersheds/villages.
- To maintain the balance in the ecological system.
- To promote sustainable management of green water, surface, and groundwater through the active participation of stakeholders at different levels.
- To facilitate a shift from intensive irrigation–based cropping systems to low water–intensive crops

- To achieve localized SDG Number Six

General information required for Water Budgeting:

The following information is required for water budgeting.

- **Weather information –** Rainfall, temperature, humidity, evaporation, evapotranspiration, etc.
- **Topographic information –** Slope of land, soil type, and geohydrology of the watershed. Census data like population, livestock number (Cow, Buffalo, Ship, Goat, Poultry, Etc.),
- Agriculture information for example cropping pattern, an area in acre or hectare under different crops, land under irrigation in acre or hectare, barren land area in an acre or hectare, etc. Availability of water resources in the watershed for example number of waterbodies (storage/ harvesting tanks, percolation tanks, cement nala bund, earthen nalla bunds, etc.) with its dimensions to calculate the capacity. Industries working in the watershed region (if any) have to be studied and understood for qualitative water budgeting. Various maps like Toposheet, Contour maps, Soil maps, Present Land use maps, proposed land use maps, Cadastral maps, Maps showing proposed land treatments and drainage line treatments, etc. are required for water budgeting. The participation of the community in the process of water budgeting is key and accordingly, the community should be motivated and oriented. Once the community comes to know whether they are part of a water surplus/deficit watershed/village they may prepare to undertake necessary actions to use water effectively and efficiently. It is expected that the village/ watershed community shall practice displaying the total water budget at the common community platform in the village.

Generally following data is required for water budgets of the watersheds/ villages.

Sr. No.	Particulars of Information
1.	Name of the Watershed/ Village
2.	Number of watershed/ Census codes of Village
3.	Name of Block and District
4.	Present Population
5.	Average annual rainfall(mm)
6.	Cattle population (Cows, Bullocks, Buffalos, etc.)
7.	Ship/ Goat Population
8.	Chicken/ Hen / Cock population
9.	Number of cottage industries / small enterprises
10.	A watershed area having a slope of more than 20%
11.	A watershed area having a slope of 5% – 20%
12.	A watershed area having a slope of less than 5%
13.	The area under Forest (ha)
14.	Farm Pond (no)
15.	The area under Social forestry (ha)
16.	Afforestation and grassland development by Agriculture Department (ha)
17.	Contour Bunding (ha)
18.	Contour Trenching (ha)
19.	Terracing (ha)
20.	Earthen Nalla Band has a catchment of 10 – 40 ha (numbers)
21.	Earthen Nalla Band has a catchment of 40– 80 ha (numbers)
22.	Earthen Nalla Band has a catchment of 80–500 ha (numbers)
23.	Farm Pond (30m*30m*3m (no)
24.	Farm Ponds (100*100*3m (no)
25.	Sunkan Pond (no)
26.	Recharge pit (no)
27.	Cement Nalla Band (no)
28.	Village Pond (no)
29.	Percolation tank (no)
30.	Other if any

Components of the Water Budget:

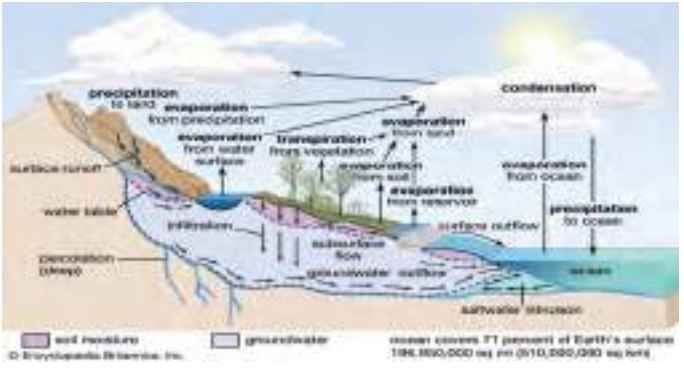


Fig.1 Water Cycle (Ref. https://www.britannica.com/science/water–cycle)

The most basic equation for water budget is based on the hydrological cycle, where water moves from the atmosphere to the different destinations on the surface of the earth and finally back to the atmosphere.

$$P = I + ET + R$$

Where, P= Precipitation, I= Infiltration, ET= Evapotranspiration, R= Runoff

Precipitation:

Precipitation is a major input to the water budget under natural conditions. We receive precipitation in different forms. Precipitation is the process of transforming water vapor into a liquid or solid form, depending upon the temperature of the air near the clouds. The term precipitation is a common term. It includes a variety of forms of precipitation. It includes mist, rain, hail, sleet, and snow. The terms precipitation and rainfall are

always used synonymously. Precipitation mainly depends on the water vapor present in the atmosphere. When the air temperature is well below the freezing point, clouds may form tiny ice crystals. Rainfall is the most common form of precipitation occurring in almost all parts of the world. In tropical regions, precipitation is expected completely as rainfall. In the polar regions, precipitation is expected to be complete as snowfall. In mid–latitudes, at high altitudinal zones, precipitation occurs as snowfall, sleet, and ice. All these are called forms of precipitation.

Interception:

Interception is the process of retaining water on the leaves of vegetation. A small amount of rainfall is intercepted by vegetation. Interception can amount to up to 15–50% of precipitation, which is a significant part of the water balance.

Evaporation:

Evaporation is the process of converting a liquid (or) solid into a gas, through the transfer of heat energy. Heat energy can convert water mass (or) ice into vapor. Evaporation occurs more rapidly when there is an increase in temperature and also the flow of wind. It also depends on the boiling point and vapor pressure. A temporary increase in temperature results in increased evaporation and also increased precipitation. Water gets evaporated more rapidly in dry air.

The following are the factors affecting evaporation.

- Air Temperature
- Relative Humidity
- Incoming radiation
- Wind speed
- Duration of bright Sunshine
- Geomorphic conditions of the region.

The amount of water getting evaporated from a free water surface is measured using evaporimeters or pans.

Transpiration:

Transpiration is the process of releasing the water absorbed by the plants through their root system after utilizing the nutrients for building their tissues, in a specified time. Vegetation including numerous growing plants plays a significant role in the hydrologic cycle.

The water which is drawn into the plants' rootlets from the soil moisture, owing to osmotic pressure moves up through the plant stems and leaves. Through the stomatal openings, the water is released as water vapor. The amount of transpiration depends on the density and size of the vegetation existing in the place. The amount of water used for irrigating the crops gets transpired into the air. Transpiration is dominant during the growing season of crops in agricultural lands. Most of this happens during day time when photosynthesis is active in plants. Transpiration is limited due to the shortage of soil moisture in some places.

The controlling factors of transpiration are:

- Temperature
- Solar radiation
- Wind
- Soil moisture.

The total water loss due to evapotranspiration is known as evapotranspiration.

Runoff:

Runoff is the quantity of water that is discharged ("runs off") from a drainage basin during a given period. The term runoff refers to the overland flow of water, after every rainfall or snowmelt. The overland flow starts when the rate of rainfall is greater than the rate of infiltration of the soil and increases in the amount of slope.

Following are some of the factors that affect the runoff in the watershed.

- The topography of the watershed/ village
- Shape of the watershed
- Drainage Network in the watershed and its minimum and maximum length
- The soil type and depth of the soil
- Vegetation cover
- Rainfall – Intensity
- Duration of Rainfall.
- Distribution of Rainfall.
- Direction of Storm Movement.
- Soil Moisture Conditions.

Infiltration:

Infiltration is the downward percolation of rainwater into the soil horizons. The downward movement of water happens in the top soil layer, especially through the smaller pore spaces present in the soil. Infiltration is governed by two forces gravity and capillary action. The smaller pores offer greater resistance to gravity, very small pores pull water through capillary action in addition to and even against the force of gravity. The rate of infiltration varies from soil to soil. It depends on the hydrologic properties of soils, like porosity and permeability. The process is also known as percolation. The percolating rainwater ultimately reaches the groundwater zone. The process of infiltration happens only when there is space available for the addition of water within the soil surface. This depends on the porosity of the soil and the rate at which previously infiltrated water can move away from the surface through the soil.

The maximum rate at that water can enter into a soil layer in a given subsurface condition is known as the infiltration capacity. Infiltration rate in soil science is a measure of the rate at which a particular soil can absorb rainfall or irrigation. The rate decreases as the soil becomes saturated. If the precipitation rate exceeds the infiltration rate, a runoff will usually occur unless there is some physical barrier.

Following factors affects the rate of infiltration.

- Porosity and permeability of the soils
- Structure and texture of the soils
- Surface entry possibilities of the soils

- Transmission through the soil
- Already available soil moisture and its depletion
- Characteristics of the fluid.

Base Flow:

The rainwater that is falling over the ground surface percolates down through the soil and reaches the groundwater zone. Depending upon the groundwater ecosystem i.e. geology and rock openings, for example, fractures/ joints, etc, groundwater table, and aquifer characteristics, the groundwater comes out of the aquifer and contributes to the rivers, lakes, or oceans. This flow of groundwater is known as base flow. It depends on the hydrologic properties of rocks forming the groundwater systems.

Major Units & Conversion Factors for Water Budget:

1 hector area = 2.5 acres
1 hector area = 10,000 sq. meters
1 acre = 40 are
1 Cubic meter water =1000 litre
1 Ha mm water = 1 ha x 1 mm = 10 cubic meter water
1 TCM = 1000 cubic meter water = 1,000,000 litre water
1 Ham = 1 crore liter water

Calculating the water budget of the watershed area/ village:

Sr. No.	Particulars	Remarks
1.	Water Receiv ed from Rainfall of the watershed area/ village in cum = Total area of watershed/village (Ha) x Average annual rainfall (mm) x 10	
2.	Water available in the form of Soil moisture which is also known as Green water (30% of serial number 1) = ……cum	The proportion of 10% groundwater recharge depends on the geography and geology of the area as well as soil profile and soil infiltration rate. These factors are necessary to be considered to finalize this percentage. The excess or shortage of the percentage of groundwater recharge can be adjusted with surface runoff)
3.	Water available in the form of Groundwater (10% of sr. no.1) = ……cum	
4.	Water available in the form of surface runoff (25% of Sr. no.1) = ……cum	
4.	Water lost due to evaporation (35% of sr. no.1) =…… cum	
5.	Gross water available in the watershed = Water received from rainfall – (water loss due to surface runoff + water loss due to evaporation) + water received from the canal or inflow from the upstream watershed area.	
6.	Water required for domestic use = Population x 55 lit. per day x 365 days / 1000 = ———————— cum	
	Water required for livestock = Livestock no x 35 lit per day x 365 days /1000 = ———————— cum.	
	Water Required for Agriculture	Should be calculated by the types of crops that are taken in sharp, rabi, and summer crops and their water requirement. The water required for perineal crops should also be taken into account.
7.	Runoff that can be harvested in existing watershed treatments. (This should be calculated by knowing the area under different treatments and several various soil and water harvesting structures.	Pl. check the table given on page number 10 for more details.
8.	Total Runoff available for harvesting = water available in the form of surface runoff (cum) – total water harvested with the help of different structures in watershed area (cum)	

Runoff that can be harvested with existing watershed treatments:

Sr. No.	Type of Intervention/ Treatment	Potential water harvesting per ha / number
1.	The area under Forest (ha)	0.224 TCM /ha
2.	Forest Pond (no)	2.00 TCM / No
3.	Afforestation and grassland development by Agriculture Department (ha)	0.224 TCM /ha
4.	Contour Banding (ha)	0.45 TCM/ ha
5.	Vegetative Contour Banding	0.45 TCM/ Ha
6.	Contour Trenching on 0–4% slope (ha)	0.27 TCM/ ha
7.	Contour Trenching on 4–8% slope (ha)	0.318 TCM/ha
8.	Terracing (ha)	1.512 TCM/ha
9.	Earthen Nalla Band has a catchment of 40–80 ha (numbers)	3.00 TCM / No
10.	Earthen Nalla Band has a catchment of 80–500 ha (numbers)	6.00 TCM /no
11.	Farm Pond (30m*30m*3m (no)	2.196TCM/No
12.	Farm Ponds (100*100*3m (no)	28.236 TCM/No
13.	Sunkan Pond (no)	0.90 TCM/ No
14.	Recharge pit (no)	0.60 TCM / No
27.	Cement Nalla Band (no)	8.00 TCM / No
28.	Village Pond (no)	10 TCM / No
29.	Percolation tank (no)	20 TCM/ No
30.	Other if any	–

About the Author:

Sarang Kulkarni is a Seasoned Hydrogeologist with 8 + years of experience working with sector team members to support new business development activities and pursuit of strategic engagements with target water stakeholders for sectoral development. Core experience in Watershed Development and Management, Aquifers Mapping, Geological / Hydrogeological Surveys, etc.

22 MARCH

WORLD WATER DAY

WAKE UP, INDIA

BUT, WASH YOUR FACE WITH LIMITED WATER!

Mr Prabhat Pani
Executive Director - Centre For Innovation In Sustainable Development, SPJIMR

The new IPCC Report, coincidentally released to time with the **World Water Day**, has reiterated with evidence what we knew all along – that human-caused climate change is already affecting many weather and climate extremes in every region across the world. The report also highlights that the effects of climate change upon India, with its large coastline, will be disastrous on multiple fronts, including on those related to water.

Rapid urbanisation in India brings its own challenges too. Nearly **400** million live in urban India, in **8000** cities and towns. Cities will remain at the forefront of economic growth, with nearly 75% of India's projected GDP by 2030 (cited by CBRE and CREDAI). The NITI Aayog projects that the demand for water will be double of supply by 2030.

While these issues are important, it is necessary to understand that there are even broader issues in India related to water consumption and supply. These need to be debated, solutions to be arrived at (sometimes requiring significant change in policies), and most importantly, implemented speedily.

The India Water portal says that Agriculture currently consumes **83%** of fresh water. This is way too high, vis-à-vis other countries that are predominantly agricultural and in a tropical zone (countries like Indonesia / Vietnam / Bangladesh, based on FAO figures). The answers to tackle this phenomenon are not easy – it may mean moving water-heavy crops (such as rice) away from current water-deficient growing areas (Punjab/Haryana) to water-plenty ones; extensive use of water conservation measures such as drip irrigation (has been used successfully even in mango orchards around Diu, in coastal Gujarat). Lastly, even though it may not be politically easy, the urgent need to charge for water use, even in agriculture.

The NITI Aayog report states that only 8% of rainfall is captured for storage in India, allowing the bounty of the monsoon flow into the oceans. This dismal picture requires an accelerated effort at building awareness, and on building capacity in the community on collecting and conserving rain-water using harvesting/storage structures across the water chain (check-dam repair & rejuvenation, pond deepening-renovation, open well-recharge, widening of bunds-nallahs, river basin treatment, etc.). That it can be done at scale has been shown by the Aamir Khan-founded Paani Foundation's efforts a few years back at community-mobilisation and awareness creation in rural Maharashtra.

Such efforts also need to build awareness around tackling reduced ground water recharge – destruction of aquifer catchment areas, and deforestation are causing this in rural India, with the situation exacerbated through lack of investment and monitoring of watershed development. In urban pockets, the primary causes are paving in cities, and lack of uniform regulation across the country to ensure rooftop water harvesting, and storage. Projects like 'Green', near Gurugram, show that pockets of green in urban pockets can be created through the efforts of citizens.

Despite the abundance of rain, India has a very low per capita water storage capacity **(India 190 m^3 vs. Australia 3245 m^3, USA 2287 m^3)**, and a highly skewed distribution of storage (**60%** reservoir capacity in only 5 states). Given that large storage projects have significant

impact upon the ecology, and people, the solution is to have a large number of smaller water storage reservoirs, wherever the terrain, and population density allows. This should ideally be taken up by the communities themselves, both in the creation of the storage, and in management thereafter.

The current status of water reuse and recycle in India is poor. In urban pockets, it is imperative that the piped water supply needs greywater collection, treatment and reuse, in agriculture, horticulture, agroforestry, plantations, industry, etc. Even the Building regulations in India do not mandatorily require building societies to necessarily possess a greywater collection, treatment and reuse facility. The World Economic Forum says that Singapore is able to reuse and recycle up to 900 million litres of wastewater daily, nearly

40% of daily consumption. We have to realise that India no longer has the luxury of not emulating Singapore.

While the Jal Jeevan Mission, announced by Govt of India, is a laudable scheme, it has the scope to be made more effective by jacking up the currently low expenditure upon "software" (support activities like capacity building, training, skilling, community mobilization, water quality management, IEC, data management, etc.). The Jal Shakti Ministry may like to examine and adapt the successful model used in the Swachh Bharat Mission (400+ young professionals deployed as **"Zila Swachh Bharat Preraks"**, through the support of Tata Trusts). Such professionals could not only build awareness and sensitisation in the community, but also support implementation of initiatives such as Paani Samitis, Water budgeting (helping match demand and supply), facilitate rejuvenating water sources (watershed / spring-shed management), etc.

The other area which needs urgent focus is the use of appropriate technology - Use IoT devices for monitoring storage/usage; promote Agri-startups, such as those using technology platforms (system- created digital map of a farm with drone or satellite imagery; sensors spread across farm that monitor multiple soil parameters – temperature / moisture / carbon-nitrogen levels, and help farmers get actionable insights with help of AI/ML-based models).

Technology can also support the necessity of tackling Water contamination, which leads to 2,00,000 deaths/year. Particularly severe is contamination due to arsenic, and fluoride (affecting 26 and 184 districts respectively in India, out of about 700). A great example of suitable technology for removal of arsenic / fluoride contamination, is that in place of RO technology, which is inappropriate and expensive, one could promote the use of a resin-based adsorption technology by Drinkwell, piloted successfully in Assam (and, with great success in Bangladesh too).

The World Water Day will come and go every year, but if we have to celebrate the day in years to come, then this is the time for Indians to wake up, and change our entire approach to the consumption and supply of a precious commodity that Indians have paid little attention to in the past, that is, Water.

The future is now!

ABOUT THE AUTHOR:

Prabhat Pani is the Executive Director of the Centre for Innovation in Sustainable Development at SPJIMR. He holds a PG Diploma in Management from the Indian Institute of Management, Ahmedabad, and an engineering degree from BITS, Pilani. Prior to joining academics in 2019, he held C-level leadership positions with well-known organizations within the hospitality, telecom, and FMCG industries in India, much of it in the Tata group. In his professional career spanning 40 years, he has held vital responsibilities managing portfolios of Sales, Marketing, General Management, Partnerships, and in Philanthropy. He has been consulting with the prominent philanthropic organization, Tata Trusts. His research and teaching interests are anchored on social sector topics, SDGs, and Impact Finance.

22 MARCH

WORLD WATER DAY

CLEAN WATER: FOR PEOPLE & INDUSTRIES

Abdul Rahman Mohammed
CEO, Sahara Industry

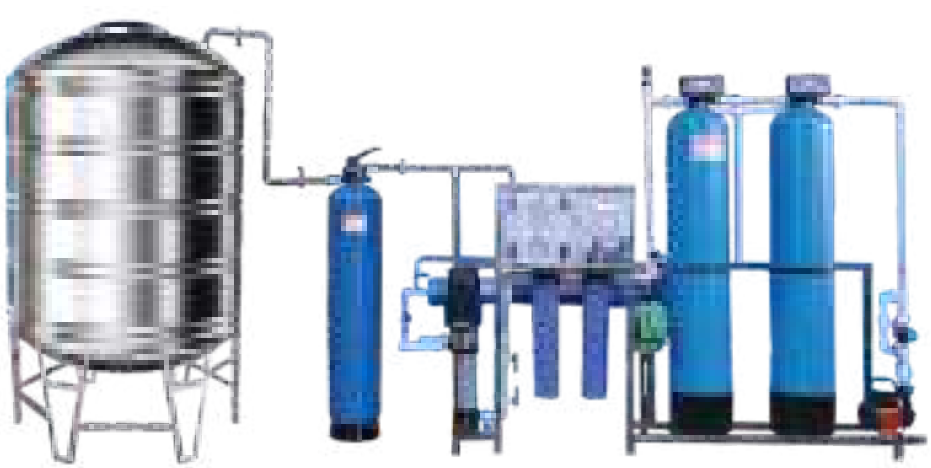
Clean, safe and easily available water is important for people, production and the planet. Apart from drinking and domestic activities, it is also used for cleaning, agriculture, food production, and all commercial purposes. Economic development of a nation largely depends on adequate availability of safe water. Appropriate water supply and sanitation and better management of water resources not only boost countries' economic growth but also greatly contribute in poverty eradication and public health.

The theme of World Water Day this year is about accelerating change to solve the water and sanitation crisis. Water affects us all in a major way, so everyone is needed to take action to enhance its sustainability.

The theme is a thoughtful one, calling upon everyone residing on the planet earth to contribute, make a difference by changing the way we use, consume and manage water in our lives. Water is everyone's business and every action counts towards ensuring water for all as per Sustainable Development Goal-6 (SDG6) defined by the United Nations and agreed by member countries. SDG6 envisage making access to safe drinking water and sanitation for everyone by 2030, a fundamental to everyone's health, dignity, and prosperity. Yet, billions of people around the world still deficient of safely managed drinking water. It is a huge task given the time frame agreed upon in 2015 and now only seven more years available to make it happen.

Wastewater Scenario

Demand for water is rapidly increasing with the population growth, faster pace of urbanization and increasing pressures from the agriculture, energy and commercial production sector. When the demand for clean water is increasing, the production of wastewater is also rising exponentially. Urban India which is currently producing over 72,000



MLD (million litres per day) of municipal wastewater apart from 62,000 MLD of industrial wastewater, is finding it difficult to properly manage it. Almost 70 percent of generated wastewater is not receiving any kind of treatment prior to disposal at water bodies.

Contaminated water and poor sanitation are linked to transmission of diseases such as cholera, diarrhoea, dysentery, hepatitis A, typhoid and polio among others. Inadequate or inappropriately managed wastewater exposes people to preventable health risks while making drinking water dangerously contaminated and chemically polluted.

Way Ahead

To achieve the target agreed under SDG6, the pace of water infrastructure development would need to multiply between double to four times for the world to achieve universal coverage with basic drinking water services by 2030. With focused approach to make a difference in the way water and wastewater being treated, Sahara Industry has designed and manufactured advance treatment systems, membranes, softeners, ozonators, and sterilizer for water and wastewater treatment.

The innovative solutions created by the company have contributed immensely by effectively treating municipal and industrial water thus helping to safeguard the health of people and increasing production in industries.

Investing in water infrastructure development for making provision of clean drinking water supply will result in many benefits, including quality of life, economic progress, environmental sustainability and overall health of people. Every dollar invested in water and sanitation interventions gives a $4.3 return in the form of reduced health care costs, reduced pollution of water and land resources, and gains in quality of life.

ABOUT THE AUTHOR:

The young entrepreneur with marketing & finance degree is the CEO of a leading water treatment solution provider, Sahara Industry. With his dynamic approach and strategic planning, he has successfully steered the company to grow resourcefully with hundreds of completed projects and turnover scaling to INR 1000 million.

22 MARCH

WORLD WATER DAY

ACCELERATE TO COMMEMORATE

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

World Water Day 2023Water is the most vital resource that we all use every single day. At global level, 2 billion people lack access to safely managed drinking water at home. The United Nations report on how climate change is affecting world's water resources has estimated that around half of the world population, nearly 5 billion people will face at least one month of water shortage by 2050. Lack of adequate water facility near homes is forcing women and girls in 8 out of 10 rural households to collect water for their family.

India's population is expected to rise from 1417 million currently to 1670 million by 2050, drastically increasing the demand for water. Several billion extra litres of water per day will be needed for public water supply while the demand for industries and agriculture will also grow exponentially. Unless major changes are made to our water management system, we simply won't have enough water to meet this demand.

The theme of World Water Day this year bring in focus the growing need of accelerated efforts to change the scenario of water provision for everyone under the Sustainable Development Goal-6 (SDG6) and encourage people to use water judiciously and live more sustainably. Water demand is rapidly rising due to population growth, urbanization and increasing pressures from the agriculture, energy and industrial sectors.

The economic progress worldwide has given rise to per-capita income which led to more consumption and life style changes together with increased awareness about the importance of safe drinking water, created huge demand for water. Access to safe water is

intrinsically linked to human health and well-being which is under tremendous challenge with reducing resources and increasing contamination.

In my opinion, the most effective way to address the prevailing and emerging water challenges is to deal with it in most holistic manner. Each nation can follow the Singapore example to establish a single authority that deals with the entire water system – from the source at catchment where water drops to where it finally ends in the ocean. We need radical changes in policies and governance with swift decision making for holistic water management that also make water saving attractive and easy to implement for people and industries.

Aquality Water Solutions Private Limited works closely with industries and institutions in a number of areas concerning water for health and productivity including water treatment for producing clean and safe water. As a strong mission driven organization, it has worked relentlessly with the sole intention of providing clean drinking water facility to its domestic and industrial clients. It has contributed immensely to the water treatment segment that has helped in improving quality of life of citizens with commitment, technological innovations and quality excellence.

The pandemic has shown that with a clear goal, diverse parties can collaborate and move at pace, sparking innovation. Every policy, plan and action need to be accelerated to bring the change towards creating a sustainable, resilient, and inclusive world with water positivity which places people and planet over profit.

ABOUT THE AUTHOR:

Mohammed Naser Azeez is the Managing Director of acclaimed Aquality Water Solutions Pvt. Ltd. that provides technologically advance treatment solution for making water clean and usable. He has contributed immensely with clean drinking water facilities to help improve the life of people with commitment, technological innovations and quality excellence.

22 MARCH

WORLD WATER DAY

ACCELERATING CHANGE TO SECURE WATER SUSTAINABILITY

Anil Sethi
Chairman, Pump Academy Private Limited

Globally, over 2 billion people lack access to safely managed drinking water at home. The latest data from WHO and UNICEF on access to clean water, adequate sanitation, and hygiene also reveal that 8 out 10 people who continue to lack basic drinking water services live in rural areas. In 2015, the world leaders committed to United Nations' Sustainable Development Goal-6 that envisages creating facilities for safely managed water and sanitation for everyone by the year 2030. Clean water and sanitation is integral to achieve a safer world which was reinforced further by the coronavirus pandemic. Almost halfway mark on the SDG-6 commitment, the target is tracked and found that the governments must work on average four times faster in the remaining half period to meet this goal on time.

The theme of World Water Day this year highlights a different aspect of freshwater. UN has suggested a theme - "Accelerating the change to solve the water and sanitation crisis" for World Water Day 2023. It places the focus on working expeditiously to make safely managed drinking water from an improved water source that is located on premises, available when needed, and free from faecal and other contamination. This task needed an approach which is smart and intelligent embedded with technological intervention in creating sustainable water infrastructure while making the existing water resource and supply system robust and resilient.

Pumping system is an integral part of water infrastructure that enables the utilities to achieve and maintain compliance with safe drinking water while limiting water losses in the distribution network. Smart pumping system improves security, scalability, and longevity of water infrastructure. Water utilities are actively looking for technological support for smart management as inefficiency

of pumping systems has become a big concern. After comprehensive research and development, Pump Academy Private Limited has introduced a smart pumping solution based on IoT frameworks called iPUMPNET, which aims to increase energy efficiency and overall improvement in pumping stations management. This technologically advance and complete automated system facilitates water utilities with real time monitoring through an intuitive dashboard interface accessible on website and mobile applications.

Inadequate management of urban water supply with run down machineries and distribution networks significantly compromises the drinking-water facilities of hundreds of millions of people with dangerously contaminated water. When water comes from improved sources of smartly managed water supply system, people spend less time and effort in collecting it, meaning they can be productive in other ways. This can also result in greater personal safety and improved economic activity. Better water sources also mean less expenditure on health, as people are less likely to fall ill and incur medical costs and are better able to remain economically productive.

With ever increasing demand of safe water and enhanced productivity, the need for technological intervention in water distribution network including pumping systems is expected to grow. To ensure efficiency and keep up with changes, it is essential that water utilities in India should remain updated with technical advancements while maintaining sustainability. And that will be proper acceleration the change to secure better water sustainability in true sense.

ABOUT THE AUTHOR:

Anil Sethi is the Founder Chairman of Pump Academy Private Limited. With deep knowledge of water sector, he has established the company to provide innovative solution to water utilities for making pumping stations technologically advance, automated and responsive with robust processes. He is a well-recognised industry captain, conferred with numerous awards for his significant contribution towards nation building.

WABAG forays into Bangladesh with a World Bank & AIIB funded DBO order worth about Rs. 800 Crores

VA TECH WABAG ('WABAG'), a leading pure–play Water Technology Indian Multinational Group, has secured an order worth about Rs. 800 Crores towards Design, Build and Operate (DBO) for the Reconstruction, Expansion, and Operation of Pagla Sewage Treatment Plant (STP) with a capacity of 200 Million Litres per Day (MLD) at Pagla in the City of Dhaka, Bangladesh for Dhaka Water Supply & Sewerage Authority (Dhaka WASA). The project is funded by Multi–lateral Funding Agencies like World Bank and Asian Infrastructure Investment Bank (AIIB) under Dhaka Sanitation Improvement Project (DSIP).

The scope of the project includes the Design, Engineering, Supply, Construction, Installation, and Commissioning of the 200 MLD STP followed by Operation & Maintenance (O&M) for a period of 60 months. This project has the potential to be expanded to 600 MLD in the future, fuelled by the city's growing needs. This plant will operate based on Activated Sludge Treatment Process where it uses Green Fuel (Biogas) generated during the wastewater treatment process producing Green Energy required for running the plant. This process also meets the Environmental norms and the production of Renewable Energy contributes to causing of combating global climate change.

Commenting on this order win, Mr. Arvind Dullu, Regional Business Head – South Asia said, "I'm extremely happy that we are following our stated strategy of making inroads into new markets and focusing on projects funded by Multi–lateral agencies. This project was won against international competition based on our technological superiority & competitiveness and is yet another significant milestone for Wabag. We are thankful to our client for the confidence they have reposed in us and this project will surely be a key reference in our journey."

WABAG–led joint venture secures DBO order towards South East Asia's largest Sea Water Desalination project funded by JICA

VA TECH WABAG ('WABAG'), a leading pure–play water technology Indian Multinational Group, further enhanced its leadership position in the Global Desalination market, by securing a Design, Build, Operate ('DBO') order, for the 400 Million Litres per Day (MLD) Sea Water Reverse Osmosis ('SWRO') Desalination Project from Chennai Metropolitan Water Supply and Sewerage Board ('CMWSSB') worth about INR 4,400 Crores. The project is scheduled to be executed under the leadership of WABAG in a joint venture with Metito Overseas Limited ('Metito'). This DBO order includes the scope of Design, Engineering, Procurement, Construction, Installation, Testing and Commissioning of the 400 MLD SWRO Desalination plant and the associated sea water intake system over a period of 42 months followed by 20 years of Operation & Maintenance ('O&M'). The desalination process will include Lamella Clarifiers, Dissolved Air Flotation System, Gravity Dual Media Filters followed by Reverse Osmosis and Re–mineralization to produce clean drinking water which will be further distributed by CMWSSB to the residents of South Chennai.

This project is a landmark project for Chennai and India since this project when completed, will be the Largest Desalination plant in the South East Asian Region. This project which is being funded by Japan International Cooperation Agency ('JICA') will enhance the water security for the city of Chennai through a stable source of drinking water in the form of Desalination. This project will also make Chennai, the Desalination Capital of India with almost 750 MLD of Desalinated water to be produced along the coast of Chennai. With the 400 MLD SWRO Desalination plant, Wabag will be responsible for about 70% of the water production through Desalination in Chennai.

Commenting on this order win, Shailesh Kumar, CEO – India Cluster said, "This is historically the largest ever order for Wabag. I'm extremely happy that we have been awarded this massive, prestigious and important Desalination plant order in Chennai from our trusted customer CMWSSB with whom our association spans over 2 decades now. Wabag has won this order against Global competition reinforcing our technological superiority and competitiveness in the Global Desalination space. This is a testament to our leadership in the Global Desalination space and puts Wabag on an inclined growth path for the future. I'm also elated that this landmark order coincides with Wabag being ranked 3rd Globally among private water operators and among the Top 10 Desalination players globally by GWI. The project when completed will not only be a landmark project for Wabag, but a testament to Tamilnadu's commitment to building Water security for Chennai and the State, making it a model for the whole country."

13th IWA International Conference on Water Reclamation & Reuse
15–19 January, 2023
Venue:
ITC Grand Chola, Chennai, India
www.iwa–network.org/events

Renewable Energy Expo 2023
20–22 January, 2023
Venue:
Chennai Trade Centre, Nandambakkam, Chennai, India
www.renewableenergyexpo.biz

Water & Solid Waste Expo 2023
16–18 February, 2023
Venue:
Pragati Maidan, New Delhi
www.watersolidwaste.com

WAPTAG Water Expo 2023
23–25 March, 2023
Venue:
India Expo Center, Greater Noida, India
www.waptag.org

Smart Cities Expo 2023
27–29 March, 2023
Venue: Pragati Maidan, New Delhi
www.waterindia.com

Convergence India Expo 2023
27–29 March, 2023
Venue: Pragati Maidan, New Delhi, India
www.convergenceindia.org/

SRW India Water Expo
5–7 May, 2023
Venue: Chennai Trade Centre, CHENNAI TRADE CENTRE, Ramapuram, Tamil Nadu
www.waptag.org

Water & Plump Skills Expo 2023
18–19 May, 2023
Venue:
Pragati Maidan, New Delhi, India
www.plumbskillsexpo.com

Water Today's Water Expo 2023
23–25 September, 2023
Venue: Chennai Trade Centre, Chennai, India

IFAT 2023
17–19 October, 2023
Venue:
Bombay Exhibition Centre, Mumbai, India
www.ifat–india.com

Water India 2023
24–26 November, 2023
Venue: Kolkata, India
www.waterindia.net

Buyer/Seller:
Karnataka Co.Operative Milk Producers Federation Limited
Ref. Number: 58710385
Requirement: Revamping and strengthening of existing dairy to handle 6 lakh liters milk per day.

Utilities work like HP&LP steam line with insulation, PRS, air line, water treatment plant
EMD: INR 2,400,000
Closing Date: 12/05/2023
Location: Bangalore – Karnataka – India

Buyer/Seller:
Tamil Nadu Housing Board
Ref. Number: 58678245
Requirement: Construction of 1.20 MLD Waste Water Treatment Plant for 1800 (ground floor + 4 floors) Shack Replacement Board flats under construction at Periyanayakanpalayam using Rotary Biological Communication Technology (RBC technology)

EMD:INR 176,100
Closing Date: 03/05/2023
Location: Coimbatore – Tamil Nadu – India
Contact Details: Coimbatore, Tamil nadu india

Buyer/Seller:
Karnataka Co.Operative Milk Producers Federation Limited
Ref. Number: 58710838
Tender Number: KMF/ENGG/TUMUL–MEGA DAIRY/2022–23
Requirement: Design, Supply, Installation, Testing & Commissioning of Steam generation system, including steam header, steam piping, PRS insulation, structural Support & other utilities like Air compressor, water Treatment plant, suitable for 10LLPD expandable to 15LLPD capacity liquid milk processing plant along with 3LLPD capacity condensing plant, 1.5LLPD capacity curd plant on turn key basis for Tumkur Milk Union.

EMD: INR 2,200,000
Closing Date: 12/05/2023
Location: Tumkur – Karnataka – India

Buyer/Seller:
Bhiwandi Nizampur Municipal Corporation
Ref. Number: 58580291
Tender Number: 87/2022–2023
Requirement: Augmentation to bhiwandi nizampur water supply 100 MLD scheme for Construction of jack well, over head pump house, retaining wall, sub station, rcc bridge, raw water and pure water MS rising mains, conventional WTP

Closing Date: 09/05/2023
Location: Bhiwandi – Maharashtra – India

Buyer/Seller:
Haryana State Industrial And Infrastructure Development Corporation Limited
Ref. Number: 58392324
Requirement: Construction of 57 MLD WTP and all contingent works there to in all respect along with 120 months of operation and maintenance at IMT kharkhoda, district sonipat
Closing Date: 03/05/2023
Location: Sonipat – Haryana – India

Buyer/Seller:
Haryana State Industrial Development Corporation Limited
Ref. Number: 58151818
Tender Number : 2023_HBC_264464_1
Requirement: Construction of 57 mld wtp ... planning, design, engineering, procurement, construction, installation, testing, commissioning of 57 mld water treatment plant (wtp) alongwith oand m of 10 years at imt kharkhoda

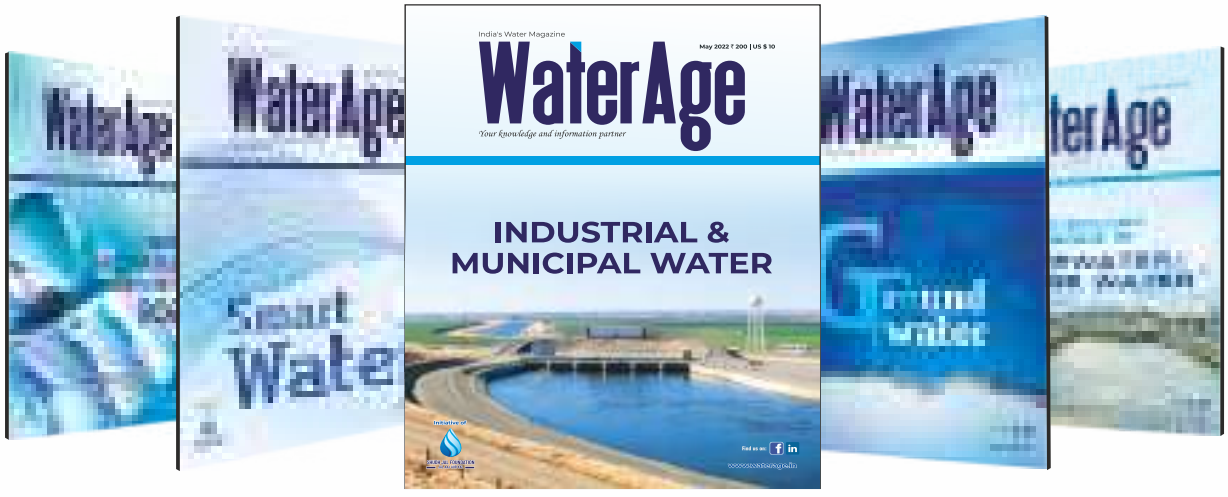
Tender Detail: Construction of 57 Mld Wtp ... #*. Planning, Design, Engineering, Procurement, Construction, Installation, Testing, Commissioning of 57 Mld Water Treatment Plant (Wtp) Alongwith Oand M of 10 Years at Imt Kharkhoda

Document Fees: INR 50,000
EMD: INR 10,281,000
Closing Date: 03/05/2023
Location: Karnal – Haryana – India
Contact Details: Haryana Board Corporati on||hsiidc||kharkhoda||industrial Area kharkhoda

Buyer/Seller:
Madhya Pradesh Power Generation Company Limited
Ref. Number: 58772465
Tender Number: 2023_MPPGC_257602_1
Requirement: Work contract for routine maintenance of system and equipments of wt plant, pt plant and pump house, clarified water and filter water pump house, cw pump house, raw water pump house, dozing system (hp, lp dozing pumps) etc. of 210 mw atps

Document Fees: INR 1,000
EMD: INR 43,000
Tender Estimated Cost: INR 2,151,318
Closing Date: 01/05/2023
Location: Chachai, Madhya Pradesh, India
Contact Details: Madhya Pradesh Power Generating Company Limited||chief Engineer(gen.)–amarkantak Thermal Power Station, Chachai, MPPGCL ATPS Chachai

BOOK YOUR COPY NOW!



MAGAZINE SUBSCRIPTION FORM

Fill out the form below and subscribe to our magazine!

Name & Designation:

Company Name:

Address: _____

_____ Pincode: _____

Mobile: | Email : | Website:

Magazine Subscriptions

	Subscribers	Term	Issues	Price	% Savings	PAY
☑						
☐	Domestic	5 Years	60	Rs. 24000	40%	Rs. 14400
☐	International	5 Years	60	USD 3000	40%	USD 1800
☐	Domestic	3 Years	36	Rs. 14400	25%	Rs. 10800
☐	International	3 Years	36	USD 1800	30%	USD 1260
☐	Domestic	2 Years	24	Rs. 9600	15%	Rs. 8160
☐	International	2 Years	24	USD 1200	20%	USD 960
☐	Domestic	1 Years	12	Rs. 4800	10%	Rs. 4320
☐	International	1 Years	12	USD 600	Nil	USD 600

BHIM
BHARAT INTERFACE FOR MONEY

Scan for Pay UPI QR Code

Merchant Name:
Shudhjal Foundation
Mobile: 70871 15455

Company	Page No.	Telephone	E–mail	Website
Aadys Components Pvt. Ltd.	1	+91 11 4155 1444	sales@aadys.co.in	www.aadys.co.in
AKASH Blowers Pvt. Ltd.	7	+91–9999 56 4644	info@akashblowers.com	www.akashblowers.com
DUVERA	47	8595 149016, 8744 040406	sales@duverawater.com	www.duverawater.com
E–Procurement Technologies Ltd.	44	+91 93745 19764	sales@TenderTiger.com	www.TenderTiger.com
Indus Waterways	Back Cover Inside	91 172 5275055, 91 11 4552 4715	induswaterways@gmail.com	–
Jai Maa Associates	25	+91 98111 88819, +91 11 2568 2346	jaimaaassociatesdelhi@gmail.com, jaimaa98gmail.com, info@jaimaaassociates.in	–
Liquiclear	17	+91 88009 42942	info@liquiclear.in	www.liquiclear.in
NSF India	48	+91 124 4820100 +91 96500867583	india@nsf.org	www.nsf.org
Optimus Enviropro Pvt. Ltd.	Front Cover Inside	+91 11 4155 1444	sales@optimusenviro.pro	www.optimusenviro.pro
Rysa Infratech Pvt. Ltd.	Back Cover	+91 11 4552 4715	info@rysainfratech.com	www.rysainfratech.com
Triveni Constructions	5	+91 98143 21749, +91 98141 32026, +91 172 4039 981	trivani_anand@yahoo.com, triveniconstructions.mohali@gmail.com	–
WaterAge Banner	6	+91 99589 60470	enquiry@waterage.in	www.waterage.in
WaterAge E–magazine	48	+91 99589 60470	enquiry@waterage.in	www.waterage.in
WaterAge Subscription	47	+91 99589 60470	enquiry@waterage.in	www.waterage.in

Thank You for Advertising with Us!

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

DROPX®

DUVERA®
BUILDING TRUST

Filter Bags
Cartridge Filters

Filter Housings
Filter Bag Housings

Norit Carbon,
Granular, Coconut, Powder Carbon
Mno2,

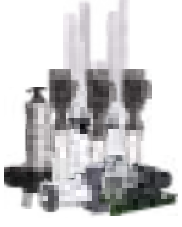
Filter Media
Anion and Cation
Ion Exchange Resin

FRP/SS/MS Vessles
Distribution Systems

Multiport Valves
Dosing Pumps

RO//NF Membranes /MBR
FRP/SS Membrane Housings

Ultra Filtration Membranes
MBR Membranes / EDI



High Pressure / Fire
Transfer Borewell Pumps

UPVC/SS
Mult-Cartridge Housings

Flow Meters
TDS, ORP, PH Metres

Pressure Gauge, Switches
Victaulic Coupling & Gasket

DropX® Chemicals
for ETP, STP, BOILER & RO

UV& Systems
& Control Panels

ETP / STP
Components

Blowers
Filter Press

QUA PURE TECHNOLOGY

SHAKTI® PUMPING LIFE

emikon

Alfa Aerosol PRESSURE VESSELS

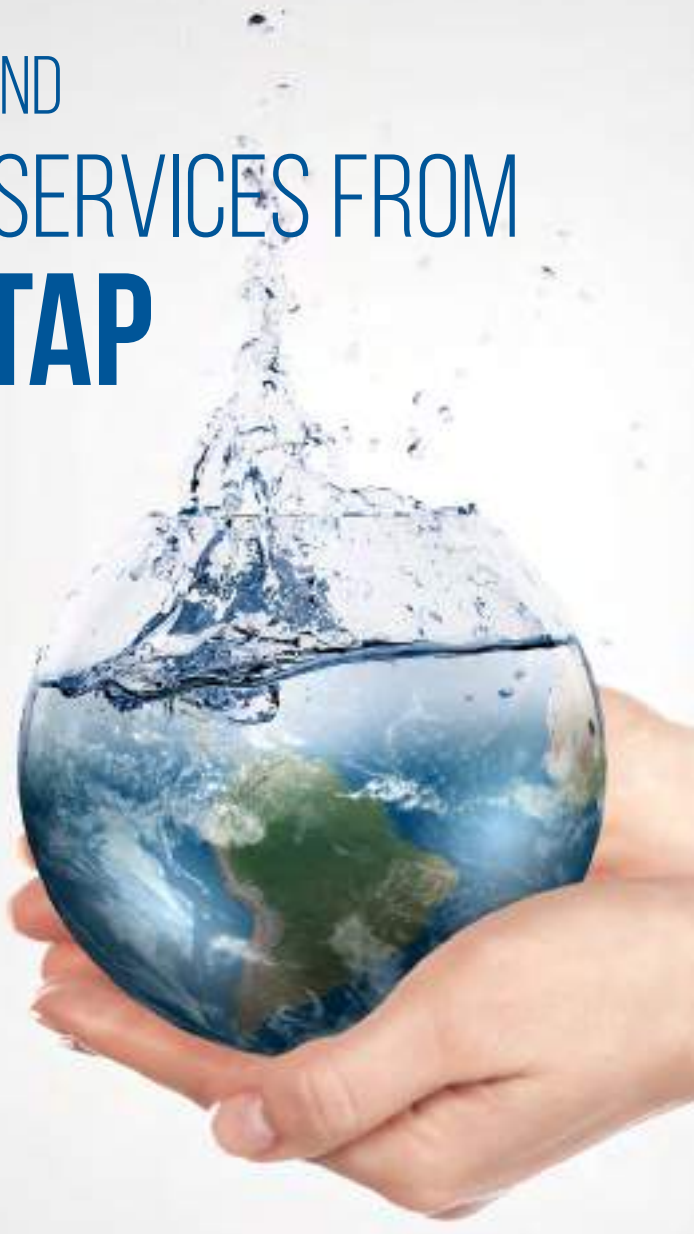
DIGITAL INSTRUMENTS CORPORATION

ALFA® THE UV EXPERT

PENTAIR HYDRANAUTICS www.membranes.com DUPONT MILTON ROY Danfoss GUDDI PLASTCON PVT. LTD. ION EXCHANGE

256/10 Church Road, Near Shiv Mandir, Jashola Vihar, New Delhi - 10025
Email : sales@duverawater.com | Call : 87440 40406, 85951 49016, 82872 03644 | Website : www.duverawater.com

GLOBAL TESTING AND CERTIFICATION SERVICES FROM **SOURCE TO TAP**



Testing and certification for:

- Water distribution system components
- Drinking Water Treatment Units
- Water treatment chemicals
- Wastewater and reuse water equipment
- Fire safety

Broaden your market reach:

North America

- NSF Standards
- ASTM, AWWA & CSA Standards
- IPC/UPS
- UL/ULc

Europe

- REG4/WRAS/BS6920
- ACS (France)
- KTW (Germany)

www.nsf.org

NSF India
Plot No.142, 4th Floor
Chimes Building, Sector 44,
Gurgaon 122 002, Haryana, India
t: +91 124 4820100 | : +91 965 0086583 | e: india@nsf.org

Indus Waterways

Water & Wastewater Solutions

Indus Waterways providing consultancy for total water management and treatment solutions for Water and Wastewater Treatment, started business in 2009 and since then provided services to hundred of clients in Industries, Municipal and Hospitality sector

SERVICES TO PROVIDED BY CONSULTANT

- Detailed survey of proposed network of sewar line.
- Preparation of sewer network showing GL/IL.
- Location type design of manholes, intermediate sump well/lift well.
- Calculation of sewage generation.
- Type of treatment of sewage.
- Specification of mechanical and electrical equipment of sewage network STP & ETP.
- Preparation of drawing.
- Preparation of bill of quantities, detailed estimates BOQ and estimate based on MES SSR – 2020 and market analysis for Non-SSR items for sewage network STP & ETP.

FIELD OF EXPERTISE

H.O.: SCO 146-147, Sector-34A, Chandigarh-160022, T.: +91 172 5275055, 4012755
Corp. Office: 605, Bhikaji Cama Bhawan, Bhikaji Cama Place, New Delhi-110 066, Tel.: +91 11 41551444, 45524715
E-mail: induswaterways@gmail.com

ENGINEERING EXCELLENCE

RYSA INFRATECH PVT. LTD. (RIPL) is a fast-growing EPC company established in the year 2015. RIPL is an enlisted contractor with Military Engineer Services (MES) for:

- Pre-Engineered Building & Infrastructure
- Water & Wastewater Treatment Projects
- Sewage Disposal and Water Distribution Network
- Electro-mechanical utility services
- Low Tension Electric Works
- Incinerators


SEWAGE TREATMENT PLANTS


LOW TENSION ELECTRIC WORK


WATER TREATMENT PLANTS


WATER DISTRIBUTION

COMPLETED PROJECTS

RYSA Infratech Pvt. Ltd.

Delhi Office: 605, 6th Floor, Bhikaji Cama Bhawan, Bhikaji Cama Place, New Delhi-110066,

Chandigarh Office:
SCO: 146-147, IIIrd Floor,
Sector-34A, Chandigarh-160022
E-mail: info@rysainfratech.com

Tel.: +91-11-4552 4715

www.rysainfratech.com