Azadi Ka Amrit Mahotsav

FICCI

Recognizing Excellence in Water Management & Conservation

10th Edition of FICCI

WATER AWARDS 2022

Compendium of Best Practices

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This report is a compilation of best practices received as part of the 10th Edition of FICCI Water Awards. The case studies of the awardees are published in the report.

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Acknowledgements

FICCI acknowledges the eminent members of the Jury for their exceptional guidance in the final selection of the awardees. FICCI also acknowledges the valuable contributions of the Expert Screening Panel in assessing and evaluating each nomination. We also extend our gratitude to the organizations who participated under the various categories of the 10th Edition of FICCI Water Awards.

Team's Contribution to the FICCI Water Awards and Compendium

The entire process of the FICCI Water Awards and development of Compendium has been executed by the FICCI Water Mission Secretariat- Hemant Seth, Senior Director, FICCI; Kirtika Arora, Senior Assistant Director, FICCI. This publication has been supported by Sustainable and Environment friendly Industrial Production -II project commissioned by the Federal Ministry for Economic Cooperation and Development (BMZ) and implemented by Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH.

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WATER
AWARDS
2022

CONTENTS

CONTENTS

FOREWORD

Water resources are under unprecedented and increasing pressure, driven by greater climate variability, population and economic growth, land-use changes and declining quantities and quality of both ground and surface water. Groundwater that supplies many urban, commercial and industrial users is classified as stressed across much of India while surface water abstractions are reaching unsustainable levels leading to deterioration of the environment, decreasing water levels in the aquifers and increasing competition and consequent conflicts between users. The water being used for domestic, industrial or rainwater accumulating in sewers contains a wide spectrum of contaminants causing increased water pollution and depletion of clean water resources.

Wastewater treatment and reuse is an important option that can help increase water supply and reduce the water pollution risks. Industry bodies are proactively implementing sustainable water management programs and are investing in multiple water management initiatives across their operations.

FICCI has been working to promote water conservation and sustainable water management within its member companies through the FICCI Water Mission. The FICCI Water Mission was constituted in 2011 to promote awareness, thought leadership, policy advocacy and best practice sharing in sustainable water management with a special focus on water use efficiency, urban wastewater management and corporate water stewardship. The annual Water Awards instituted by the Mission recognize exemplary contributions in the areas of industrial water use efficiency, urban wastewater management, community initiatives by industry, NGO initiatives in water, and innovations in water technology.

This Compendium of Best Practices is a collection of the award-winning case studies which exemplify water use efficiency and sustainable water management. It also aims to raise awareness on the scale and urgency of the water challenges facing business and industry in India and enables the engagement of new players in the future management of water.

I am deeply grateful to the eminent Jury of the FICCI Water Awards for their invaluable contribution and for continuously raising the standard of the Awards. I am also thankful to the Expert Screening Panel for their scrutiny and technical evaluations. Last but not the least, I would like to thank all the organisations who sent their nominations for the Awards and applaud the winners for setting high benchmarks for others to emulate. Although awardees can only be a select few each year, the Awards process enlightens us through all nominations received, with the plethora of good initiatives taken up by industry and NGOs in India.

Naina Lal Kidwai

Past President, FICCI
Chair, FICCI Water Mission

SPECIAL MESSAGE BY CHAIR OF JURY

As we move forward into the 21st century, it has become abundantly clear that we cannot continue with business-as-usual in our development paradigm. This insight applies with great force and urgency to all issues concerning water. COVID-19 has alerted us that we must recognise that the economy is profoundly circumscribed by the larger eco-system of the planet, within whose bounds the economy operates. All over the world, which is witnessing unprecedented challenges posed by climate change in this era of the Anthropocene, there is a growing recognition that we need to focus on nature-based solutions for the problems facing humanity. Such solutions have been shown to be economically viable and socially appropriate, based as they are on collective action by concerned stakeholders. They leverage the power of Nature to find cost-effective, sustainable solutions to the emerging water crisis, which deepens by the day.

The Committee to draft the new National Water Policy, which I had the privilege to Chair, has also placed great emphasis on changing the relationship of development initiatives with Nature, from command-and control towards leveraging the power of Nature to serve our purposes. What we need to acknowledge is the profound inter-connectedness and inter-dependence that characterises the world we live in and to be humble in our approach to natural systems, showing them the respect they deserve and recognise that prakriti rakshati rakshita (Nature protects those who protect her).

The FICCI Water Mission is a unique initiatve to recognise and showcase precisely these kinds of best practices and innovations. Many of our water solutions are still largely based on the mid-20th century paradigm of water resource development, which is now reaching its limits and causing more problems than it solves. We urgently require a multi-pronged paradigm shift in the way we manage our water resources. We need to decisively move towards a trans-disciplinary approach to water that focuses on demand-side solutions rather than endlessly trying to increase supply

There are many unsung heroes who are making brilliant contributions in this direction. This compendium will give you a glimpse into some of this work, which is showcased here after a very rigorous process of scrutiny and appraisal. The aim of the Water Awards jury has been to reward those efforts that embody truly cutting-edge innovation, while also providing the best chances of replication on a large scale.

I heartily congratulate the winners and hope that FICCI Water Awards will continue to make this invaluable contribution in moving India towards a 21st century paradigm of water management.

Dr Mihir Shah

Chair of Jury – FICCI Water Awards 2022

MESSAGE

Water scarcity is a major inhibitor to growth. The situation is dire. In the 75 years since Independence, as per CGWA, annual per capita availability of water has declined by 75% - from 6,042 cubic meters in 1947 to 1,486 cubic meters in 2021. Not only are we staring at the depletion of groundwater and pollution of surface water, but also facing vanishing water bodies - ponds, lakes, tanks, wetlands. The government's attempt to consolidate all departments and ministries that deal with water issues and to focus exclusively on addressing water challenges by creating the Ministry of Jal Shakti in 2019 is a big step towards sustainable solutions.

On the other hand, there is a growing concern among industry and the community about the need to save water resources. The industry is playing a proactive role in sustainable water management through various innovative approaches and technologies. However, larger awareness needs to be created on the positive steps being taken to encourage wider engagement of stakeholders towards ensuring water sustainability in India.

FICCI has always been at the forefront of driving the dialogue on water sustainability in the industry. Our

water mission was constituted to initiate a dialogue and work with the Government on policy changes and increasing private sector participation in urban and industrial water governance.

FICCI Water Mission accords the highest priority to increasing private sector participation in urban and industrial water. The India Industry Water Conclave and FICCI Water Awards recognize excellence in water conservation and sustainable water management practices. FICCI believes corporate sector engagement can help promote efficiencies in the achievement of targets set out by the government.

The Awards instituted by FICCI act as a platform for recognizing and awarding water stewardship, promoting awareness, sharing of best practices and thought leadership in the area of water-use efficiency and sustainable water management. Over the years, it has also helped generate a knowledge base on sustainable water management practices adopted by different stakeholders and disseminate best practices for encouraging their adoption. This compendium provides several additional insights on activities and innovative approaches used by stakeholders in an industry which could add value to others for similar adoption. I congratulate the winners of the Awards this year for their exemplary work. It is through their work that we draw inspiration for others in Industry and urban environments.

I thank the Expert Screening Panel for their immense effort in the scrutiny and assessment of each nomination. I am grateful to the Jury for their valuable time in this initiative, for elevating the understanding of excellence in sustainable water management, and for showing the direction towards making a meaningful contribution to all stakeholders through the learnings of the FICCI Water Awards.

Arun Chawla

Director General, FICCI

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WATER
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2022

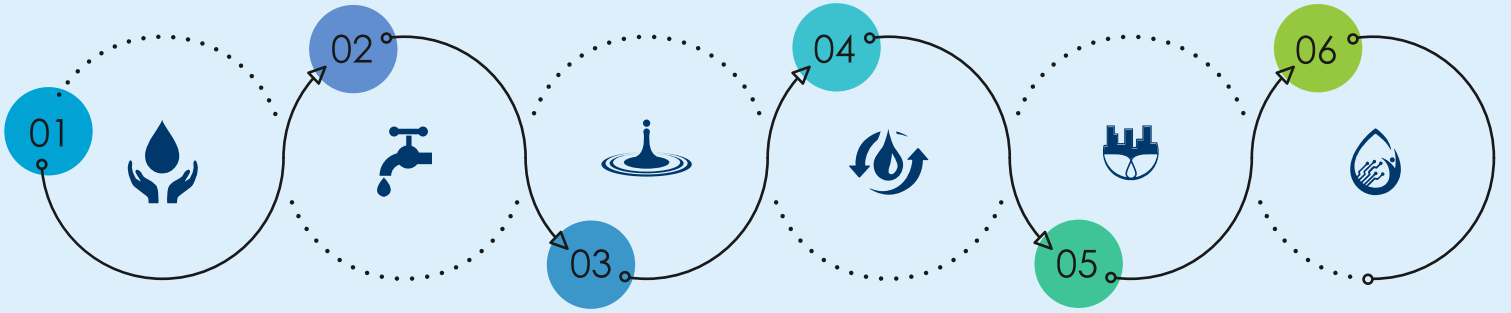
FICCI WATER AWARDS CATEGORIES

FICCI WATER AWARDS

FICCI launched the Annual Water Awards in 2012. The awards were initiated with the following objectives:

- To recognize efforts and leadership in the area of water efficiency and conservation; and
- To develop a knowledge base on sustainable water management practices adopted by different stakeholders and disseminate best practices for encouraging their adoption.

AWARDS CATEGORIES



Industrial Water Use Efficiency	Community Initiatives by Industry	Water Initiatives by NGO	Innovation in Water Technology	Urban Wastewater Management	Best Start-up for Water Innovation
(Industrial units belonging to the water intensive sectors)	Industry (Industrial Units – CSR related but community focussed initiatives only)	NGOs (Registered as a society, trust, not for profit organization) working in the area of watershed management, drinking water and sanitation	Product developer/technology supplier in the area of innovative tools, techniques, products, technologies and technology application in Water Technology and Management	Any unit involved in water and waste-water supply and management in the urban space like, Urban Local Bodies (ULBs), Jal Boards, Water Intensive Industries etc. including the extraction, treatment, and distribution of water, and collection and treatment of wastewater activities which are directly managed by Water and Wastewater Utilities (WWUs)	Start-ups offering water efficient product or equipment or technology

SELECTION PROCESS

PHASE 1
Call for Applications

The call for awards is put up through print and online advertisements, and nominations for the different categories are received. A standard template for sending information is developed for every category. Through its network and database, FICCI Water Secretariat reached out to organizations working in the areas of water and wastewater.

PHASE 2
Preliminary Screening

Initial screening by the FICCI Water Secretariat, to ensure adherence to eligibility criteria.

PHASE 3
Expert Screening Panel

The expert screening panel screened each nomination to check the authenticity of the data and information presented. Then the expert panel presented the screened applications to the jury at its first meeting.

PHASE 4
Jury Meeting

Each application under all the six categories were presented by the Experts Panel to the Jury.

Jury upon thorough review and discussion over three meetings, shortlisted applicants to make presentation to the Jury and answer additional questions.

PHASE 5
Final Awardees Selected

Post the presentation with the shortlisted applicants, the Jury finalized the winners in each category in forth & final meeting.

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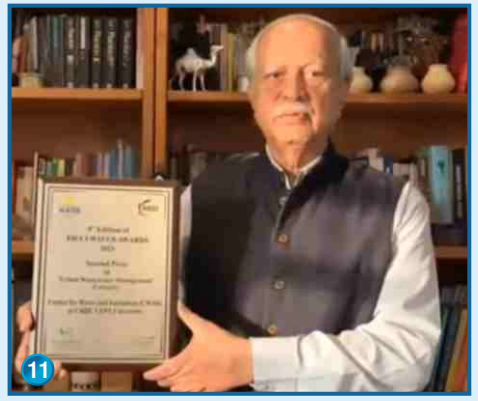
WATER
AWARDS
2022

WATER AWARDS THROUGH THE YEARS

2021

1. Tata Steel Ltd. (1st Prize) in the Industrial Water Use Efficiency Category
2. Vardhman Fabrics (2nd Prize) in the Industrial Water Use Efficiency Category
3. Asian Paints Khandala (Joint 3rd Prize) in the Industrial Water Use Efficiency Category
4. Delhi International Airport Limited (Joint 3rd Prize) in the Industrial Water Use Efficiency Category
5. Green Lantern Engineering Pvt. Ltd. (1st Prize) in the Innovation in Water Technology Category
6. Himmotthan- Tata Trusts, Dehradun (1st Prize) in the Water Initiatives by NGOs Category
7. Bio-me Solutions (2nd Joint Prize) in the Water Initiatives by NGOs Category
8. People's Service Society Palakkad (2nd Joint Prize) in the Water Initiatives by NGOs Category
9. Watershed Organisation Trust (WOTR) (2nd Joint Prize) in the Water Initiatives by NGOs Category
10. Primove Infrastructure Development Consultants Pvt. Ltd. (1st Prize) in the Urban Wastewater Management Category
11. CWAS-CEPT University (2nd Prize) in the Urban Wastewater Management Category
12 Digital EcoInnovision (1st Prize) in the Best Start-up in Water Innovation Category
13 NMCG , Special Jury's Award



Winners of the Water Awards being felicitated virtually by Mr Gajendra Singh Shekhawat, Hon'ble Minister of Jal Shakti, Government of India; Mr Pankaj Kumar, Secretary, Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India; Mr Sanjiv Mehta, President, FICCI and CEO & MD, Hindustan Unilever Limited; Dr Mihir Shah, Chair of Jury - FICCI Water Awards 2021, Distinguished Professor, Shiv Nadar University; Ms Naina Lal Kidwai, Chairperson, FICCI Water Mission, and Past President, FICCI; Ms Reshma Anand, Co-Chair, FICCI Water Mission and CEO, Hindustan Unilever Foundation; and Ms Rita Roy Choudhury, Assistant Secretary General, FICCI.

2020

1. Tagros Chemicals India Private Limited (Joint 1st Prize) in the Industrial Water Use Efficiency Category
2. Trident Limited (Joint 1st Prize) in the Industrial Water Use Efficiency Category
3. ITC Limited (1st Prize) in the Community Initiatives by Industry Category
4. Daiki Axis India Private Limited (1st Prize) in the Innovation in Water Technology Category
5. Konark Fixtures Limited (2nd Prize) in the Innovation in Water Technology Category
6. JS Water Energy Life Co. Private Limited (3rd Prize) in the Innovation in Water Technology Category
7. Water Resources Department (WRD) Rajasthan (Special Jury's Award) in the Innovation in Water Technology Category
8. Aga Khan Rural Support Programme (1st Prize) in the Water Initiatives by NGOs Category
9. Jan Jagran Kendra (2nd Prize) in the Water Initiatives by NGO Category
10. Vishvaraj Environment Private Limited (1st Prize) in the Urban Wastewater Management Category
11. Vadodara Municipal Corporation (Special Jury's Award) in the Urban Wastewater Management Category

Winners of the Water Awards being felicitated virtually by Mr Pankaj Kumar, Secretary, Department of Water Resources, River development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India; Mr Rajiv Ranjan Mishra, Director General, National Mission for Clean Ganga, Department of Water Resources, River development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India; Dr Mihir Shah, Chair of Jury - FICCI Water Awards 2020, Distinguished Professor, Shiv Nadar University; Ms Naina Lal Kidwai, Chairperson, FICCI Water Mission, and Past President, FICCI; Mr Mukund Vasudevan, Co-Chair, FICCI Water Mission and Managing Director & Country Head, Ecolab India and Ms Rita Roy Choudhury, Assistant Secretary General, FICCI.

2019

1. Arvind Limited (1st Prize) in the Industrial Water Use Efficiency Category
2. SSP Private Limited (1st Prize) in the Innovation in Water Technology Category
3. Water, Sanitaation and Hygiene (WASH) Institute (Joint 1st Prize) in Water Initiatives by NGO Category
4. Pratiks Enviro Foundation (Joint 1st Prize) Water Initiatives by NGO Category

Winners of the Water Awards being felicitated by Mr Gajendra Singh Shekhawat, Hon'ble Minister, Ministry of Jal Shakti; Mr U P Singh, Secretary, Department of Water Resources, River development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India; Dr Mihir Shah, Chair of Jury - FICCI Water Awards 2019, Distinguished Professor, Shiv Nadar University; Ms Naina Lal Kidwai, Chairperson, FICCI Water Mission, and Past President, FICCI; Mr Mukund Vasudevan, Co-Chair, FICCI Water Mission and Managing Director & Country Head, Ecolab India and Ms Rita Roy Choudhury, Assistant Secretary General, FICCI.

2018

1. ITC Maurya (1st Prize) in the Industrial Water Use Efficiency Category
2. HSBC (1st Prize) in the Community Initiatives by Industry Category
3. Transchem Agritech Private Limited (1st Prize) in the Innovation in Water Technology Category
4. WATSAN Envirotech Private Limited (1st Prize) in the Innovation in Water Technology Category
5. NTPC Ltd (3rd Prize) in the Innovation in Water Technology Category
6. Surat Municipal Corporation (1st Prize) in the Urban Wastewater Management Category

Winners of the Water Awards being felicitated by Shri U P Singh, Secretary, Department of Water Resources, River Development and Ganga Rejuvenation, Ministry of Jal Shakti, Government of India; Dr Mihir Shah, Chair of Jury - FICCI Water Awards 2018, President, Bharat Rural Livelihood Foundation, and Former Member, Planning Commission; Ms Naina Lal Kidwai, Chairman, FICCI Water Mission, and Past President FICCI and Ms Rita Roy Choudhury, Assistant Secretary General, FICCI.

2017

1. Sterlite Copper Vedanta Ltd (1st Prize) in the Industrial Water Use Efficiency Category
2. Aga Khan Rural Support Programme (1st Prize) in the Water Initiatives by NGOs Category
3. Akhil Bhartiya Samaj Sewa Sansthan (2nd Prize) in the Water Initiatives by NGOs Category
4. Hindustan Ecosoftt Pvt Limited (1st Prize) in the Innovation in Water Technology Category
5. Technorbital Advanced Materials Pvt Limited (2nd Prize) in the Innovation in Water Technology Category
6. SM Sehgal Foundation (3rd Prize) in the Innovation in Water Technology Category

Winners of the Water Awards being felicitated by Shri Parameswaran Iyer, Secretary (DWS), Ministry of Drinking Water & Sanitation, Government of India, Dr Amarjeet Singh, Secretary, Ministry of Water Resources, Government of India; Dr Mihir Shah, Chair of Jury - FICCI Water Awards 2017, President, Bharat Rural Livelihood Foundation, and Former Member, Planning Commission; Ms Naina Lal Kidwai, Chairman, FICCI Water Mission, and Past President FICCI and Ms Rita Roy Choudhury, Assistant Secretary General, FICCI

2016

1. ITC Ltd. Saharanpur, Winners, Industrial Water Efficiency Category
2. TATA Motors Ltd., 1st Runner - Up, Industrial Water Efficiency Category
3. ITC Ltd. Jalahobli, 2nd Runner - Up, Industrial Water Efficiency Category
4. ITC Ltd., Winners, Community Initiatives by Industry Category
5. Self Employed Women's Association (SEWA), Winners, Water Initiatives by NGOs Category
6. Group Photograph for the FICCI Water Awardees for 2016

Winners of the Water Awards being felicitated by Shri Shashi Shekhar, Former Secretary, Ministry of Water Resources, River Development and Ganga Rejuvenation, Government of India; Dr Mihir Shah, Chairman of Jury, FICCI Water Awards 2016; Ms Naina Lal Kidwai, Past President, FICCI; Dr Didar Singh, Former Secretary General, FICCI; Ms Rita Roy Choudhury, Assistant Secretary General, FICCI.

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2015

1. ITC Munger (1st Prize), Industrial Water Use Efficiency Category
2. Ambuja Cements Ltd (2nd Prize), Industrial Water Use Efficiency Category
3. Infosys Limited, Bangalore (3rd Prize), Industrial Water Use Efficiency Category
4. Ambuja Cements Foundation (1st Prize), Community initiatives by the Industries Category
5. Ultratech Cement Ltd (2nd Prize), Community initiatives by the Industries Category
6. Ramkrishna Jaidayal Dalmia Seva Sansthan (1st Prize), Initiatives by NGOs Category
7. SIRUTHULI and Watershed Organization Trust (joint 2nd Prize), Initiatives by NGOs Category
8. Sanjeevani Institute for Empowerment and Development (3rd Prize), Initiatives by NGOs Category

Winners of the Water Awards being felicitated by Ms Jyotsna Suri, Past President, FICCI.

2013

1. Noamundi Iron Ore Mine - Tata Steel Limited, Winners, Industrial Water Use Efficiency Category
2. ITC Ltd – Bangalore, 1st Runner-Up, Industrial Water Use Efficiency Category
3. JSW Steel Limited, Vijayanagar Works, 2nd Runner Up, Industrial Water Use Efficiency Category
4. Ambuja Cement Foundation, Winners, Community Initiative by Industry Category
5. ITC Limited, 1st Runner Up, Community Initiative Category
6. Vikram Cement Works, 2nd Runner Up, Community Initiative by Industry Category
7. IRRAD (An Initiative of S. M. Sehgal Foundation), Winners, Initiatives by NGOs Category
8. Watershed Organisation Trust, 1st Runner Up, Initiatives by NGOs Category
9. KGDS RE Pvt. Ltd., DST & NIOT, Winners, Innovation in Water Technology Category
10. Ortho Clinical Diagnostic, J&J Company, 1st Runner Up, Innovation in Water Technology Category

Winners of the Water Awards being felicitated by Shri Montek Singh Ahluwalia, Former Deputy Chairman of the Planning Commission, Government of India, Ms Naina Lal Kidwai, Chairman, FICCI Water Mission, and Past President, FICCI and Mr Atul Singh, Group President, Asia Pacific, The Coca-Cola Company.

2012

1. Essar Steel India Limited, Hazira, Winner, Industrial Water Use Efficiency Category
2. ITC Limited, 1st Runner Up, Industrial Water Use Efficiency Category
3. Tata Chemicals Limited, Winners, Community Initiatives Category
4. Hindustan Unilever Limited, 1st Runner Up, Community Initiatives Category
5. HSIL Limited, Winners, Innovation Category

Winners of the Water Awards being felicitated by Shri Montek Singh Ahluwalia, Former Deputy Chairman of the Planning Commission, Government of India, Smt Shiela Dikshit, Former Chief Minister of Delhi, Ms Naina Lal Kidwai, Chairman, FICCI Water Mission, Past President, FICCI and Dr Arbind Prasad, Former Director General, FICCI.


10th Edition of FICCI
WATER
AWARDS
2022

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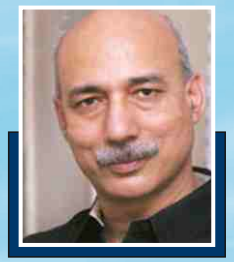
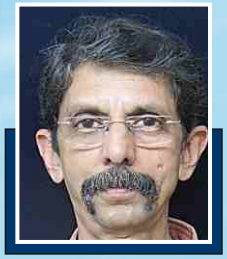
JURY

Dr Mihir Shah
Chair of Jury



Prof AK Gosain
Member of Jury



Dr Himanshu Kulkarni
Member of Jury

Mr VK Madhavan
Member of Jury

Dr Dipankar Saha
Expert Screening Panel

Dr Manoranjan Hota
Expert Screening Panel

CHAIR OF JURY, FICCI WATER AWARDS 2022

Dr Mihir Shah

Chair of Jury, FICCI Water Awards 2022
Distinguished Professor, Shiv Nadar University
Chair, National Coalition for Natural Farming
Former Member, Planning Commission, Government of India

Dr Mihir Shah has spent the past three decades living and working in remote, central tribal India, forging a new paradigm of inclusive and sustainable development, and strengthening Indian democracy through initiatives for people's empowerment, led by women.

From 2009 to 2014, he was Member, Planning Commission, Government of India, holding the portfolios of Water Resources, Rural Development and Panchayati Raj. He is the youngest ever Member of the Planning Commission. Dr Shah was chiefly responsible for drafting the paradigm shift in the management of water resources enunciated in the 12th Five Year Plan. He also initiated a makeover of Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), the largest employment programme in human history, with a renewed emphasis on rural livelihoods, based on construction of productive assets.

In 2019, the Government of India asked him to chair the committee to draft the new National Water Policy (NWP). The draft NWP is under active consideration of the Government of India

Dr Shah graduated in Economics from St. Stephen's College, Delhi University (where he won the prestigious KC Nag Economics Prize) and did his post-graduation from the Delhi School of Economics (where he was Merit Scholar) in the 1970s, before going on to complete a much-acclaimed doctoral dissertation at the Centre for Development Studies, Kerala. After teaching for some years at the Centre, he resigned to explore fresh terrain beyond the ivory towers of conventional academia, which culminated in 1990 in the formation of Samaj Pragati Sahayog (SPS), headquartered in a remote tribal village of MP. Inspired by the life and work of Baba Amte, SPS is today one of India's largest grass-roots initiatives for water and livelihood security.

Dr Shah is Distinguished Professor, Shiv Nadar University, where he has designed a globally first-of-its-kind Masters Program on Water Science and Policy. He is a Founding Signatory of the Geneva Actions on Human Water Security, 2017. He was a Member of the International Steering Committee of the CGIAR Research Program on Water, Land and Ecosystems (WLE) from 2012 to 2018.

His research papers have been published extensively in pre-eminent journals such as Economic and Political Weekly, Current Science, Ambio, Hydrogeology Journal, Journal of Hydrology, Contributions to Indian Sociology, Review of Development and Change, Seminar and Indian Journal of Labour Economics.

Dr Shah has addressed audiences on his life's work all over the world from Stanford University to the World Bank in Washington, the OECD in Paris, the Arctic Circle in Iceland, Chatham House and University College, London, University of Cambridge, England, UNESCO-IHE, Delft, International Institute for Applied Systems Analysis, Austria, the EAT Forum, Stockholm, the Himalayan University Consortium in Chengdu, China, International Water Management Institute, Colombo, the Asian Development Bank, Manila and the Singapore Water Week. He was the Keynote Speaker at the Global Water Summit at Rome in 2012 and the International EcoSummit Congress at Montpellier in 2016.

JURY MEMBERS

Prof A K Gosain

Professor, Department of Civil Engineering
Indian Institute of Technology- Delhi

Dr. Ashvani K. Gosain, is an Emeritus Professor in the area of Water Resources Engineering and GIS

Technologies, in the Civil Engineering Department, IIT Delhi. Prof. Gosain pioneered the climate change impact assessment on Indian water resources that was incorporated in the NATCOM I & II – two National Communications made to the UNFCCC. He has also been reviewer for AR4 and AR5 of IPCC.

Prof. Gosain has served on many prestigious assignments within and outside the country. Twenty-six students have completed their Ph.D. under his supervision. Prof. Gosain contributed to the formulation of the Ganga River Basin Management Plan (GRBMP), of which he was the Team Leader of the Water Resources Management group. He has also formulated the Drainage Master Plan of NCT of Delhi for the Delhi Government. He is part of the expert committees appointed by the National Green Tribunal to suggest solutions to deal with the ever-increasing pollution levels in Ganga and Yamuna. Prof. Gosain has to his distinction the formulation of the Ganga Act on behalf of the Ministry of Water Resources, River Development & Ganga Rejuvenation, as a member of the committee. Recently, Prof Gosain served as member on the Task Group on "Water, Agriculture and Food Security" constituted for formulation of India's new Science, Technology, and Innovation Policy (STIP 2020).

Dr Himanshu Kulkarni

Founder Trustee and Executive Director,
Advanced Center for Water Resources
Development and Management (ACWADAM)

Dr Himanshu Kulkarni leads ACWADAM, a not-for-profit knowledge institution and think-tank working on groundwater since 1998. He is a hydrogeologist by qualification and has been working on aquifers and groundwater across India's diverse groundwater typology for more than 35 years. ACWADAM has partnered with a variety of organisations on piloting and mainstreaming the ideas of participatory groundwater management and springshed development across India, neighbouring Nepal, Bhutan, Vietnam and has begun work in Africa. ACWADAM's work under Dr Kulkarni has followed the principle of bringing communities closer to their aquifers and managing groundwater as a common pool resource through the process of Aquifer-based Participatory Groundwater Management. He has, through ACWADAM, steered the concept of hydrogeology based 'springshed' management that has now become so important from local to national levels in India and its neighbouring regions.

Dr Kulkarni has, before co-founding ACWADAM, worked at Pune University for 13 years, after which he also worked with the corporate sector for a couple of years. Through ACWADAM's collaboration with educational institutions, Dr Kulkarni works as adjunct faculty and course advisor at Shiv Nadar University for the post-graduate course on Water Science and Policy. He is also visiting faculty and a member of the Board of Studies at TISS, Mumbai. He is also on the BOS of one of Pune's and India's oldest institutions, the Fergusson College in Pune. He actively continues to teach, guide and mentor students, also publishing his key research findings while working at the grassroots and in policy domains. He has supervised 2 PhDs and many post-graduate dissertations. Dr Kulkarni continues to advise various State Government Agencies and the Central Government. He has held many advisory positions on various committees of the Government. He was also a member of the committee that is drafting India's new National Water Policy during 2019-20. Dr Kulkarni has anchored several international action research collaborations in the subject of groundwater, particularly in his lead role at ACWADAM. He has also been on several juries for water related awards in India.

Mr VK Madhavan

Chief Executive
WaterAid India

Madhavan has spent fifteen of the last three decades living and working in rural India. First in the desert districts of North-Western Rajasthan with the Urmul Rural Health Research and Development Trust till 1998 and then from 2004 to 2012 in the Kumaun Himalayas with the Central Himalayan Rural Action Group (CHIRAG). In the interim period, Madhavan worked on policy issues with ActionAid, worked as an independent consultant and then on women's leadership and governance with the Hunger Project. Since May 2016, Madhavan has been the Chief Executive of WaterAid India. In the past three decades, Madhavan has worked on an integrated rural development – community health; primary education; investing in young people and particularly adolescent girls; natural resource management – community forestry, watershed development, recharge of springs, water conservation, drinking water and on-farm and off-farm livelihoods.

EXPERT SCREENING PANEL

Dr Dipankar Saha

FFormer Member (HQ), Central Ground Water Board,
Ministry of Jal Shakti
Former Member Secretary, Central Ground Water Authority

Dr Saha is a former of Member (Head Quarters), Central Ground Water Board, under Ministry of Jal Shakti, Government of India. He had also served as Member Secretary, Central Ground Water Authority and Head of Rajiv Gandhi National Ground Water Training and Research Institute, Raipur. He spearheaded the National Aquifer Mapping and Management Programme, the largest ground water mapping endeavour in the world, as National Coordinator. He obtained PhD on Ground Water Management from IIT-ISM, Dhanbad.

He has authored 48 papers published in International Peer Reviewed Journals and delivered more than 300 lectures and keynote addresses in national and International Seminars. Professionally trained from Asian Institute of Technology, Bangkok and from JICA, Tokyo, he represented the country and presented papers in World Bank session at Kathmandu, International Atomic Energy Agency at Ho-Chi Minh City, and Vienna, World Water Week – Stockholm, India-UK Water Security Exchange- Wallingford, Oxfordshire, IAH Congress in Dajeon, Korea, Lincoln University UK, led the Govt of India Delegation to Myanmar and remained part of the Govt of India Delegation to IEH, England . He edited two books on to water exploration, monitoring and policy issues, published by Springer and special volume of Journal of Hydrology-Regional Studies.

He is the recipient of National Geoscience Award – 2010, conferred by Ministry of Mines and Excellence in Ground Water conferred by International Association of Hydrogeologist-Indian Chapter in 2014. He has also conferred with Eminent Engineers Award 2019 by Indian water Resources Society, Roorkee. Post Superannuation he worked as Advisor Ground Water, Govt of Gujarat, Adjunct Professor IIT Kharagpur, Consultant to International Water Management Institute. He is presently Chairman of the Committee on Accreditation of Groundwater Consultant Organisation under Quality council of India.

Dr Manoranjan Hota

Member, Expert Appraisal Committee of MoEFCC,
Member, EIA Accreditation Committee of QCI-NABET
(Former Adviser/Scientist "G", Ministry of Environment,
Forest and Climate Change, Government of India)

Dr. Manoranjan Hota, M.Phil; Ph.D., worked in Ministry of Environment, Forest and Climate Change (MoEFCC) and Central Pollution Control Board (CPCB), has 38 years of professional experience in the field of Environmental Management which include Environmental Impact Assessment, Pollution Control, Chemicals & Waste management, Sustainability and Environmental Governance, Environmental Health, Environmental Management & Environmental Audit, Policy planning, Research, Life Cycle Assessment, Biosafety, environmental law enforcement, monitoring and compliance.

He is an Expert Member in Expert appraisal Committee of MoEFCC, EIA Accreditation Committee of QCI-NABET, and OECD Expert Group on Best Available Technology (BAT).

He has professional trainings which include Environmental Management & Audit, Impact Assessment in University of Aberdeen, U.K.; Pollution Control training in the University of Ottawa, Managing Global governance at InWent and DIE in Germany, Life Cycle Assessment, etc.

He was National Project coordinator of the World Bank projects on Pollution Control; Hazardous waste management and implementation of the WHO country programme in Environmental Health in India.

Besides, He was the UNEP Regional Advisor for Biosafety Clearing House and also has experience of other Multilateral Environment Agreements (MEAs) in chemicals and wastes by representing India in negotiations in the Minamata Convention, Rotterdam Convention, ICCM.

He was the Regional Coordinator for Strategic Approach for International Chemicals Management (SAICM) for the Asia-Pacific region; Member, Chemicals Review Committee, Rotterdam Convention of Prior Informed Consent on international trade of hazardous chemicals; Chair, UNEP Asia-Pacific Mercury Storage Programme Member, UNEP Mercury Global partnership Programme and represented India in the UNEP Intergovernmental Negotiating Committee meetings on Mercury.

10th Edition of FICCI WATER AWARDS 2022

AWARDEES 2022

CATEGORY

Industrial Water Use Efficiency

1st Prize

Honda Motorcycle & Scooter India Pvt. Ltd. (Narsapura)

CATEGORY

Industrial Water Use Efficiency

2nd Prize

Hindalco Industries Ltd. (Belagavi Unit)

CATEGORY

Innovation in Water Technology

1st Prize

The Energy and Resources Institute (TERI)

CATEGORY

Innovation in Water Technology

2nd Prize

Taylormade Renewables Ltd.

CATEGORY

Innovation in Water Technology

Special Jury's Award

Centre for Environment Concerns

CATEGORY

Community Initiatives by Industry

1st Prize

Hindustan Unilever Ltd. (Khamgaon Factory)

CATEGORY

Community Initiatives by Industry

2nd Prize

Coastal Gujarat Power Ltd.

CATEGORY

Community Initiatives by Industry

Special Jury's Award

Talwandi Sabo Power Ltd.

CATEGORY

Urban Wastewater Management

Special Jury's Award

The Administration of Aurangabad (AMC & ASCDCL)

FICCI WATER AWARDS 2022
Category


10th Edition of FICCI
WATER
AWARDS
2022

INDUSTRIAL WATER USE EFFICIENCY

Honda Motorcycle & Scooter India Pvt. Ltd. (Narsapura)

Mr. Atsushi Ogata
Managing Director, President & CEO
Honda Motorcycle & Scooter India

"Since inception, Honda Motorcycle and Scooter India has continuously endeavoured to imbibe sustainability and create a better society through its products, services and activities. Our efforts and initiatives for achieving benchmark performances at Narsapura Plant in water conservation and Rainwater Utilization have been aligned with our global vision of "Striving to be a Company that Society Wants to Exist"

Cognizant of the potential for business activities to impact upstream and downstream water resources, Honda is also focusing on the conservation of water resources. Through Honda's proprietary technologies and business activities, the Company works to deal with effective utilization of resources, climate change issues, energy issues, and preservation of clean air, which are outlined as challenges in the materiality matrix, with an aim to realize a zero-environmental impact society in the future. In addition, to minimize water use, various business sites are implementing initiatives based on regional circumstances, such as rainwater harvesting, utilization of recycled water and water conservation.

HMSI's Water Excellence Journey

100% Self Sufficiency through Rainwater Utilization-Water Positive Within the Fence

HMSI's Narsapura Plant was established in 2013 at Kolar district of Karnataka. The current production capacity of the factory is 2.4 Million two wheelers per year, making it Honda's largest two-wheeler manufacturing factory globally. The water requirement for such a huge factory is high and hence, water risk was one of the important decision-making aspect that was analysed during the factory's design and planning stage. The groundwater levels of Kolar district of Karnataka state are considered as over exploited. Further, due to lack of enough surface water sources, it was a challenge to run a world scale facility in such an environment.

In alignment with the Global Honda Direction of "Striving to be a Company that Society wants to Exist", our management evaluated all viable options for meeting the factory's water demand with minimum adverse impacts on our stakeholders and the environment. On analysis of the rainfall patterns at Kolar district, rainwater harvesting potential inside the factory premises and technologies available for rainwater treatment, it was decided to rigorously utilise the most sustainable source of water-rainwater for meeting the factory's water demand. HMSI Narsapura initially built two rainwater collection tanks of capacity 47000 KL (one open tank and one closed tank) to collect and utilize the rainwater which falls in the premises for domestic and Industrial purpose. During the factory expansion that happened in the 2017, as there was an overall increase in water demand, one more closed rainwater

collection tank of capacity 33000 KL has been built to increase the storage capacity to 80,000 KL. These tanks ensure that the water collected from rooftops and surface runoffs during rains in the monsoon season are stored for treatment and utilization as per requirement.

Underground Tank-1
24,000 KL Capacity

Open Water Tank-2
23,000 KL Capacity

Underground Tank-3
33,000 KL Capacity

During the course of implementation of the above project, several challenges were faced initially, as the use of treated rainwater as the only source of water was new for the industrial sector in India. Through in-house PDCA and several modifications in the treatment schemes, optimal treatment schemes for both rooftop rainwater and stormwater runoff were identified. Further, methodologies and procedures were developed in-house for management of tank levels and water transfer frequencies so that the rainwater collected could sustain the factory water demand in the summer months also.

As a combined result of the above, HMSI, Narsapura is currently able to meet the entire factory's water requirement with only rainwater since 2018 making us one of the first large scale industry in India to achieve water self-sufficiency.

In addition to this, four rainwater harvesting pits are installed at various locations with the factory using modular cross wave structure for groundwater recharge. Due to zero depletion of groundwater and addition of groundwater recharge structures our groundwater levels have also increased. This has enabled HMSI, Narsapura to become "Water Positive Within The Fence".

In addition to the above, several initiatives have been taken to Reduce, Reuse, Recycle and Upcycle water and wastewater within the factory.

Step 1: educe: Source Reduction

i) Design Phase:

- **Air handling units for cooling instead of water washers:**

Air handling units are installed for shop cooling and HVAC in HMSI Narsapura instead of water washers which would have consumed large amounts of water.

Before	After
Water Washers	Air Handling Units
	

Air Handling Units does not require water for shop floor cooling

Air Handling Units at Site

- **Air cooled screw compressors:**

Air cooled screw compressors are installed in company for all compressed air requirement inside the shop floor. This also enabled us to recover the waste heat from the lube oil enabling both energy efficiency and water conservation.

Before	After
Centrifugal Compressors with Cooling Tower	Air Cooled Screw Compressors
	

Air Cooled Compressors are installed for zero water consumption

Air Cooled Screw Compressors

- **Air cooled chillers:**

Chillers which are used for shop cooling are designed as air cooled chillers instead of water cooled.

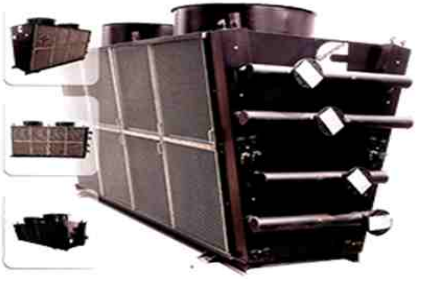
Before	After
Water cooled chillers	Air Cooled Chillers
	

Air Cooled Chillers does not consume water

Air Cooled Chillers

- **Coil coolers for DG in the place of Radiators:**

HMSI Narsapura has 10 DG sets to generate electricity during power failures. All these DG are retrofitted to run with air cooled coil coolers in the place of conventional water-cooled Radiators.

Before	After
Water Cooled DG	Air Cooled DG
	

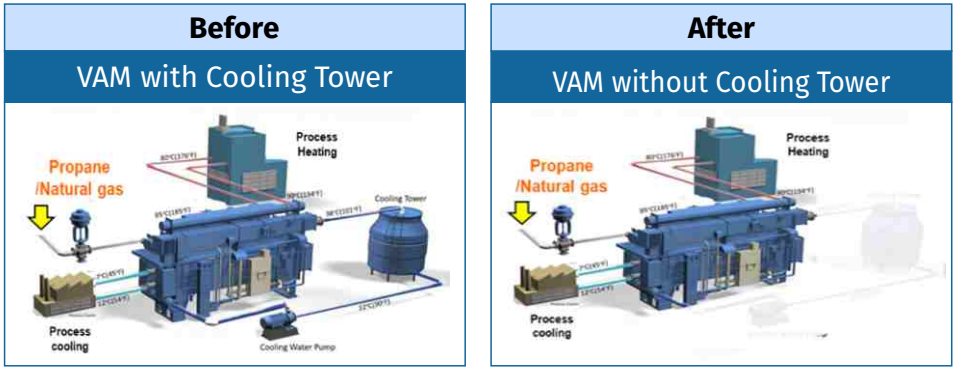
Air Coil Coolers are installed for DG Cooling eliminating cooling tower requirement

Coil Coolers for DG

ii) New technology:

- **Vapour Absorption Machine:**

HMSI Narsapura has evaluated and implemented a unique VAM technology that is different form the conventional VAM system. The VAM units installed at HMSI, Narsapura by design does not require cooling tower. This patented technology of VAM without cooling tower is relatively new and is an improvement over the conventional VAM systems that require cooling tower. Further, intangible benefits include replacement of steam from boiler through use of hot water from VAM leading to steam loss reduction and further water savings.



New Technology VAM system implemented that does not require Cooling Tower

VAM without Cooling Tower

- **Implementation of magnetic module in PT area:**

In the phosphating process, due to phosphate scale formation on the line, cleaning of phosphate raisers and Heat Exchanger were earlier required on weekly basis which consumed 400 KL of water per year. Magnetic module has now been installed in the phosphating line which generates magnetic field and cause phosphate molecule to form regular crystalline structure which exhibit lower lattice energy, reduced covalent bond formations within crystals leading to smaller particle size and due to smaller size, they remain suspended in fluid thereby avoiding precipitation & scale formation.

Magnetic Module

Magnetic Module Installation

- **Installation of EDRO in paint shop:**

In the conventional process of Electro Deposition (ED) in paint shop, a single stage filtration system (Ultra Filtration System) was used for recovering the ED paint material which was having a recovery rate of 96.68%. This also required a De-Ionized water top up of 2016 KL/Annum. Existing process has been replaced with the two-stage filtration system (Ultra Filtration & Reverse Osmosis) to increase the ED recovery percentage from 96.68% to 99.49%.

Electro Deposition Reverse Osmosis System

- **Zirconium coating in pre-treatment:**

Zinc phosphate was conventionally used in phosphating process of paint shop. The present phosphating process requires larger water consumption and heating is required as the process occurs at 45-500C. The proposed method of Zirconium coating involves usage of a proprietary zirconium compound that requires less water for the process and happens at room temperature, thereby reducing the need for hot water. With the zirconium coating in pre-treatment in ABS line of Paint shop, water consumption and heating process has been eliminated resulting elimination of heat exchanger cleaning and steam consumption reduction.

Electro Deposition Reverse Osmosis System

Step 2: Reuse:

- **Quality based blowdown in Paint shop, Weld shop & Cooling tower:**

1. Quality (TDS Parameter variation in PA process) based blowdown method is opted in paint shop to avoid unnecessary frequent blowdown. In this method, earlier blowdown was being done once every shift irrespective of water quality. However, it was found that blowdown water volume can be reduced if TDS is monitored and this water can be reused for longer time in the same process.
2. Quality (Turbidity & Color Parameter variation in leak testing process) based blowdown method is opted in weld shop to avoid unnecessary frequent blowdown. At the beginning of every shift, blowdown was done as per Quality standard requirement in Weld shop leak testing

machines. However, it was found that with turbidity and colour testing, this water can further be used for several more cycles. In the current method, the shift engineer from environment visits the location and tests the water quality before deciding on whether to do blowdown as per set limits.

3. The most important in parameters in cooling tower is pH and Conductivity (Microbiological fouling, corrosion, Scaling etc.). Blowdown & Top up of cooling tower is controlled by installing the online TDS and pH measuring instrument system so that it results in avoiding unnecessary frequent blowdown.

4. Reusing of Weld shop blowdown water by optimizing the treatment system in ETP. Based upon ETP incoming water quality parameters (TDS, Turbidity, pH & TSS), the shift engineer decides the treatment system required for such effluents. In case, the effluent can be fed directly into the secondary or tertiary treatment stages without primary treatment, then such effluents are mixed accordingly. This helps in reducing the water, waste, energy and resources in the primary treatment stages.

Step 3: Recycle:

i) Implementation of phytoremediation system:

Phytoremediation is a bioremediation process of wastewater with the help of plants. In this method, wastewater / sewage is made to pass through a pond full of Phyto (plants). Some of the commonly used plants in this system are Alocasia, Typha, Heliconia and Cyperus papyrus. Roots of these plants absorbs water, nutrients and minerals. Facultative microbes are added into the system which symbiotically work with the plants and increase the efficiency. This system unlike the conventional method of Sewage water treatment uses very less power, less manpower and zero chemicals. There is no sludge generation as well as compared to the conventional method. A 50 KLD pilot project is implemented at HMSI-Narsapura.

Phytoremediation System for Sewage Treatment

Membrane Bio Reactor System

ii) Installation of MBR in STP and ETP:

In STP, sewage is being treated using the conventional activated sludge process followed by MGF and ACF which consumes more water for backwash. A latest technology MBR is installed in STP which eliminates water consumption through savings in backwash of UF, MGF and ACF. In addition, the usage of MBR will also result in lesser chemicals and sludge generation from the process.

iii) Installation of highly efficient UF membranes in STP:

In the existing process of STP, membranes which are of low permeate recovery (80%) are being used and these are replaced with the High efficiency UF membranes which is having a permeate recovery percentage of (85%) and hence the reduction in water consumption. The advantage of high efficiency membranes is that in addition to higher recovery, these membranes have quality based backwash monitoring systems that generates alarm on basis on recovery, thereby enabling optimal backwash and avoiding wastage.

High Efficiency UF Membranes

iv)Installation of Highly efficient disc and plate type membrane and Waste Heat Evaporator:

Highly efficient disc and plate type membranes are installed in ETP in the place of conventional three stage RO system. These membranes have a remarkably high efficiency of more than 93%. The advantage of these membranes is that they are totally SCADA controlled and composes of only two stages thereby requiring lesser backwash volume. In addition, these systems can be operated at higher pressures with more feed TDS, thereby enabling us flexibility in terms of feed quality. Reject from these membranes are sent to Waste Heat Evaporator which is operating in the place of conventional MEE which uses steam from the LNG fired boilers.

High Efficiency Disc and Plate Membranes

v) Installation of EDI for ETP:

In the conventional process, RO permeate water from ETP passes through mixed resin bed manually operated DM plant to generate DI water for paint process. This system requires weekly backwash and regeneration twice in a month resulting in water wastage. An automated EDI system which runs through a chemical free process involving ion exchange membranes that removes ionized and ionizable impurities has been installed to replace the existing DM plant which eliminates the process of backwash and regeneration and hence saves water and chemical consumption.

Electro De-Ionization System

iv) Installation of Decanter for sludge handling:

Existing process of STP and ETP uses Filter press for sludge handling and removal. This is bulky requiring large surface area and runs on manual mode. Due to its manual operation, it requires daily cleaning resulting in more water consumption. On the other hand, Decanter is an automatic machine and requires comparably very less space than Filter press and does not require daily manual cleaning and hence saving water required for cleaning purpose.

Decanter Centrifuge

Upcycle:

iiv) STP water upcycling to use as industrial water:

In STP, reject water was treated through ACF and MGF and the permeate was conventionally sent for toilet flushing and garden consumption only. The exact requirement for toilet flushing and garden consumption was evaluated, and options were examined to further optimize this requirement. It was found that the water requirement for garden could be optimized through drip irrigation and could be eliminated in monsoon seasons. Further, the water requirement for toilet flushing was varying depending on the manpower count. The flushing systems in urinals were changed from manual to automatic in areas of high consumption. In the modified process, an additional UF treatment system has been installed and a portion of treated water is sent to ETP for further treatment. At the ETP, this effluent is passed through RO and the permeate is sent to shops as industrial water. The remaining water from the UF is sent for toilet flushing and gardening.

STP Treatment

IMPACT:

I. One of the Only large-scale factory in India where 100% factory water requirement is met throughout the year by rainwater collection and utilization with zero groundwater withdrawal and zero external water supply since last five years.

II. Lowest specific water consumption among automobile companies in Asia Pacific region.

III. Water positive within the fence and groundwater augmentation in neighbouring villages.

IV. Zero Liquid Discharge factory since inception through implementation of several state of the art recycling technologies such as three stage high efficiency Reverse Osmosis, Waste Heat Evaporator, Electro De-Ionization and Membrane Bio-Reactor for wastewater reuse.

V. 85% of the process water requirement is met with recycled water only. Only evaporation losses and other losses are made-up with fresh rainwater.

VI. Award by Central Ground Water Board for "Advance Technology used in Rainwater Harvesting". Technology used - Cross wave structure (SEKISUI, Japan)

VII. 1st prize in Best Large-Scale Industry category in National Water awards by Ministry of Jal Shakti, Government of India - 2019.

Hindalco Industries Ltd. (Belagavi Unit)

T. V. Narendran
CEO & MD, Tata Steel

"If you save water, water will save you. It is better to conserve water now to conserve life in future"

Brief message from CEO on long-term water sustainability plan

As a global metals business working across the aluminium and copper value chains with operations in 13 countries, sustainability is at the very core of Hindalco's operations. Hindalco is strongly committed towards Environment, Social & Governance (ESG) and on the Environment front the key focus points are:

- Continued Emphasis on Recycled Content & Circular Economy for Waste Management (Red Mud, Fly Ash & SUP)
- Net Carbon Neutrality, Zero Waste to Landfill, No Net Loss on Biodiversity & Water Positive in Mining Locations by 2050
- Reduce 20% specific freshwater consumption by 2025 against the baseline of FY 2018-19
- Achieve Zero Liquid Discharge status by 2025 across all our plants

Specifically in terms of Water Stewardship, water is considered as one of the most critical shared resources of the planet and equally important for our business continuity. At Hindalco, we understand the importance of effective and efficient usage of water and have adopted a structured approach to ensure water security in areas where we operate.

We have defined Water Management Task Force (WMTF) at all units. WMTF identifies risks pertaining to water consumption and plans for mitigation by taking up relevant projects to achieve the targets. The task force meetings are conducted regularly at unit level and the progress of initiatives is presented to the Chief Sustainability Officer twice a year.

For water risk assessment we have deployed World Business Council for Sustainable Development's (WBCSD) India Water Tool (IWT) and World Resource Institute's (WRI) Aqueduct tool. We have framed our strategy in line with TCFD framework based upon multiple scenario analysis such as RCP 2.6 to RCP 8.5 which proactively helps in understanding future possibilities and facilitate financial decision making for the business. We have a total of 5,885 KLD worth water efficiency projects completed, with 9,873 KLD worth of projects under implementation and 12,923 KLD worth projects being conceptualized.

Hindalco has adopted processes to recirculate, reuse and recycle the outlet process water to achieve Zero Liquid Discharge (ZLD) and reduce fresh water consumption. At our Belagavi unit, fresh water consumption has been reduced by 49% in 2021-22 v/s baseline 2018-19. Belagavi plant harvests rain water and uses the same for controlling fugitive dust emission in Dry Red Mud Disposal Area (DRDA). They are also equipped with 450 KLD Sewage Treatment Plant (STP) and the treated water is used for gardening purposes.

Hindalco is committed to operating in an environmentally conscious and socially responsible manner. We aspire to become the industry benchmark in our sustainability performance and, to achieve this, are continuously evolving and improving our business practices.

Name of the Organisation: Hindalco Industries Limited

Location: Belagavi, Karnataka

Name of the Initiative: Long-term Refinery Operation through Sustainable Water Management

Brief about the Initiative:

A) Major reasons for water conservation at Belagavi refinery are,

1. Entire water supply is coming from Hidkal reservoir both for industry and for domestic. The reservoir storage is purely dependent on rains in the catchment area, hence, it is thus essential to be self-reliant on water usage
2. Fresh water from Corporation is very expensive and water rate is going to be increased almost by double the existing rate in the coming days
3. Earlier, treated water from ETP was discharged to outside public pond. Treated water has some metallic traces, which is not permitted for discharge as per CPCB guidelines. Also, no proven viable technology is available for removal of metallic traces from treated water

Looking at various criticalities, a project was initiated aiming reduction of freshwater consumption in the refinery by recycling treated process effluent back into process. The project had been divided into two major heads.

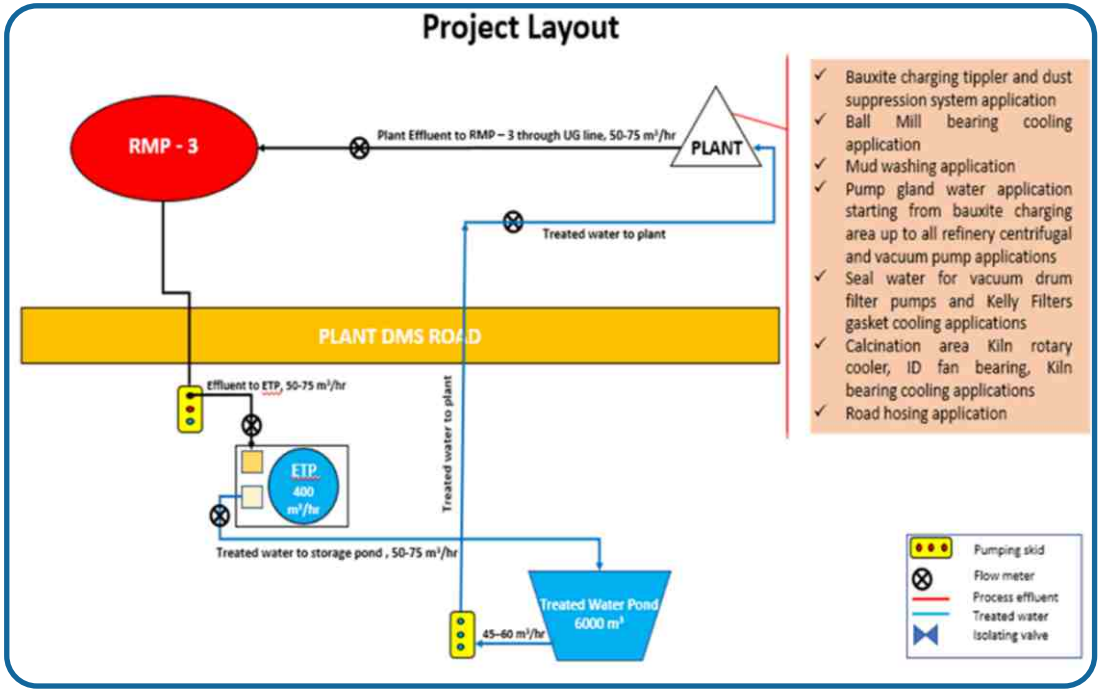
a) Dedicated freshwater line for treated water transfer

b) A lined treated water storage pond of 6000 cu.m with required pumping facility

Below are the areas where fresh water got replaced with treated water.

- Bauxite charging tippler and dust suppression system
- Ball Mill bearing cooling
- Mud washing
- Pump gland water
- Seal water for Kelly Filters gasket cooling
- Road hosing

With the suitability of various process applications, total usage of treated water has been maximized in the process and reduction of fresh water realized by 49% in 2021-22 w.r.t the baseline year 2018-19.



B) Project Glimpses & Expenditure

Lined pond : 6000 cu.m

Project Expenditure : Rs 48.0 Lac

Dedicated pipeline of ~2.5 Km

Project Expenditure : Rs 37.0 Lac

Project installation and commissioning phase

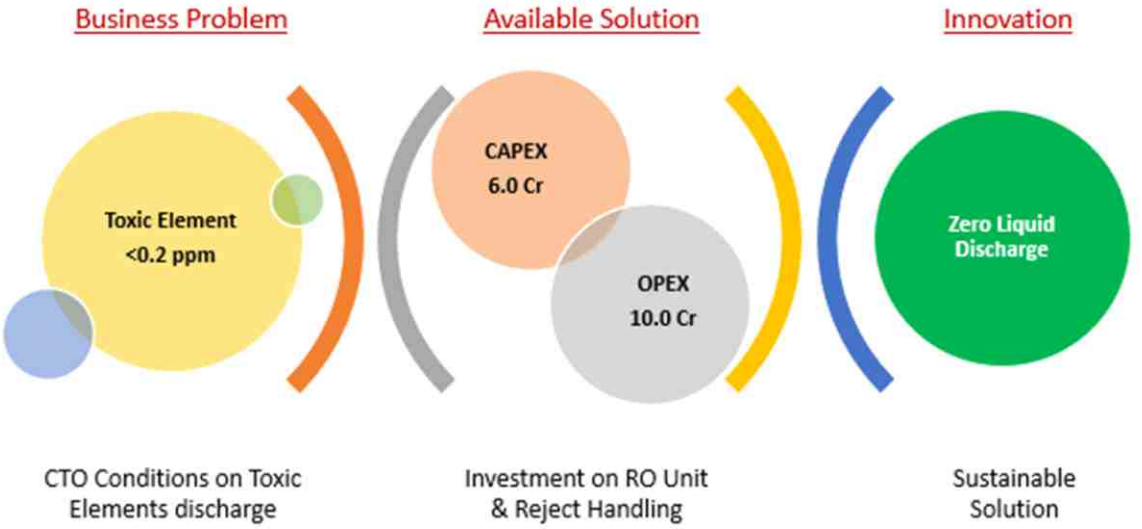


Project post commissioning phase (Treated water storage pond):

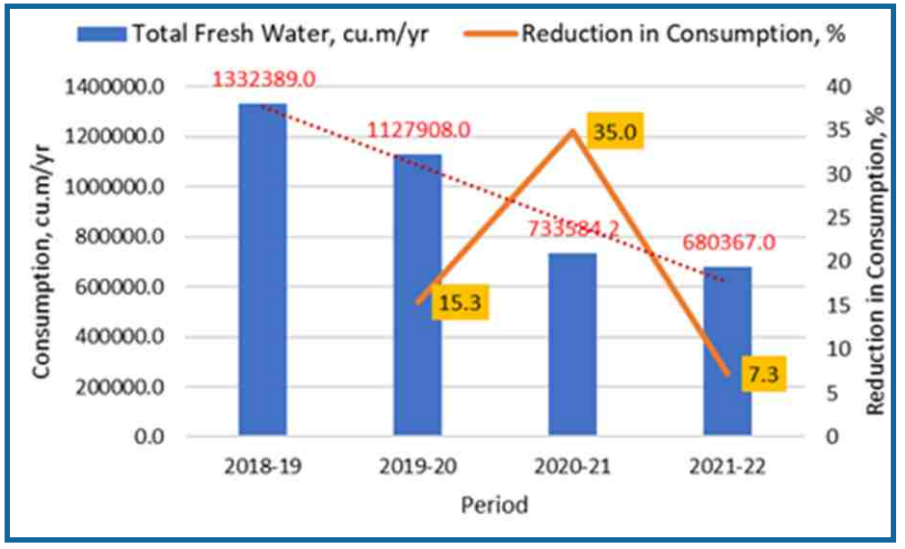
C) Benefit: Long-term sustainable refinery operation

- Novelty of this Initiative: Intangible Gain





- Reduction of fresh water consumption : Tangible Gain



Reduction in Fresh Water consumption by 49%

Savings of Rs 5.50 Cr in last 3 years

D) Recognitions

Appreciation in MD's Message

MD's Message on World Water Day

The UN theme for World Water Day 2021 is Valuing Water. Water as a finite resource and a critical raw material in our mining, power plants and manufacturing processes.

At Hindalco, water has been a long-term focus area. Today, in many of our units, water scarcity is a looming risk as availability of water is getting worse and more difficult each year. Our aim therefore is to 'reduce water consumption and recycle every drop of water we use'. We are aiming for 5% reduction in fresh water consumption year on year. I would like to appreciate some of the water-related initiatives at our sites.

Recycled water consumption is 24% in Aluminium and 18% in Copper in FY21. Specific water consumption has reduced year on year basis. **We are working towards making all of our units 'Zero Liquid Discharge' by FY25, which would enable us to increase the circular use of water.**

Belagavi has led the way, reducing significant fresh water usage by 40% with savings to the tune of 530,000 m^3/Year. Dahej has completed the construction of a Tertiary Water Recycling Unit which will enable complete RO reject recycling and bring about fresh water savings of about 3,65,000 m^3/year. In the downstream business, Mouda has created a Rain Water Harvesting structure with an additional capacity of about 35,000 m^3, totalling > 1 lakh m^3 of rain water storage within the premises for use in the process.

We have begun several initiatives to ensure water security for the local community through rainwater harvesting. Muhan Aluminium won the 'CII National Award for Excellence in Water Management' in the category **Beyond the Fence** in FY21, for the extensive work in water shed management, multiple check dams, reservoirs and ponds developed in nearby areas for communities' water need, giving back almost 1 million m^3 of water".

I appreciate the dedicated efforts made by the operations, maintenance, innovation and environment teams and Water Champions in implementing innovative water conservation solutions. These include shifting to mist spray type dust suppression system from conventional water sprinkling. For new projects, lower specific water consumption is a key design consideration and important criteria for technology selection for example Flue gas desulphurisation (FGD) projects with semi dry or dry instead of wet system.

Lastly, I believe we will achieve our goals not only through process water use optimization but by contributions made by each one of us in offices or homes. I implore you to find ways to save water in your day-to-day lives. No matter how small they seem, let me assure you if all of us devote a little bit of our energy in conserving this precious resource, it will add up to a significant pool of water saved.

Regards,

Satish Pai

27.05.21

Belagavi has led the way, reducing significant fresh water usage by 40% with savings to the tune of 530,000 m^3/Year. Dahej has completed the construction of a Tertiary Water Recycling Unit

Published in
1. ABG media sharing
2. Sustainability Conference

Recycling was the first step and the unit built a 6,000 cubic metres lined pond to store water for treatment and reuse along with pumping facility and pipelines for the transfer of treated water from the treated water pond to the Refinery. The unit has even installed 25 waterless urinals at the facility. An on-site Sewage Treatment Plant (STP) of 450 KLD capacity has been commissioned for domestic wastewater treatment. The treated water is used for gardening in the surrounding area and staff colonies.

These measures have helped. The refinery's monthly consumption of 10 kL freshwater has reduced by around 40 per cent, along with additional savings of 4 million per annum for the unit.

Hindalco's Alumina Refinery, Belagavi

- a 6,000m3 lined holding pond for treated water
- 25 waterless urinals at the refinery
- 450m3/D STP for domestic water treatment

The impact

- 40% reduction in freshwater consumption for operations
- Annual cost saving of Rs.24 million
- Domestic water consumption reduced by 12,500 cmpc/month

Appreciation by CSO

Certificate of Appreciation


10th Edition of JCCI
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FICCI

INNOVATION IN WATER TECHNOLOGY

The Energy and Resources Institute (TERI)

THE ENERGY AND RESOURCES INSTITUTE
Creating Innovative Solutions For A Sustainable Future

Dr. Vibha Dhawan
Director General
The Energy & Resources Institute (TERI)

"As UN SDG 6 is closely linked to all other SDGs, therefore all sectors need to improve the way water resources are managed and utilized. A cross-sectoral approach should be the way forward, together with better water management, governance, policies, compliance, financial support, and collaborative mechanisms to validate and ensure water security for all."

Dr. Nupur Bahadur
(Inventor of TADOX® Technology)
Senior Fellow & Head, NMCG-TERI Centre of Excellence on Water Reuse, TERI

Brief Message:

With the water crisis looming large and freshwater availability increasingly becoming scarce, contaminated and costlier, it becomes imperative for Industries and Urban Local Bodies (ULBs) to adequately treat wastewater at source and reuse. In order to support and make National Missions truly successful, we have to make wastewater treatment and management highly resource and energy efficient, much more sustainable, affordable, robust and future ready with augmentation of capacities within existing infrastructure. Thus, it is required to integrate in current systems, novel approaches, and advanced technologies like TADOX®, which could help in meeting these requirements.

Name of the initiative: TERI's Advanced Oxidation Technology (TADOX®) for Industrial and Municipal wastewater treatment and enhancing Water Reuse

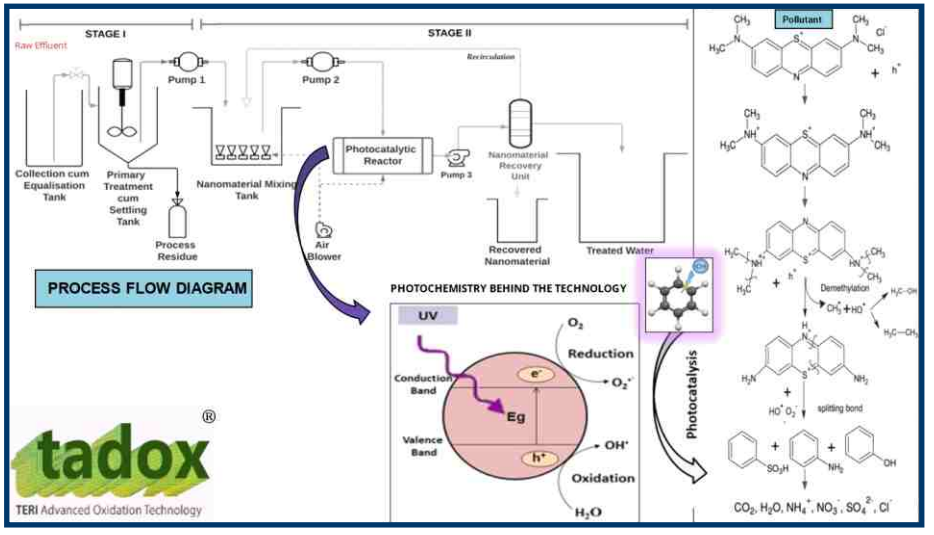
The current wastewater treatment faces various issues of (i) use of a large amount and large number of chemicals, which leads to secondary problems associated with large amount and toxic sludge generation, disposal and management; (ii) almost all kinds of effluents are treated with a similar approach, without understanding the composition and requirement of treatment, (iii) high dependence on biological treatment systems, which involves large footprint, prone to shock loads and inadequate treatment especially in case of industrial effluent treatment, (iv) inadequately treated colored water when goes as the feed to tertiary systems, involving RO/MEE/MVR etc. leads to chocking and biofouling of membranes and create associated problems leading to higher CAPEX and OPEX and make the overall wastewater treatment and management highly unsustainable, unacceptable,

unaffordable and non-compliant. The requirements of National Missions like 'Namami Gange', to achieve 'Nirmal Dhara' (unpolluted flow), and Swatch Bharat Mission (SBM) to achieve 30% and more treated water reuse and possibly COD<30 mg/L and BOD<10 mg/L for high end reuse, seems difficult to be achieved with existing wastewater treatment technologies and systems in place. Hence, it is required to integrate in current systems, novel approaches and advanced technologies which could help in addressing these gaps and challenges and help achieve targets of National Missions.

The Innovation: TERI's TADOX® Technology (TADOX®):

TADOX® involves UV-Photocatalysis as an Advanced Oxidation Process (AOP), where certain nanomaterials (NMs) are mixed with the effluent stream and passed into a Photocatalytic Reactor (PCR) having suitable UV light radiation source; in the presence of which, the NMs are self-activated and in-situ generates hydroxyl radicals, which lead to oxidative degradation and mineralization of pollutants present in the effluent matrix.

TADOX® is under TERI's Patents (to be granted soon) and a registered Trademark with the Govt. of India. This indigenous technology is developed during 2017-2020, through funding support from DST-Water Mission, Water Technology Initiative (WTI) Program of the Dept. of Science & Technology, Govt. of India, together with ONGC Energy Centre as the Industrial partner. Currently the technology is at TRL-7 with a successfully running 10 KLD TADOX® Wastewater Treatment Plant (WWTP) in TERI Gurugram campus since Aug. 2020.



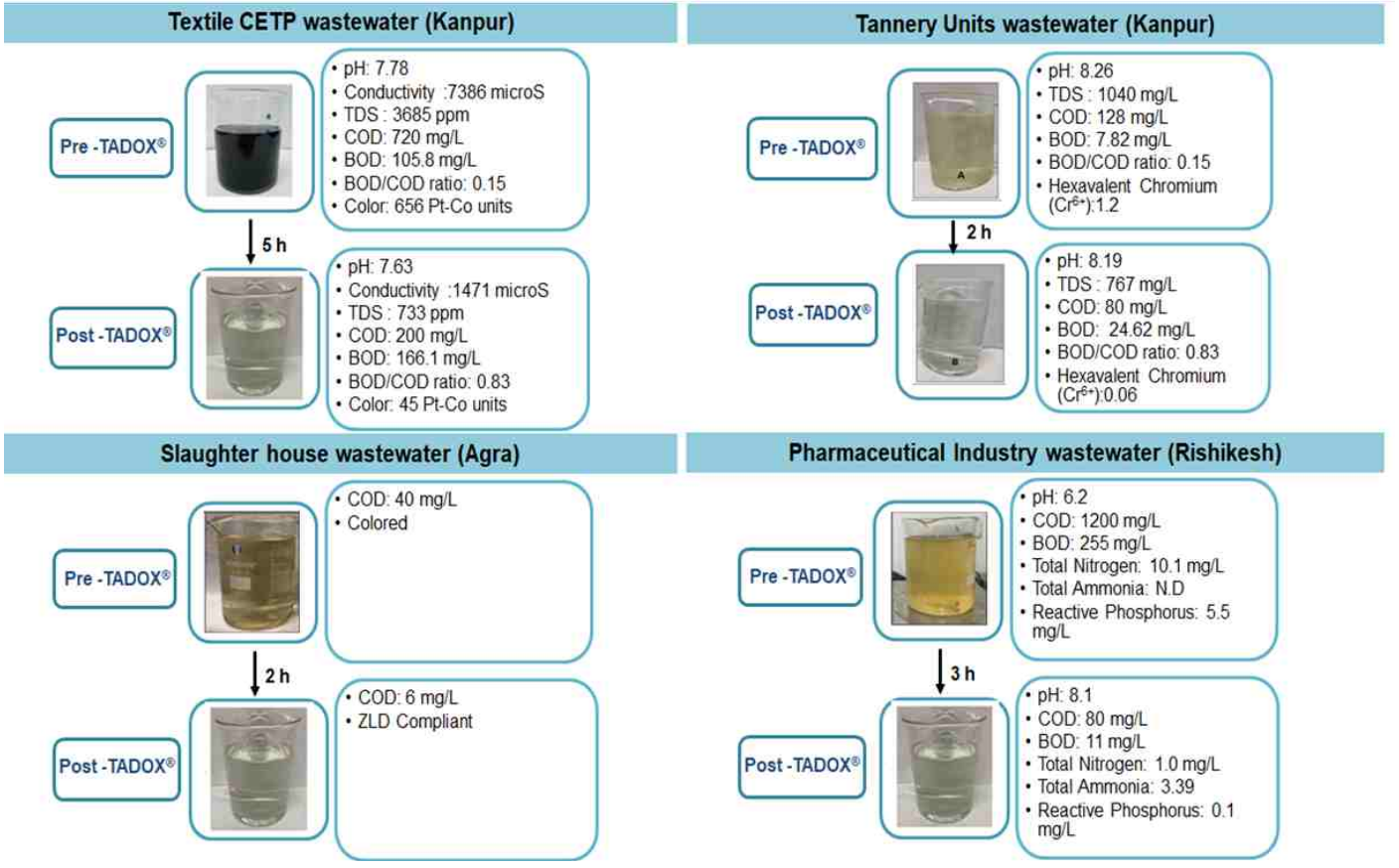
Location: 10 KLD TADOX® Wastewater Treatment Plant (WWTP) in TERI Gurugram Campus

Impact

I: Industrial Wastewater Treatment
Location: Different Industrial sectors and geographies across India

Successful case studies developed with treatment of effluents from grossly polluted industries like textiles, tannery, slaughterhouse, Oil& Gas, Chemical, Pharmaceuticals, Pesticides, electronics, MEE Condensates, Open drains across industrial areas etc. The wide applicability of this technology is also ascertained by different geographies across India, from where TERI received effluent samples, like UP, Uttarakhand, Haryana, Jharkhand, Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh, Telangana, Kerala etc.

A.Case studies of TADOX treatment from Uttar Pradesh & Uttarakhand



B.Case studies of TADOX treatment from Haryana & Kerala

Textile ETP wastewater (Sonipat)

- pH: 10.3
- Conductivity :5144 micromho/cm
- TDS : 2566 ppm
- TSS: 1800 mg/L
- COD: 304 mg/L
- BOD: 24 mg/L
- Hardness: 115 mg/L

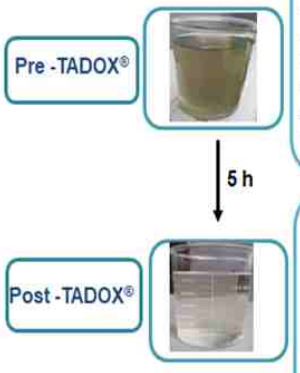
- pH: 9.1
- Conductivity:198 micromho/cm
- TDS : 146 ppm
- TSS: 172 mg/L
- COD: 44 mg/L
- BOD: 10 mg/L
- Hardness: 25 mg/L
- ZLD Compliance

Petrochemical Industry wastewater (Panipat)

- pH: 7.84
- Turbidity :76 NTU
- TDS : 4005 ppm
- COD: 400 mg/L
- BOD: 43 mg/L
- Color: 711 Hazen

- pH: 9.69
- Turbidity :93 NTU
- TDS : 3680 ppm
- COD: 160 mg/L
- BOD: 2 mg/L
- Color: 18 Hazen

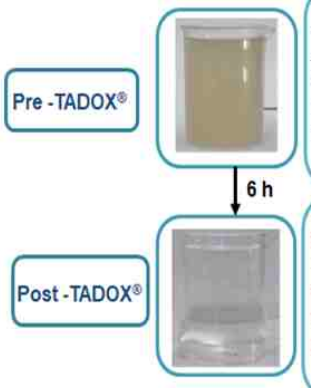
Gochi drain (Faridabad)



- pH: 7.33
- TDS : 1079 mg/L
- TSS: 280 mg/L
- COD: 320 mg/L
- BOD: 64 mg/L
- PO_4: 3.80 mg/L
- NH_4-N: 2.33 mg/L
- Colour: 405.18 Hazen

- pH: 8.91
- TDS : 620 mg/L
- TSS: 156 mg/L
- COD: 160 mg/L
- BOD: 8 mg/L
- PO_4: 0.20 mg/L
- NH_4-N: 1.22 mg/L
- Colour: 68.17 Hazen

Chemical manufacturing ETP wastewater (Kochi)



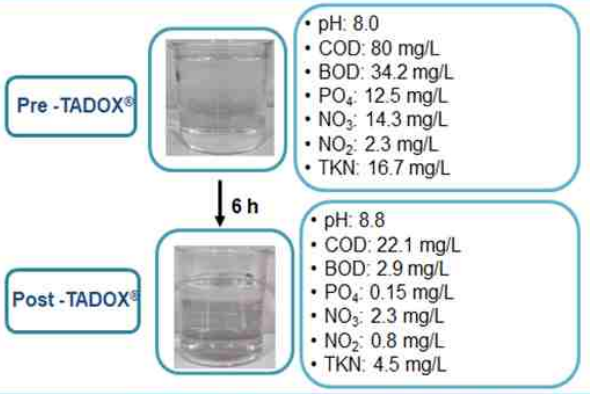
- pH: 5.4
- Conductivity :8970 micromho/cm
- TDS : 4490 ppm
- Turbidity: 356 NTU
- COD: 2720 mg/L
- BOD: 2.97 mg/L

- pH: 9.07
- Conductivity :1427 micromho/cm
- TDS : 2852 ppm
- Turbidity: 1.17 NTU
- COD: 480 mg/L
- BOD: 1.52 mg/L

C. Case studies of TADOX treatment from Maharashtra/Tamil Nadu/Gujarat

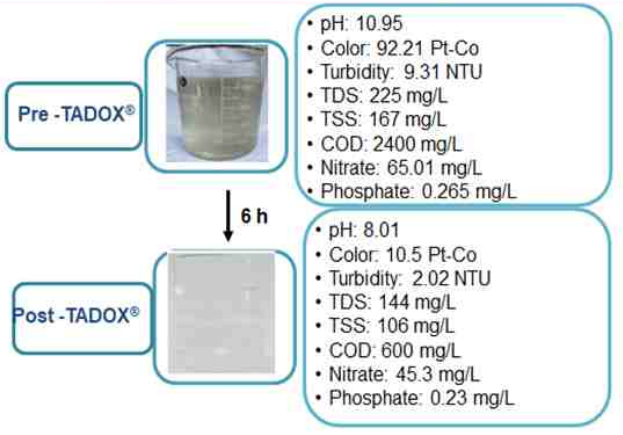
Chemical Manufacturing Industry wastewater (Raigad)

Electronics manufacturing Industry ETP wastewater (Hosur)



Oil & Gas Industry wastewater (Ahmedabad)

MEE Condensate wastewater (Bharuch)



II: Sewage & Municipal Wastewater Treatment

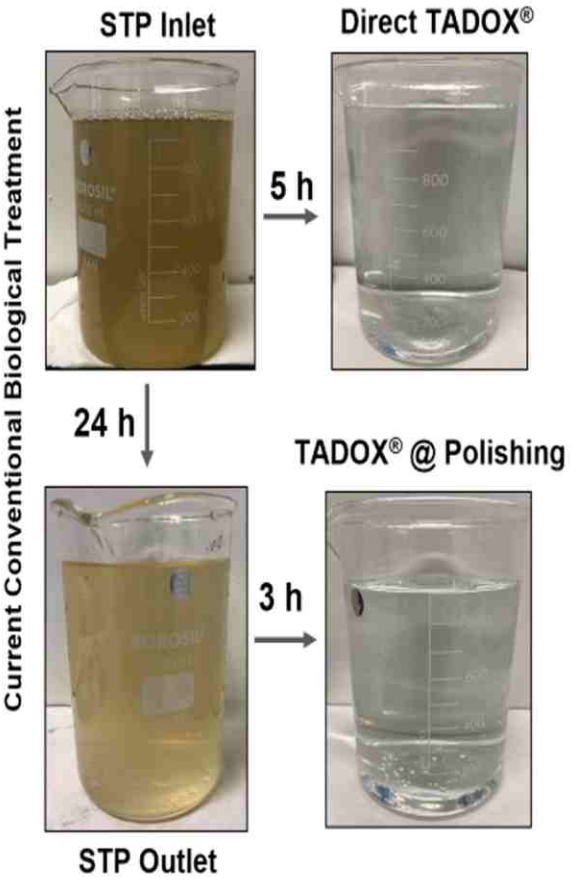
In case of Sewage and Municipal wastewater treatment, TADOX® having Advanced Oxidation is sufficient for direct treatment, without any kind of biological treatment or additional disinfection technology, not even requiring any kind of grey and black water stream segregation.

Location: 10 KLD TADOX® WWT Plant operational in TERI Gurugram campus

Here mixed sewage is directly being treated, which is coming from a collection sump, having effluent from various research laboratories, hostel, canteens, laundry, toilets, etc. No stream segregation of any kind is required before treatment. The two approaches could be (i) directly treating the Inlet water and/ or (ii) further treating or polishing the currently treated. Since in both cases, the quality of treated water is the same, therefore direct treatment saves the time, resources and footprint as compared to existing treatment technologies. The treated water quality is suitable for low to high-end reuse and great potential for self-sustainability of STPs and as a model technology under 'Arth Ganga' Mission of the MoJS, Govt. of India.

STP INLET	
pH	7.9
Colour, (Pt- Co) (CU)	185
COD, mg/L	650
BOD, mg/L	261
TSS, mg/L	380
Total N, mg/L	32.0
Total P, mg/L	81.2
E. coli, MPN/100 ml	1.02×10^5
Total Coliform bacteria, MPN/100 ml	6.12×10^6
Total count, CFU/100 ml	5.24×10^5

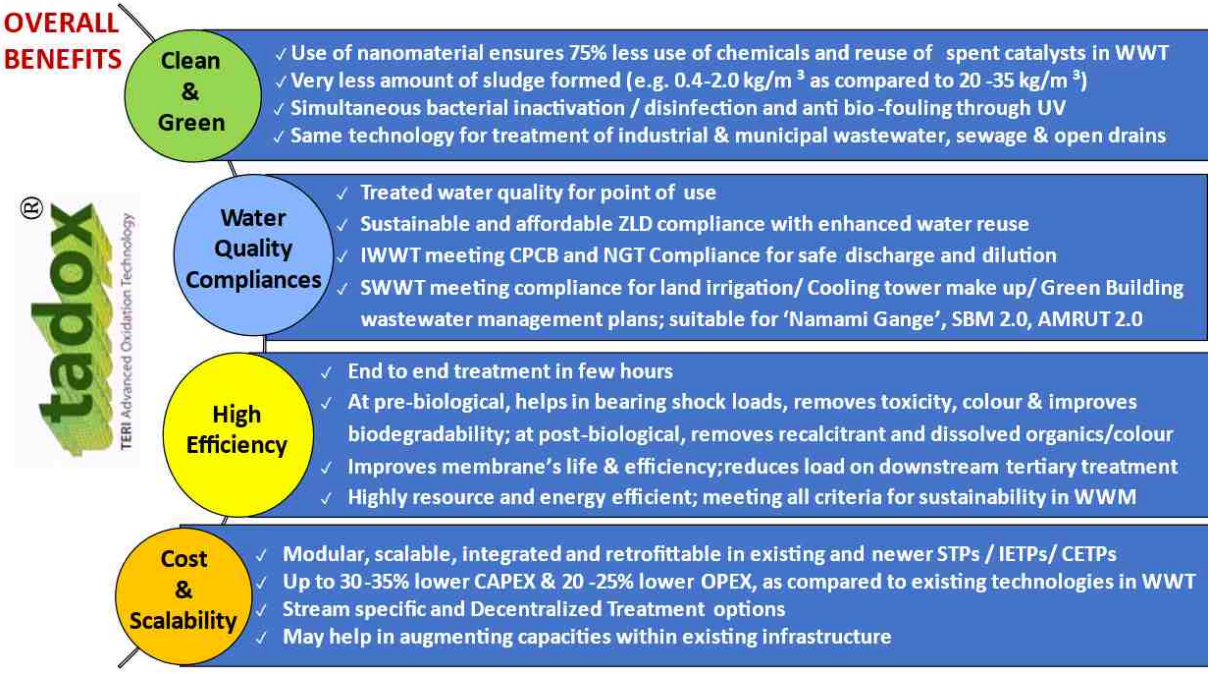
STP OUTLET	
pH	8.2
Colour, (Pt- Co) (CU)	125
COD, mg/L	400
BOD, mg/L	78
TSS, mg/L	110
Total N, mg/L	30
Total P, mg/L	13
E. coli, MPN/100 ml	1.21×10^4
Total Coliform bacteria, MPN/100 ml	1.13×10^5
Total count, CFU/100 ml	1.84×10^4



DIRECT END-TO-END TADOX®	
pH	8.0
Colour, (Pt- Co) (CU)	8
COD, mg/L	64
BOD, mg/L	7
TSS, mg/L	<5
Total N, mg/L	1.9
Total P, mg/L	<1
E. coli, MPN/100 ml	16
Total Coliform bacteria, MPN/100 ml	1.16×10^2
Total count, CFU/100 ml	28

TADOX® AT POLISHING STAGE	
pH	8.1
Colour, (Pt- Co) (CU)	5
COD, mg/L	46
BOD, mg/L	<3
TSS, mg/L	<5
Total N, mg/L	1.7
Total P, mg/L	<1
E. coli, MPN/100 ml	<8
Total Coliform bacteria, MPN/100 ml	3.13×10^2
Total count, CFU/100 ml	11

Tangible & Intangible Benefits of TADOX® technology



Testimonials from Industry

- M/S Perfact Advanced Water Solutions Pvt. Ltd. Delhi. This company is working with TERI since 2019 to upscale TADOX® technology. According to this company, the payback period for this technology is around 10-11 months from plant operation.
- M/S ISRPL Pvt. Ltd. Sonipat, Haryana. This company is working with TERI since 2021 for Pilot trails at 10 KLD WWT Plant. According to this company, this technology holds huge potential for water saving and the cost of petrochemical wastewater has been reduced by 30-40% with direct TADOX treatment.
- M/S Gharda Chemicals, Lote Parshuram, Ratnagiri, Maharashtra is working with TERI since 2019 for upscale & Pilot trails at 10 KLD WWT Plant. The effluent from this industry was studied for feasibility assessment of TADOX technology. According to this company, "the results appeared quite promising and the technology has a huge potential and such an innovation in technology could be a game changer for sustainable wastewater management practices in future".

- M/S NSL Textile, Guntur, Andhra Pradesh worked with TERI in 2019 and validated that results met ZLD compliance and company wish to go ahead with next stage of technology implementation.

Recognitions

- Ministry of Science & Technology, Govt. of India made a Press Release on 25th Aug. 2021 publishing the successful outcomes of the project, through which TADOX® Technology was developed: https://pib.gov.in/PressReleasePage.aspx?PRID=1748888
- Department of Science & Technology (DST), Govt. of India published findings from this Project on its website: https://dst.gov.in/new-advanced-oxidation-technology-can-enhance-waste-water-reuse-lower-cost
- TADOX Technology has been chosen by National Mission for Clean Ganga (NMCG), MoJS under 'Namami Gange Program' to treat some selected polluting streams. NMCG and TERI signed an MoU on 12th Oct. 2020 in this regard and the 1st Pilot demonstration project is sanctioned under Namami Gange Program for a textile CETP in Kanpur, UP. The pilot is expected to be demonstrated by Dec. 2022.

- National Mission for Clean Ganga (NMCG), MoJS under Namami Gange Program established, Country's 1st CoE on Water Reuse in TERI, called NMCG-TERI Centre of Excellence on Water Reuse. The CoE envisions to become a globally recognized Centre for reuse of treated water by bridging the knowledge gap, nurturing innovation, supporting targeted research and act as an interface amongst various stakeholders. It focuses on Industry participation and commercialization of complimentary technologies for wastewater treatment and reuse. Ministry of Jal Shakti, Govt. of India made the announcement through the press release Link: https://lnkd.in/dnZiniWR
- TADOX® Technology has been selected by the Office of the Principal Scientific Advisor to GoI under CKIC-DRIIV (City Knowledge Innovation Cluster-Delhi Research Implementation and Innovation) for Wastewater Management. Such a partnership has been announced through its May 2022 Newsletter.
- TADOX® WWTP in TERI Gurugram campus has been visited by several dignitaries including (A) Mr. Dushyant Chautala Dy. CM of Haryana on 2nd Oct. 2022 and (B) Mr. P. Raghavendra Rao, IAS ®, Chairman, HSPCB, on 27th May 2022.

Awards

Design & Manufacturing Technologies for 'Make in India'

7th Dec 2015

Ministry of Science & Technology, Govt. of India

STE Water Award for Technology Innovation

22nd Oct 2019

STE-Save the Environment, Society for Research & Awareness, Kolkata

Aqua Foundation Excellence Award for Technology Development

30th Oct 2019

Aqua Foundation, New Delhi & Ministry of Jal Shakti, Govt. of India

2nd PRIZE

Taylormade Renewables Ltd.

TAYLORMADE RENEWABLES LTD.
Energy | Environment | Innovation

Mr. Dharmendra Gor
CMD

"At TRL we believe in saving the valuable Resources & Environment by Innovative Ideas. Our Research & Development is focused on reducing Water, Air and Ground Pollution"

Brief message

At TRL, we believe in delivering solutions (Make in India) that help to make a positive impact on Economy, Environment and the society by Innovation. Our main focus is on solving the most complex water and wastewater problems with innovative and sustainable solutions and help our client to achieve regulatory and environment compliance consistently.

TRL has developed various Technologies to transform the most challenging industrial waste streams into valuable water resources and have invented TRL-RAIN™ Patented technology to overcome biggest problem of hazardous effluent treatment from various industries worldwide.

TRL-RAIN™ technology can be used for any quality and any quantity of effluent generated from any industry like oil exploration, Dyes & chemicals, food processing, tanneries, textiles, metals & mining, food, pharmaceuticals and many more.

Implementing industry can reduce its recurring fresh water demand to great extend due to treated water quality is so good, it can be reused in process without any further treatment. Prevents fresh water resources and reduces GHG emissions due to lesser use of fossil fuels for water transportation. Requires very less power to run the system compare to any other existing technologies in use. Do not require highly skilled labor's due to simple operation and fully automated technology. Technology provides safe environment to the workers as it is a low temperature application and uses no pressure or vacuum. Per liter cost of effluent treatment is 1/3 time compare to other existing technologies resulting in lower the production cost.

TRL Different Wastewater Technologies:

- TRL - ZEO Membrane for Surface and Subsurface disposal of Produced Water with ZLD option.
- TRL - ZEO Membrane in combination of TRL-RAIN for treating RO reject to ZLD.
- TRL RAIN "Patented technology" for any kind of Hazardous Wastewater.

- TRL RAIN ULTRA - Best for Solvent Recovery.
- TRL Super Distillation Unit (SDU) for heat sensitive Products.
- TRL IAF EC-ULTRA with Zeolites & AOP using Artificial Intelligence.
- Solar Wastewater Evaporation using Parabolas.

The above technologies combined with other known technologies can treat all and any kind of Waste Waters from different industries.

Also, TRL is coming up with below innovative technologies:

- TRL Automated Electro Fenton Process
- TRL Electrodialysis Reversal (EDR)
- TRL Forward Osmosis (FO) in combination with RO for better recovery
- Cascade RO with Rankine Cycle

TRL-RAIN™ Plant at Neelikon Food Dyes and Chemicals Limited

Author : Mr. Dharmendra Gor, Managing Director of Taylormade Renewables Limited (TRL).
Customer Name & Brief Introduction : Neelikon Food Dyes and Chemicals Ltd.

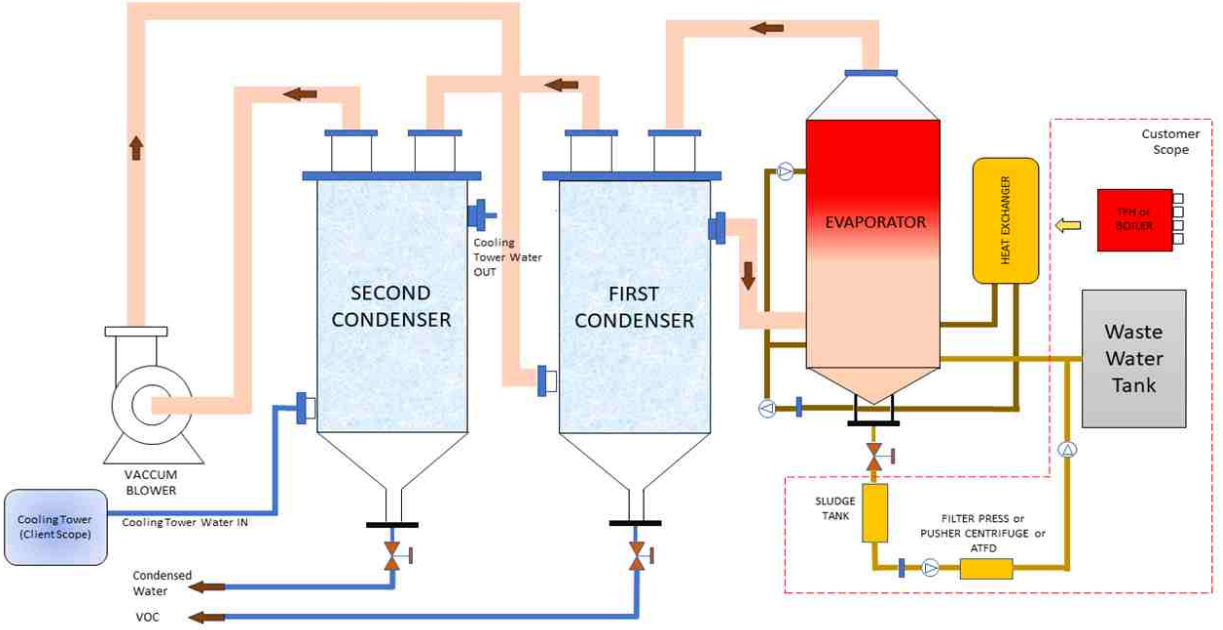
Neelikon is one of the world's top 3 manufacturers of high-quality colors for Food, Pharmaceutical, Cosmetic, Personal Care, Home Care, Stationery Ink industries and Specialty Fluorescent Dyes used in various industrial applications.

Intervening Technology/ Technique : Product concentration with effluent treatment for its Unit - II located at Plot no.: 17, MIDC, Dhatav, Raigad district, Roha, Maharashtra

About the Industry : Neelikon is a globally dominant producer and exporter of top - notch grade colourants. Be it 'One World, One Quality' products, FDA-approved food colours, pharmaceuticals colours, personal care and cosmetic colours, or fluorescent dyes, our colourants cater to multiple verticals around the world. All our products including the specialty fluorescent dyes for specialty industrial application are pioneers in trailblazing global colorant standards.

Implemented Techniques/ Technology: The effluents come out from the process of manufacturing activities and is feed to TRL-RAIN™ plant.

TRL-RAIN™ is a low temperature application developed for evaporation of water and condensation from any kind of Saline, Brackish, mine wastewater, Chemical induced water, Waste Water produced from various industries like Oil & Gas, Textiles & Tanneries, Power Generation, Mining & Metals, Refining & Chemicals, Food & Beverages, Pharmaceuticals and many others. It can also handle hazardous wastewater because of its capability to run on low temperatures.



TRL-RAIN™ Schematic

TRL-RAIN™ is a process which removes Salt and other Chemicals from the water resulting in having fresh water. The required energy for this purpose can be provided by Thermic fluid heater or steam or waste heat running on Electricity/ Gas/ Diesel/ Coal or Biomass.

The hazardous effluent which needs to be treated is pumped in the storage tank. From there it is feed to the Evaporator and by Circulating Pump it is continuously circulated in the Evaporator. There is a heat exchanger, which is heated by a heat source, and the heat source maintains the effluent in the Evaporator up to 80º C (Max.).

Due to heating of the Wastewater vapors are generated in the Self-cleaning Evaporator, which are extracted by a specially designed vacuum blower and sent to a Heat Exchanger (First Condenser), where in the low boilers/ VoC's are condensed and the heavy water vapors will flow to the

Second Condenser which is having a cooling water circuit. An energy efficient design.

The heated dry air from condenser creates a cyclonic effect in the specially designed evaporator giving an multi effect evaporation.

Whatever water is evaporated and condensed, similar quantity of water to be treated is pumped into the system automatically and the plant runs in continuous mode.

If the TRL-RAIN Plant is to be used for ZLD application than the sludge is sent to a simple Filter Press or Nutche filter or Pusher Centrifuge or ATFD (depending on the kind of sludge) for removing the Salts (Sludge handling is not in our scope) and the mother liquor is again recirculated, making it a complete Zero Liquid Discharge Plant.

100% Closed Loop, No Chillers or Vacuum Pumps are used in the system saving huge energy costs and water recovery is almost 100%.

TRL-RAINTM installed on site : Why Neelikon choose TRL RAIN™ Plant?

The TRL RAIN™ technology is a low temperature technology and does not require any vacuum pumps, high pressure, chillers, and the technology can work on waste heat available. For client its products is precious product and any product loss in waste water will significantly increase its product cost. After due technical discussions Neelikon decided to take trial on TRL-RAIN Pilot plant facility. Looking to the encouraging results, ROI and Environmental benefits Neelikon immediately decided to implement TRL- RAIN technology for their Unit II at Dhatav, Roha.

Results of TRL RAIN™ Plant at Neelikon Food Dyes and Chemicals

Sr. No.	Sample Name	pH	COD (in ppm)	TDS (in ppm)
1	Feed	12.76	20,800	37,655
2	Final Condensate	7.28	77	194
3	Residue	8.47	29,702	62,147

Looking to the results above TDS were reduced by 99.49 % and concentrated by 165 %. COD reduced by 99.6 % and pH improved by 33%.

Implementing TRL-RAINTM patented technology not only increased its production, it also reduces its power consumption and maintenance cost. TRL-RAIN's simple operation and less energy consumption ultimately resulted in lower the product cost and also reduce the product losses due to higher concentration, no vents and efficient design of the system. Reuse of treated water in process application reduced freshwater demand and thus cut down the water bill. Apart from that below are general advantages:

- All wetted parts are non-corrosive and never the system clogs due to its self-cleaning mechanism.
- Recovery of good quality water without organic load, which can be reused in process.

- Highly Energy Efficient and Eco-friendly Design concept.
- Water can be extracted up to super saturation levels, so minimum sludge produced.
- Very less power demand compared to MEE or MVRE.
- The system can run on waste heat or biomass, as low temperature energy is required for treatment of wastewater.
- Very minimal maintenance and no need for skilled man power.
- Can treat any quality and quantity of input water.
- No pre-treatment required for input water.
- Condensate water recovery is almost 100% making it Zero Liquid Discharge (ZLD).
- Modular design - Easy to Install & Operate.
- No Chemical Consumption and No CIP work required.
- 100% Closed loop system to no Air Pollution, Soil Pollution or Water Pollution.
- Maintenance and operation costs are at the very minimum as compared to any other technology.

Benefits to Customer / Industries Economical: A process developed for waste water treatment and product concentration become the asset like technology for the customer. It reduced its freshwater demand for product manufacturing and higher product concentration ratio resulted in lower product cost. Besides that, customer benefited by continuous operation, lower energy demand for treatment of wastewater, low maintenance, Lesser manpower requirement due to automatic controls and easy operation without any pre & post treatment. Fresh water requirement reduced due to treated water reuse in process. Reduced air pollution due to no vents in the system.

- Avoid any regulatory actions /closer notice from PCB and CPCB.
- Achieved higher production

Environmental: Total plant is very energy efficient and can run on waste heat or solar energy, thus lower the energy requirement and lower the environmental hazard. No vents, so no air pollution. Reduce the fossil fuel use for freshwater transportation and sludge handling.

TRL-RAIN™ Plant at Interchem Corporation Limited

Intervening Technology/ Technique : Treatment of Hazardous wastewater from dyes manufacturing & textile applications.
Implemented Techniques/ Technology:

Before: The Hazardous effluents comes out from the process of Interchem Corporation Ltd., and they wanted to remove high TDS, TSS, COD, Ammonical Nitrogen from their hazardous effluent stream and reuse the same water back in their process. This was a very big task for Interchem Corporation Ltd as, they did not have any Effluent Treatment Plant (ETP) in their existing facility. Previously, they were sending their hazardous effluent to common effluent treatment facilities at a very high cost, which was not affordable in long run.

After: Interchem Corporation Ltd. installed a TRL RAIN™ patented technology to treat their hazardous waste water and the capacity of the Plant was 5 KLD. The main purpose was to re-use the water for many purposeful applications and reuse the same in their plant. The TRL RAIN™ Plant is working consistently from last 11 to 12 months without any maintenance and trouble-free operation.

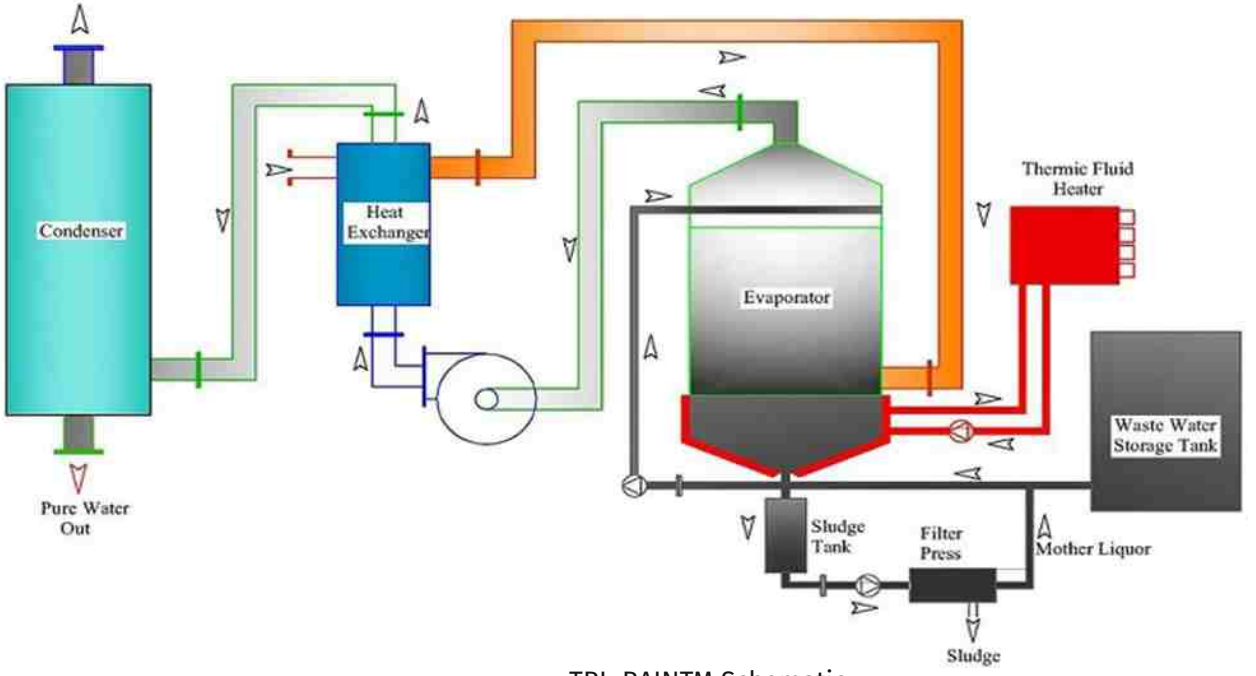
TRL-RAIN™ Installed on Site

Results of TRL RAIN™ Plant at Interchem Corporation Ltd.

Sr. No.	Characteristic	Pre-Treatment	Post-Treatment	Difference %
1	COD (mg/lit.)	23,300	136	99.41
2	TDS (mg/ lit.)	110,700	18	99.98
3	TSS (mg/ lit.)	540	< 10	98.14
4	Ammonical Nitrogen	2,200	56	97.45

Why they choose TRL-RAIN™ Plant?

The TRL-RAIN™ technology is a low temperature technology and does not require any vacuum pumps, high pressure, chillers, and the technology can work on waste heat available.



TRL-RAINTM Schematic

NOTE: This is the schematic of our first commercial plant. After this, there are some modifications in our TRL-RAINTM Plant for improving the quality and quantity of the wastewater.

The Main Advantages of TRL-RAIN™ are:

- Non-Pressurized System.
- All the wetted parts are non-corrosive.
- Its self-cleaning mechanism does not clog the system.
- Its need very low power, minimum maintenance, and no need of skilled person for operating.
- Highly energy efficient and Eco-friendly design concept.
- Low maintenance and operating cost.
- Can treat any quality and quantity of input water.
- The sludge can be filtered through simple Pusher Centrifuge, which is removed, and mother liquor is again sent to TRL RAIN for further process, so a complete ZLD. The sludge which is having some moisture can be sun dried. So, there is no need of ATFD, Spray dryer or any kind of Evaporator saving huge cost of treatment.

The Major Features of TRL-RAIN™ are:

- No CIP, no backwash and no chemicals required for regular operation-saving time and cost.
- Low cost of Wastewater Treatment.
- Water recovery is very high compared to any other existing technologies in the market.
- Can take any effluent from any industry, no limitations.
- Condensate water recovery is almost 100%.
- Post treatment of residue is drastically less.
- Low temperature and pressure application, hence, can run on any source such as Waste Heat, Boilers, Thermic Fluid Heaters, etc.
- The quality of condensate water is excellent due to absence of volatile organic material. So, water can be used directly process or boiler or other utilities

Benefits to Customers / Industries Economical: A cost effective and time saving process was developed for reduction of TDS, COD, TSS, Ammonical Nitrogen, etc. So, the water can be reused.

- Interchem Corporation Ltd. get a 50% subsidy from Gujarat Cleaner Production Centre (GCPC).
- Achieved the discharged norms stipulated by Gujarat Pollution Control Board (GPCB).

Environmental: The benefits from this modification to the treatment scheme helps in reducing the TDS, COD, TSS & Ammonical Nitrogen from high levels to discharge levels.

Centre for Environment Concerns

Mr. K S GOPAL
Director, CENTRE FOR ENVIRONMENT CONCERNS

"Managing irrigation will be the enduring gauge of this generation's intelligence in water, soil and planetary health"

Brief message

The challenges we face are: groundwater scarcity, falling water table, prolonged heat waves, climate change, soil health, loss of biological biodiversity, petro-chemicals, consumer demand for healthy food, low farm productivity/incomes, loss of valuable tree assets etc. To successfully address them, we must transforming our approach and the method of irrigation that lead to multiple triggers to deliver our ambition to set gold standard in water use per kg of produce along with soil health.

Challenge

India has 17% of the world's population with 4% water and agriculture uses 84% of it. It is the World's largest user of groundwater of 250 cubic kilometers per year or double of China and with higher farm productivity. From water "stressed" they rapidly get to "water-scarce" countries using 2% to 4% more water to produce one gram of food compared to the US, Brazil, China, and the agriculture water utilization efficiency is 38% compared to 70-80% in USA. Groundwater contributes 62% of irrigated farming in India wherein 50% are "chronically drought-prone". Groundwater withdrawal increased tenfold between 1980 and 2015. Groundwater helps grow high-value farm incomes crops of fruits, vegetables, flowers, and agro-forestry. Groundwater depletion and heat waves accentuate the demand for plant water, especially in the summer months.

State of Art in Irrigation water efficiency

Drip irrigation is "state of the art" in water efficiency and savings while in farmer practice of drip, they apply 60-70% excess water compared to campus trials and scientist field recommendations. They remove the dripper that controls water flow. When asked why they use drip, farmers said: "not to reduce water application but to eliminate labour costs in flood irrigation and is very cheap with subsidies". Next, drip logic is "field capacity to wilting point", and is ideal and effective for the application of

petrochemical applications of Urea, NPK, etc, but it is extremely poor in accounting for soil biology and microbial survival. Precision irrigation uses 30 to 100 micron plastic mulch to cover drip emitters leading to mountains of plastic mulch with torn pieces in the soil that stop rainwater seepage, absorption, drainage and aeration. This will end soil biological living micro-organism habitats, leading to dead soils and serving as mere plant anchors.

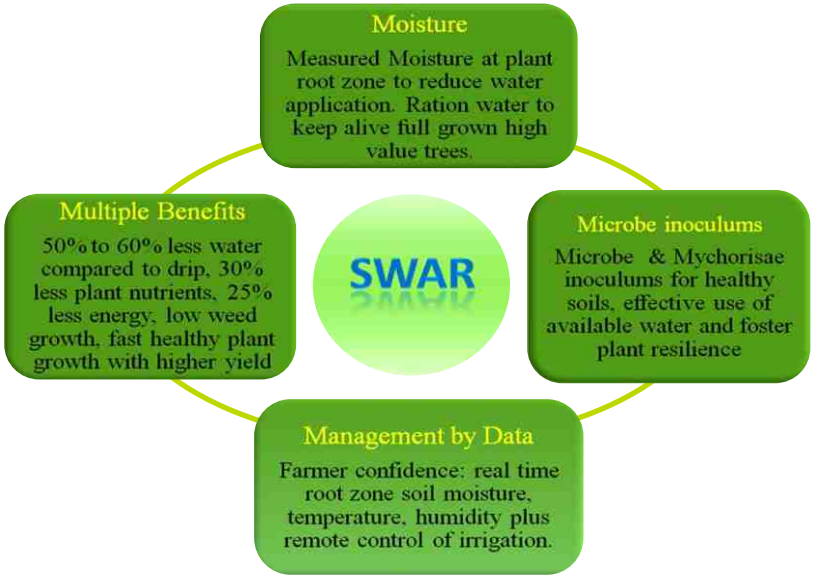
Scenario

India is a tropical country with scorching summer, rising heat waves, and recurring drought to wonder: why drip systems apply water on the soil surface when actually needed at the plant root zone. Water is most scarce in summer months with multiple user demands while also the key season in terms of plant growth, health and yield of perennial horticulture crops. Despite using of drip systems, millions of peak yield age large canopy fruit trees dry and die, causing a huge loss of productive assets to farmers and the nation.

Millions of fully grown peak yield age trees dry and die causing huge loss to farmers driving them to commit suicide.

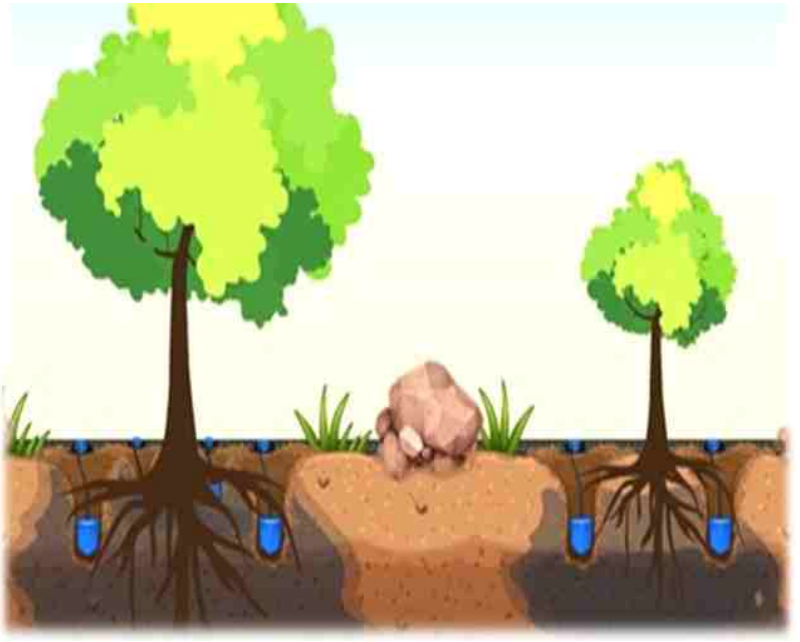
How SWAR Works

System of Water for Agriculture Rejuvenation (SWAR) is a low-cost buried plastic moisture diffuser with a special dripper connected to the drip lateral from where the water is sent via a micro-tube into a box that contains granular cut-size quartz. By using design software and field testing the ideal box size, shape, and height to slowly release and maximize moisture spread was calculated. It brought down water application by 40% compared to the recommendation of scientists for drip systems. Short-run trials on vegetables convinced farmers of its efficacy, and 70000 SWAR units were sold. SWAR won the ARISE PUSA KRISHI 2022 innovation award from the Indian Council of Agriculture Research while ACT Environment Trust provided Rs 50 lakhs to support commercial sales to maximize impact.



SWAR Eco System

SWAR is a plant root zone embedded moisture diffuser. A special dripper is connected to drip lateral and water is sent via a micro-tube into a designed box containing granular size quartz, to slow release water & widest moisture spread. The diffuser box size, shape, and height and release water slowly with maximize moisture spread.



Validation

On-Campus validation by Krishi Vigyan Kendra, Andhra Pradesh when compared to drip shows:

SWAR uses at least 40% less water application and has 10% higher yield, early fruiting, low on weeds, more bio-mass and higher root to shoot ratio.

Findings of 10 agencies: SWAR & Drip in different regions and crops shows the following:

- 40-60% less water use,
- 10% higher yield and improved crop quality,
- 20% less nutrient application,
- 30% less electricity,
- Use of lower HP solar pumps,
- 60 to 75% % less labor cost on weed control,
- Works with saline water
- Ration water to moist root zone to prevent high fruit tree mortality and later recoup.

Root zone moisture levels vide portable moisture probe or embedded sensors for data on phone with remote pump switch on-off mechanisms.

Living Compost advisory guides to prepare and apply as inoculums to promote native bio diverse Soil Microbes & Mychorisae

Pomegranate Plantation with SWAR

Tribal instals SWAR to grow vegetables and flowers

Paradigm

SWAR is transformative irrigation system that delivers 5 Ms:

Moisture at plant root zone to drastically reduce water application

Measured to minimize water application

Microbe inoculates for efficient plant use of soil moisture and for soil health

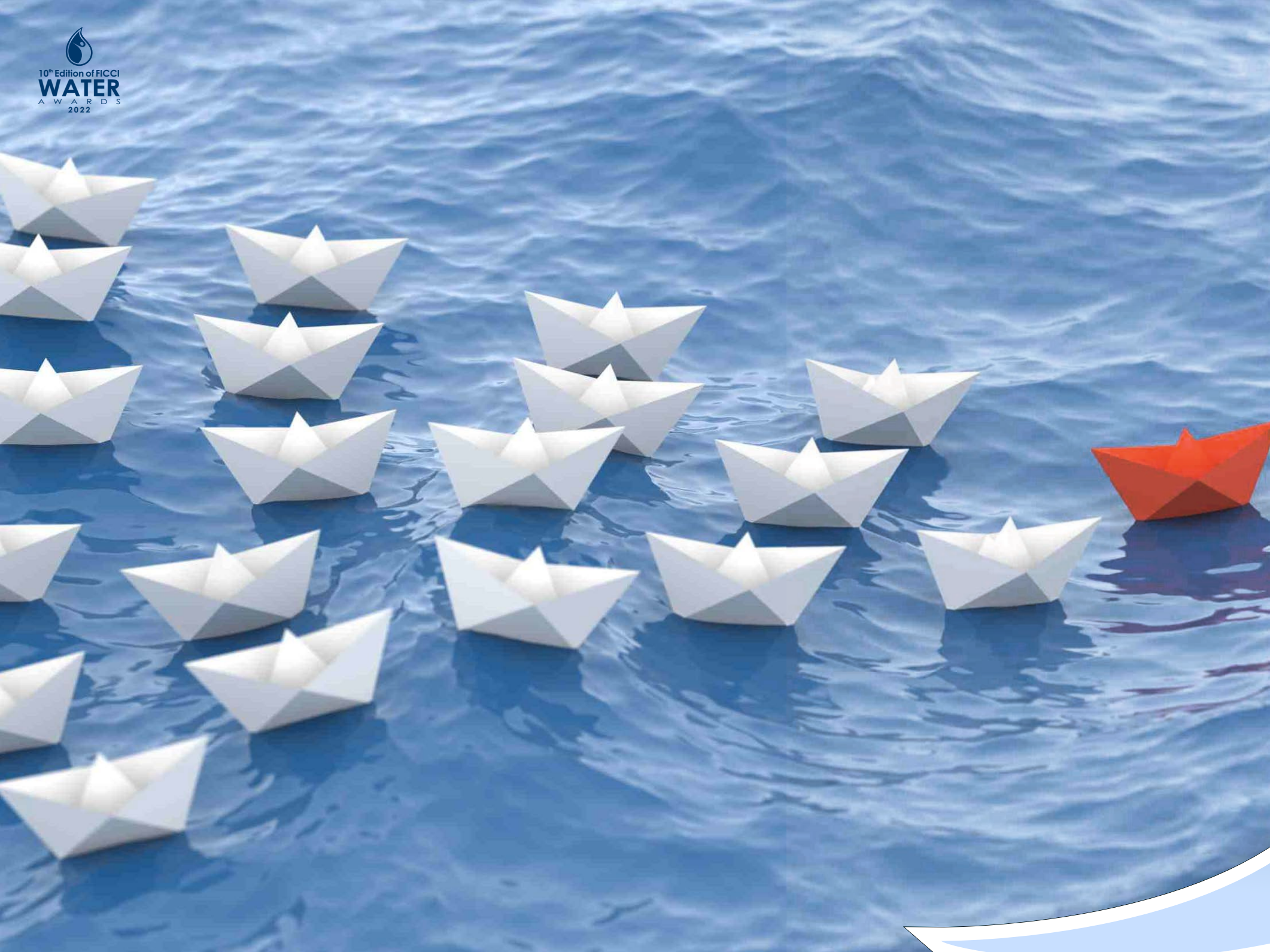
Mychorisae for effective root moisture absorption with root spread

Management ease: data based decision making of moisture status to plan their irrigation with confidence.

Conclusion

SWAR is a field and scientifically validated irrigation paradigm shift to save water with soil health and plant growth and higher yield. It offers multiple dividends: huge water savings, efficient water application, confidence of real water savings to bridge gap between scientist recommendation to farmer practice plus biologically rich healthy soils for higher yield, healthy produce quality, double farmer's incomes, soil bio-diversity and plant resilience to drought, heat waves and climate change. Upon this ecological foundation, the farmers build the mezzanine of their ambition and choice.

10th Edition of FICCI
WATER
AWARDS
2022



COMMUNITY INITIATIVES BY INDUSTRY

Hindustan Unilever Ltd. (Khamgaon Factory)

Sanjiv Mehta
CEO and Managing Director
Hindustan Unilever Limited
President, Unilever South Asia

"At Hindustan Unilever, water is a priority area for us not just because it is important for the consumption of our products but because water is important for our society's survival. Our commitments to water conservation include implementing water stewardship programmes in water-stressed factory areas, working with the communities, and contributing to 3 trillion litres of water potential in India by 2025. This award is a testimony to our continuous efforts to tackle water issues across our value chain and in thousands of villages and help secure water for all."

Hindustan Unilever Limited

Hindustan Unilever Limited (HUL)

Hindustan Unilever Limited (HUL) is India's largest Fast-Moving Consumer Goods company with its products touching the lives of nine out of ten households in the country. HUL works to create a better future every day.

Prabhat, the sustainable community development initiative of HUL, is contributing to a fairer, more socially and environmentally inclusive world, while using HUL's scale for good. Linked to the Unilever Compass, Prabhat is working in communities in and around HUL sites. It builds on the local community needs - in line with India's development agenda and the United Nation's Sustainable Development Goals. In the last 8 years, Prabhat has touched over 7 million lives across 21 states and two union territories.

Name of the Initiative: Prabhat Jal Sanrakshan Pariyojana Project

Location: HUL's Prabhat Jal Sanrakshan Pariyojana Project has covered 11 villages in and around Khamgaon of the Buldhana District in Maharashtra. Similar projects are being undertaken in 7 more factory sites across the country.

The Initiative

Prabhat, the sustainable community development initiative of HUL, is contributing to a fairer, more socially and environmentally inclusive world, while using HUL's scale for good. Linked to Unilever Compass, it is working in communities in and around HUL sites. It builds on the community seeds locally - in line with India's development agenda and United Nation's Sustainable Development Goals (SDGs).

Its ultimate purpose is to create sustainable communities in and around our sites through focused interventions on Economic Empowerment (skilling, entrepreneurship, and value chain development), Health & Nutrition and Environmental Sustainability (water conservation, waste management).

The company operates the 'Water for Public Good' programme, with a specific focus on water conservation, building local community institutions to govern water resources and enhancing farm- based livelihoods through adoption of judicious water practices.

The cumulative and collective achievements through partnered programmes of the Company (independently assured) at HUL Khamgaon till date include:

- Water Conservation: 10.64 BL of water potential created;
- Crop Yield: Additional agriculture production of over 5000 tonnes has been generated;
- Livelihoods: Over 1.24 lacs person-days of employment have been created though water conservation and increased agriculture production;
- Outreach: 5000 farmers

Meeting with Gram panchayat members and villagers at Mandka village, dt. Buldhana, Maharashtra

Preparation of Participatory Village Development Plan at Hiwra village, dt. Buldhana, Maharashtra

Approach

HUL's Khamgaon factory is based in the Buldhana District of Vidarbha region in Maharashtra with a population of the district close to 26 lacs with a literacy rate of 83.4%. The average rain fall in the region is around 700 mm and the area has been categorized as very high in vulnerability to drought and water scarcity by Central Research Institute for Dryland Agriculture. Khamgaon is identified as an area with water scarcity, uneven rainfall, unorganized farming, very high vulnerability to droughts, degraded natural resources, usage of traditional agricultural practices, and less productive farming.

Our strategy has been four folds that include Planning, Implementation, Maintenance, and Sustenance.

The journey commenced with a thorough needs assessment in the villages identified by the factory leadership team. Based on this needs

assessment, the program was designed and implemented. The team members were trained on the understanding of groundwater, aquifers, water efficiency measures in agriculture etc. by our technical partner, ACWADAM. Paraprofessionals who are the key members of the project were onboarded. A Participatory village development plan was prepared in collaboration with the community members and the project implementation partner. With a thoroughly worked out plan of action, the teams were able to initiate work on creating water potential in a water-scarce region. The sustainability of the project has been a key element right from its inception.

The program aimed at double engine thrust in increasing water potential through the construction of water conservation and recharge structures and at the same time farmers were trained on adopting less water-intensive initiatives in agriculture. -

Demand Side Interventions: Focused on adopting modern and smart agriculture practices and thereby saving water, the practices include improved variety seeds, soil health management, across the slope sowing, intercropping, sprinkler irritation system and rain pipe technology. Adoption of these practices have reduced water demand and improved the crop yields and reduced costs of cultivation.

Over 1500 farmers across 11 villages have benefited so far through adoption of sprinkler systems, rain pipe technology, adoption of water saving and farming practices.

Supply Side Interventions: Focused on conserving and creating water potential through structures, the work includes farm bunding, water absorption tranches, continuous contour tranches, nala deepening, loose boulder structure, gabion structure, nala bunds, de-siltation of check dams, farm pond and line ponds.

During project, 295 structures were created to conserve and create water potential.

Deployment of sprinkler system in-progress at project village

Development of water absorption trench in Khutpuri village, dt. Buldhana, Maharashtra

Capacity building for sustainability: Throughout the project, sustainability has been the key element. Several initiatives like training of paraprofessionals, water user groups, exposure visits, KVK scientist visits, field visit by HUL leadership team were taken to build capacity of the community to ensure the project remains alive even after our exit.

During the project, 37 community programs and trainings were undertaken to build capacity of the community benefitting 5000+ farmers.

In the community, for the community and by the community has been our approach for the project.

KVK scientist visit to project villages for capability building

Partnership

This project has been a collective endeavor of Community, Industry & Government Machinery.

Prabhat has the end-to-end ownership of the project, is responsible for funding, strong governance mechanism to ensure benefit reaches the last mile.

Our implementation partner, BAIF is ensures execution of actions as per plan. They are also responsible for building capacity of community and paraprofessional to ensure sustainability of the project. They are playing a key role in mobilizing convergence fund, ensuring strong governance, and providing linkages.

Government of Maharashtra & the Gram Panchayats being the key partners of this project have ensured participatory involvement right from the inception of the project.

ACWADAM's expertise played a key role in understanding the hydro-geology, aquifers and groundwater status of these 11 villages. They have passed on this expertise to our team and the paraprofessionals through training.

Coverage and Impact

Our efforts on the Demand Side resulted into

Touching lives of 5000+ farmers

Covering 3288 ha of area

Conserving 4.38 BL of water

Additional agri output of 5000 tns

Additional income of 35 Crs

96929 manday's of work

Our efforts on the Supply Side resulted into

Conserving 6.02 BL of water

295 conservation structures

Treating 3219 ha of area

27,849 manday's of work

Conclusion

The water project is set up by HUL to support and amplify scalable solutions that can help address India's water challenges - specifically for rural communities that intersect with agriculture. The program is anchored in the belief that water is for common good and must be governed by citizen communities. The aim is to catalyze effective solutions to India's water challenges involving the government, communities, experts, and mission-based organizations.

The learnings from this project and the other 7 locations are helping us to further evolve our program towards water stewardship. With the catchment-based approach, our goal is to further strengthen our work on water by implementing water stewardship programs in 12 water-stressed areas by 2030.

Coastal Gujarat Power Ltd.

A . N Ramesh
CEO
Tata Power, Mundra

Message

The House of Tata has as decades long legacy of doing extensive work for the community, which is why as a Tata company, good corporate governance has organically become an intrinsic part of our business culture. The spirit of service has been embodied in our everyday activities and plays an integral role in shaping the organisation's philosophy. At the heart of the Tata legacy of 'Leadership with Trust', lies the Tata Values and Tata Code of Conduct (TCoC), which guides us to be ethical and honourable in our operations.

Guided by this thought, all the CSR programs at Tata Power, Mundra Division are aligned with the broad thematic pillars of Strategic Intent, which focus on: (1) Livelihood Linked Ecosystem Development, (2) Provision of Basic Needs and (3) Building Social Capital and Infrastructure. By strengthening the ecosystems for development in various sectors such as education, upskilling, livelihood creation etc. we aspire to further our future-ready approach and environmental conservation awareness

In Mundra, water is at the core of our interventions in the region, considering its regional and topographical need. Our flagship Participatory Groundwater Management (PGWM) program titled “Amrutdhara” has established a strong multi stakeholder partnership with industry experts and technical agencies, Government, NGOs, and other industry forums, with the purpose of facilitating collaborative and collective impact in the region.

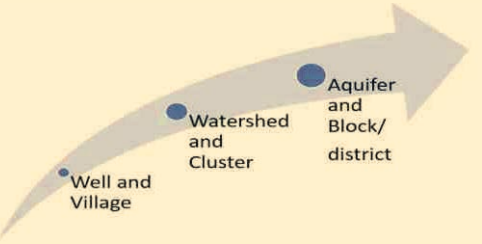
It is our firm belief that Sustainable Development is critical for all round development of the region, and can also boost the quality of life of the people by enabling socio- economic development in the region. In our PGWM program, our primary focus is to balance the demand and supply side of water requirement so that new, efficient and effective replicable models can be developed in the region. In due course of time, our focus is also to introduce different innovations and technologies in the program which will safeguard business continuity and sustainability through greater engagement with the community in the region.

With this plan of action cut out for us, Tata Power is marching with a water stewardship which is socially equitable, environmentally sustainable and economically beneficial for all. Powered by our belief that ‘Water is for all. Today and tomorrow.’

I would like to pay my sincere thanks and gratitude to all our stakeholders, implementing partners, Research and Technical partners, Funding partners and last but in no matters the least, the Community, through whose dedicated and continual contribution our program has been able to achieve all-round success.

Conceptualization of PGWM in Kutch (Gujarat)

REGIONAL CHARACTERS	REGIONAL ISSUES	SOLUTIONS- LOCAL TO REGIONAL
• Arid climate • Low rainfall and drought- as regular phenomenon • Presence of Potential aquifers • Ground Water Centric Livelihoods • Over Exploitation of Ground Water • Lack of inclusion of Geohydrology Sciences	• Aridity • Rock Salinity • Water table depletion • Sea water Salinity ingress • Water quality deterioration • Water Scarcity • Scanty Rainfall	• Planning Based on Geohydrology • Started with Single Priority -Drinking Water Secure with limited footprint • Localized approach -Groundwater management based on single aquifer • Evolved Participatory Groundwater Management (PGWM) concept for shared aquifer • Piloting and Demonstration of PGWM in ONLY one Cluster • Scaling up of experience through Convergence for Regional Level

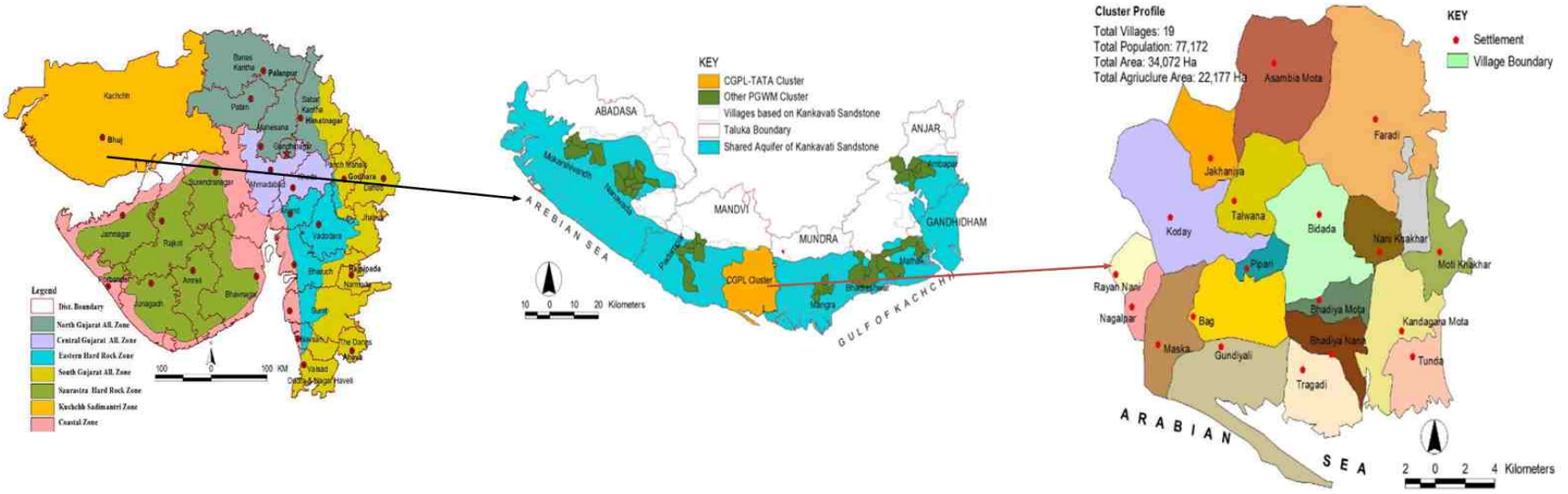


Aim and Objectives

To establish an aquifer management institutions equipped with groundwater management skills to become self dependent for their water demand

- To build evidence on Participatory Groundwater Management – Creation of Benchmark Model
- To demonstrate and construct community participation for effective ground water management at various administrative units through partnerships and Convergence
- Effective communication with stakeholders around the science of geohydrology and advocacy at higher levels for wider application.
- To develop a cadre of knowledge workers- Bhujal Jankar and establishing demand for their services and institutionalizing as Bhujal Gurukul; Hence established the Same in partnership with IIT- Gandhinagar & Kutch University (Gujarat) as K-MARC Centre for Excellence !!
- Advocacy to mainstream PGWM principles and practice across the region for convergent actions and investments.
- Addressing SDGs– 11, 13 & 17

Why Kankavati Sandstone - Aquifer



GUJARAT

- 7 geo-hydrology characteristics based zonation;
- Aspiration- 7 Bhujal Gurukul; whereas 01 already established

COASTAL KACHCHH

- Kankavati Aquifer caters water to 250 villages, 6 towns and >10 Industries-

  Multi-stakeholders
- Spread about 4000 SQKM
- Aquifer boundary crosses 26 watershed
- Sea water salinity ingress

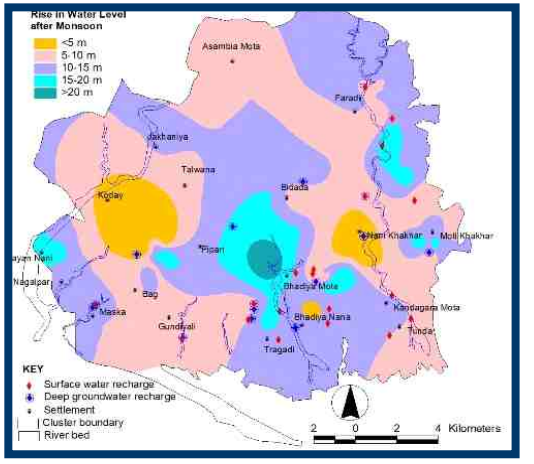
K-MARC Cluster

- Coordinate N 220 46’ 13.1” to N 220 59’ 40.66” and E 690 21’ 6.24” to E 690 34’ 16.44”
- 340.72 SQKM
- 19 Villages
- 77,172 Population
- Major livelihood - agriculture, animal husbandry and fishing

Approach, methodology and Interventions

An Unique Approach based on Multi- Stakeholder Partnership for the ENTIRE REGION

Approach



Stage 1

- Data collection- demography, land resource
- Geohydrology- well studies, aquifer mapping, water budgeting
- Surface water resource inventory
- Monitoring network set up- soil, water, rainfall, weather

Bhujal Jankar

Stage 2

- Data analsis
- Thematic mapping- location, drainage, watershed, aquifer, water re
  action plan
- Water security plan cretaion with PGWM approach

Science-local knowledge

Stage 3

- Supply management through Groundwater recharge augementat
- Surface water structure upgradation through excavation and reparing
- Construction of artificial recharge borewell at specific sites
- conversion of defunct well into recharge well
- River bed filter well
- Roof rain water harvesting tank

Site specific design

Stage 4

- Demand management through
- Soil health improvemenet intervention- compost, vermi compost, sil
- Crop pattern- Introduce new varieties of field crop and new fodder cr
- Irrigation practices- Drip irirgation
- Introduced technology for consumptive use of water- Soil moisture meter, flow meter,
  automatic weather station, atuomatic water level recorderr

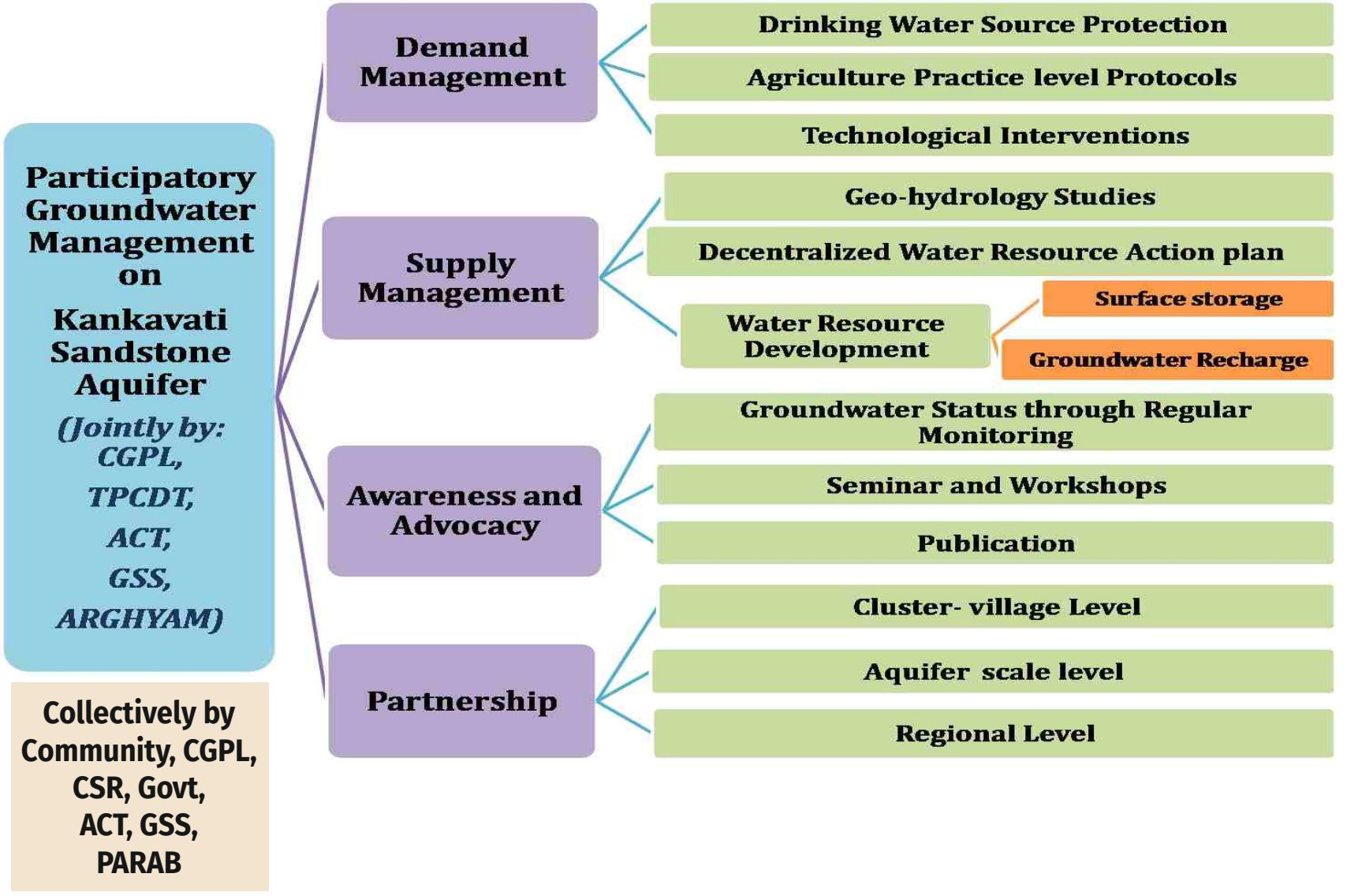
Farmer CBI linkages

Stage 5

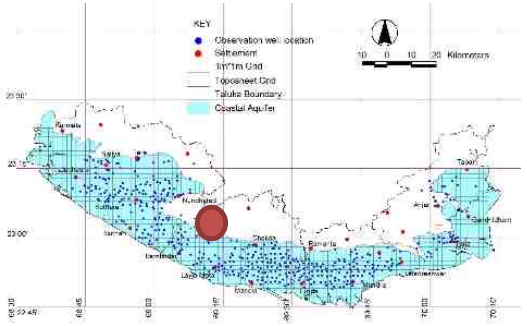
- Periodic groudnwater monitoring in term of water level and water quality
  assessment
- Impact ananlysis through hydrographs, thematic maps
- IEC material generation - Posters, Pamphlets, Case study
- Experience sharing for awareness, mobilization, advocacy and conver

Impact - advocacy

Program Components



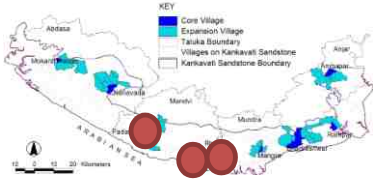
Journey So Far....



Developing Understanding on Shared Aquifer system through Mapping, Monitoring and Support to Stakeholders
Pilot in Abadasa

2010-14

Arghyam
Students
Bhujal Jankar



Exploring Strategic Partnership through Open up PGWM Processes with CSR Partners
For Capacity building
Advocacy
Piloting for Implementation
Cluster Level Approach

2014-18

Arghyam, Parab, GSS IL&FS, CGPL, Adanai

Consolidation of Experiences and Steps towards outreach and Evidences for Adaptation
Organizing community towards common pool resource Management
Innovation Techniques
Emergence of learning lab

2018-2020

GSS, Parab, CGPL, WIN Foundation

Linkages with KVK, IIT, TISS,

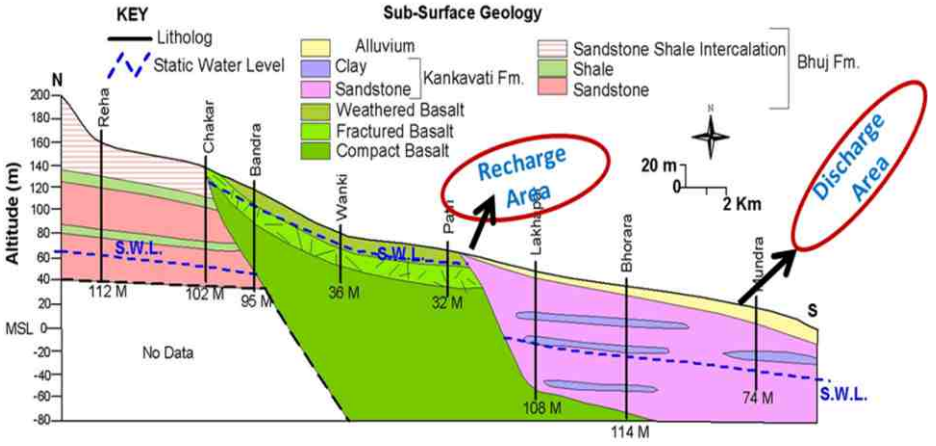
A Centre of Excellence for PGWM
BJ's Sustainability through entrepreneur Model
Resource Management with the use of Technology Scale up with other stakeholders and ABhY

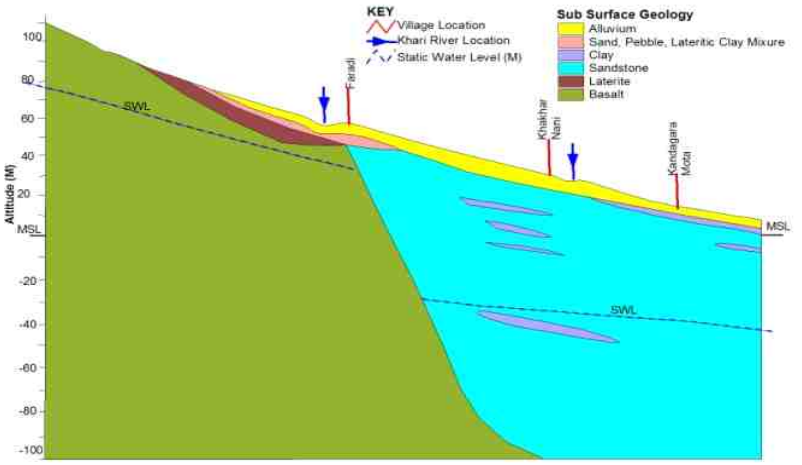
2020 ONWARD

CGPL, WIN Foundation
GoG, Other Stakeholders
APPI

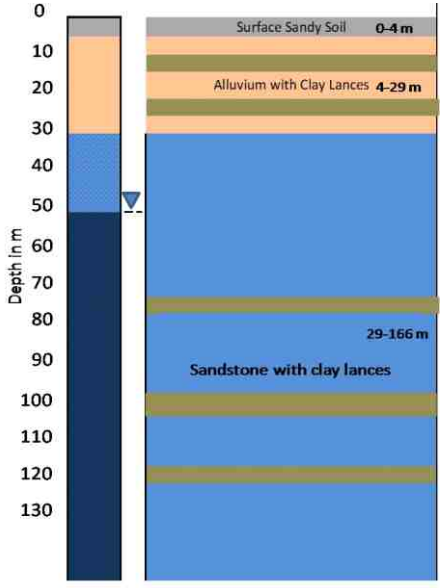
Scaling up & Expansion Supported by Bhujal Gurukul

Geo-hydrology Characteristics

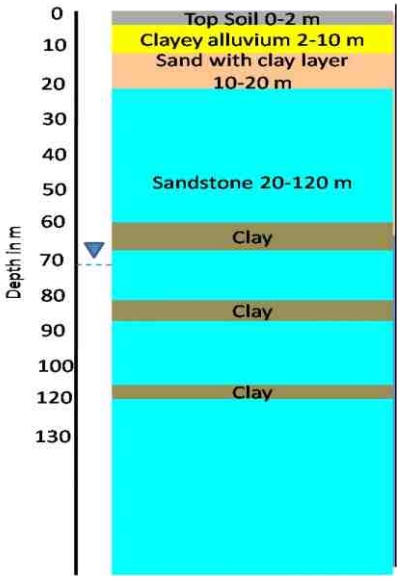




Nana Bhadiya



Pipari



Alluvium is a shallow depth aquifer which get dry due to water table depletion.

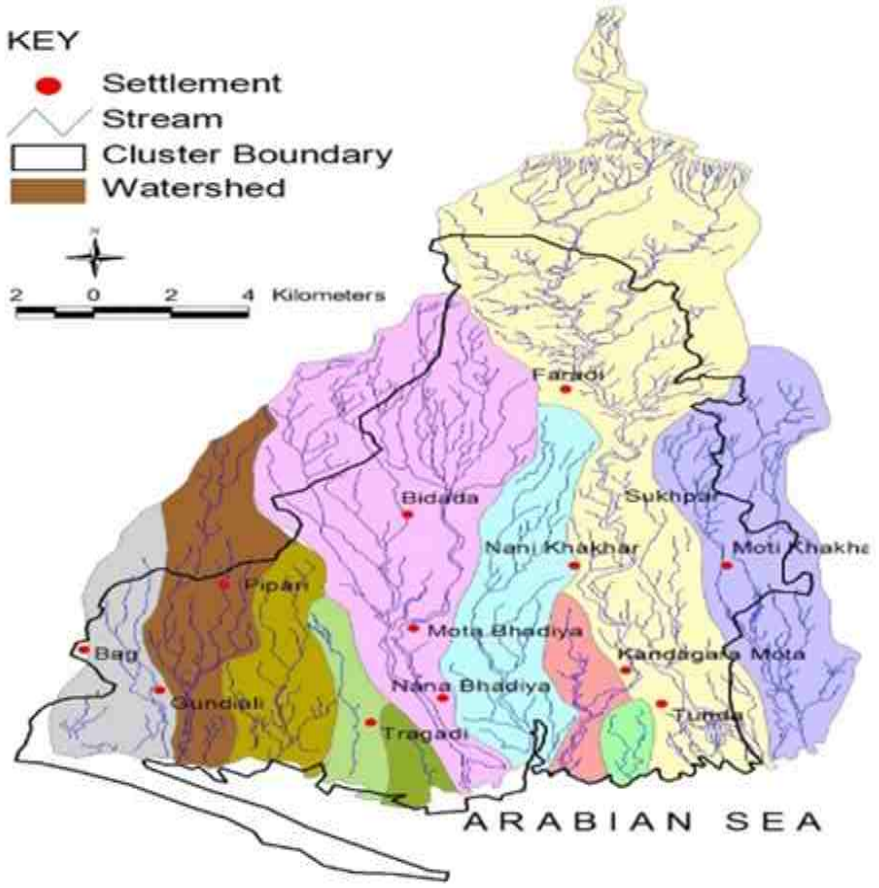
Kankavati sandstone deep and potential aquifer of the region.

Average depth is 40 to 170 m.

Average static water level is 20 to 120 m.

Water Budgeting

Sr. No.	Village Name	Water demand					Water Supply							
		DW for human	DW for cattle	Grass land dev	Irriation	Total demand MCM	Total rainfall in village	Total rainfall in W/S area	Total Runoff watershed MCM	Existing SW potetial GW	Existing GW draft MCM	Rain water retention in agri land	Total Supply RW+SW+GW	Water Balance MCM
For the 19 Villages Cluster in the Coastal Gujarat Power Limited Vicinity														
TOTAL		**1.97**	**0.30**	**10.77**	**132.37**	**145.41**	**149.92**			**15.31**	**73.08**	**25.74**	**114.12**	**-31.29**



Faradi, 2) Nanikhakar, 3) Motikhakar, 4) Bidada, 5) MotaBhadiya, 6) Tunda, 7) MotaKandgara, 8) Tunda, 9) Tragadi, 10) Pipri, 11) Bag, 12) Gundiyali, 13) Maska, 14) Nagalpar, 15) Rayan Nani, 16) Koday, 17) Talwana, 18) Jhakaniya, 19) Mota Asambia

Total Village in the Cluster- 19

Water Security Plan

- Components Covered
- Village Profile
- Landuse
- Surface water resources
- Groundwater resource
- Aquifer characters
- Water demand
- Water supply
- Water budget
- Problem identification
- Strategy
- Planning- Map and Table

Faradi Village Water Security Plan

Village Profile	
Total Household	495
Total Population	2318
Total Cattle Population	2315
Occupation: Agriculture, Animal Husbandry, Labor, Services	
Crop Pattern: Cotton, Castor, Sesame, Guvar, Bajara, Horticulture	
Drinking water: 02 borwells and 01 open well in sandstone aquifer for drinking water purpose with household distribution system.	

Water Demand	MCM
Drinking water demand for human	0.06
Drinking water demand for cattle	0.017
Grassland development demand	1.13
Irrigation demand	22.24
Total demand	23.45
DW Norms: 70 lit/day/person, 40 lit/day/ACU **Irrigation: 2 crop season (4 Watering /season)** **Rainfed: 1 crop season (4 watering/season)**	

Water Supply	MCM
Total rainwater received in village	25.82
Rainwater inflow in WS	31.88
Runoff water from WS	14.34
Rainwater retention in agriculture	4.65
Surface water storage	5.39
Groundwater draft	3.40
Total Supply (SW+GW+RW retention)	13.44

Note: Demand has been calculated for drinking and irrigation. For irrigation 02 crop considered for irrigated area, 01 crop for rainfed and 10% additional irrigation to rainfed area. In supply side, Existing SW storage, GW draft and rain water retention in agriculture area are calculated. Rainfall retained in soil need to conserve and deficit can match from runoff water.

Land Use (in hectors)	
Total area	5870.14
Dry land farming	3218.12
Irrigated farming	1011.00
Grazing land	566.60
Barren and other land	1074.44

Water Balance: -10.00 MCM (Deficit)

Problems:

- Agriculture water demand is higher as the village has large agriculture area.
- Northern area has no groundwater potential.

Strategy:

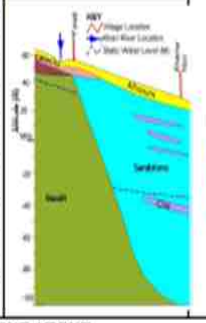
- Participatory irrigation management through combination of existing surface water and groundwater.
- Change in crop pattern to reduce use of water.
- Water conservation practices in agriculture.

Surface Water Resource (Total 13 water body)	
Drinking water use for cattle	05
Irrigation use	01
Groundwater recharge use	07

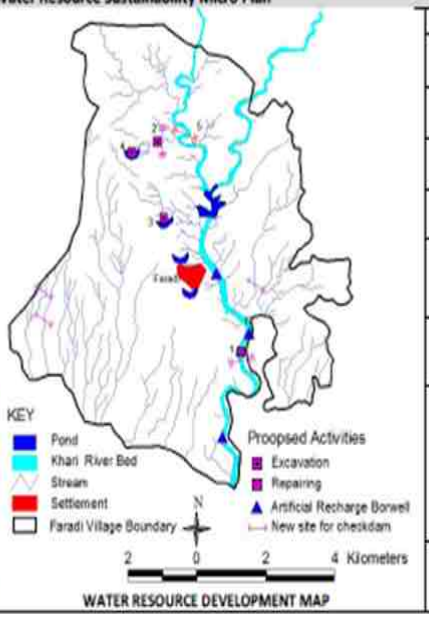
Groundwater Resource	
Total wells	85
Drinking water and other use	03
Irrigation use	82
Average depth of well (M)	Shallow:10-30; deep:80-160
Average water table (M)	Shallow:5-25; deep:45-130
Average water quality (TDS)	500 to 3500 mg/l

Geo-hydrological Characters

- The village has two types of rock formation. Laterites exposed in northern hilly area. Kankavati sandstone exposed in Faradi dam submergence and spreaded southward. Sandstone is potential aquifer where groundwater occurs at shallow depth around Khari river. Further downwards water table goes at deeper level. Faradi dam is major source of groundwater recharge for village and further downstream area.



Water Resource Sustainability Micro Plan



WATER RESOURCE DEVELOPMENT MAP

Code	Location	Activity	Objective
1	Kundhan Checkdam	Waster weir repairing	Groundwater recharge augmentation
2	Bhabhuvalo CD	Excavation, Up-gradation	
3	Dungar-sarai Pond	Excavation	Increase in Surface storage for drinking water for cattle
4	Dhanarai pond	Catchment treatment, Excavation	
5	New checkdam	Construction of checkdam in western watershed	Groundwater recharge augmentation
6	Abundant borewell/ pond/river	Recharge through abundant borewell (Approx. 50 Nos) and new recharge borewell	Artificial groundwater recharge
7	Agriculture area	Promotion of drip irrigation	To increase water use efficiency and reduce demand against water supply
		Compost demonstration in 200 ha land	
		NB 21 grass cultivation and water efficient crop demonstration in 200 ha	
8	Campus	Roof rainwater harvesting in school/other campus	Technological intervention

Source: District Census Handbook year 2011, GSS (2017), ACT (2017)

Participatory Groundwater Management Program Supported by: CGPL, WIN FOUNDATION Prepared by: Arid Communities and Technologies, Parab Water Management, Geo Science Services

Process for active community participation WSPs

District Level Workshop

Block level Workshop

Rapport Building GP & Community Visit

Community Orientation

Capacity Building

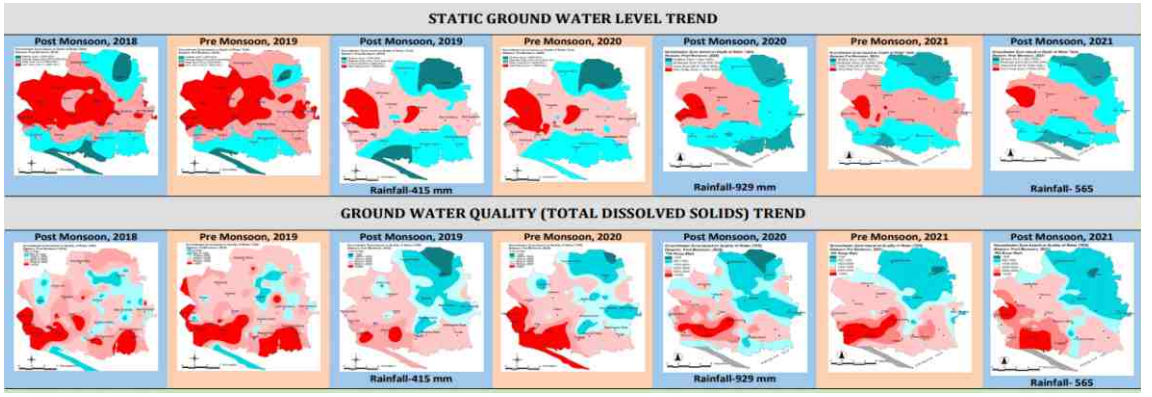
Awareness

Field data collection by CRP

Sensitization of community on supply & demand side Intervention

Water Security Planning

Impact on Groundwater Improvement



Impact

WSP – 19
Bhujal Jankar – 08
Supply Side Intervention
Demand Side Intervention
Community Mobilization
Monitoring by Community

WSP – 09
Bhujal Jankar – 10
Supply Side Intervention
Demand Side Intervention
Community Mobilization - 04 Farmer Groups

WSP – support to VRTI – 19 WSP
Bhujal Jankar – 14
Supply Side Intervention
Demand Side Intervention
Community Mobilization - 12 Farmer Groups)6 Male and 06 Female)
Introduction of Technologies – WQ Kit, WL Recorder, AWS, Moisture Meter
Strengthening Trainings Center

2017-18

Deficit 29.50 MCM

2018-19

Deficit 27.00 MCM

Defunct Bore Recharge Sacksful Trial
SRI –Wheat 10 farmer
Compost
Water Meter – 15 Farmers

DLI5

2019-2020

Deficit 24.38 MCM

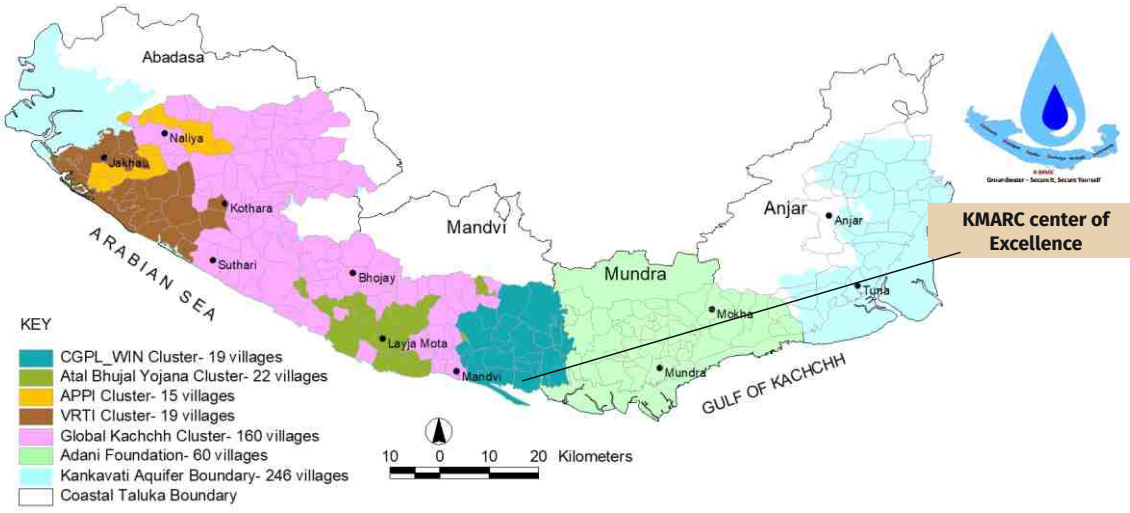
Community Ownership - Defunct Bore Recharge > 350 done by Community

KVK- Trains Farmer Groups
Water Quality Kit, AWS, DWLR, Moisture meter

Connect with 04 Strat ups
Support to VRTI, Anarde Foundation, 05 Taluka panchayat

Measures of Success

Expansion through Collaboration



KMARC center of Excellence

Extension-222 villages covered

Learnings to Scale up.....

Communities can understand science and affect the change in behavior for better resource management

- Participatory Decision making through trusted data and knowledge in the hands of the community
- The community institutions (Women and Farmer Groups) have their own protocols based on their data and interpretation

Bhujal Jankars are the main bridge for transforming knowledge to the community- Centre for Excellence for PGWM- Bhujal Gurukul

- Enable Bhujal Jankar in every village – Make him visible and offer income generation opportunities across programs
- Bhujal Gurukuls as decentralized knowledge dissemination units.

Village level WSP being used in convergence by gram panchayat

- Participatory process of WSP creation enables sustainability of the interventions.

Local context specific solutions

- Groundwater recharge augmentation
- Demand management through technology (Weather Station soil, water, moisture) and partnerships (KVKs, Farmer groups)

LEADING TO WATER DEFICIENCY TO WATER SUFFIICIENCY ..... Scripting Future

Special Jury's Award

Talwandi Sabo Power Limited

> *If this trend continues, it will adversely affect the agricultural economy of the State and it is apprehended that irrigated area may decrease by up to 15% in the year 2025,*

S.K. Saluja
Superintending Engineer,
Directorate of Ground
Water Management
(The Hindu, 17th August 2019)

CEO message:

Vedanta has embarked on its overarching sustainable ESG journey of 'Transforming for Good'. In terms of Water conservation, TSPL aims to be net water positive by 2030. TSPL has a peeled eye for developing projects to optimize water usage, reuse & recycle waste-water via deploying innovative solutions such as 'Reed Bed System', recharging water structures, developing effective systems for Rain water harvesting, unleashing the potential for environment based solutions, & so much more. TSPL is perpetually on the lookout to identify strategies for responsible & sustainable operations & identifying opportunities for water security is no exception.

Name of the Organisation: TSPL

Name of the Initiative: TSPL Navi Disha

Location: Mansa Punjab

The Initiative/Innovation:

Bed Plantation:

Bed planting system is referred to the planting and cultivation of crops on raised beds resulting in fewer weeds and crab grass. Bed plantation saves 40% of water. Better crop stand due to even application of fertilizers and other inputs resulting improvement in crop yield by 5 to 10%. Bed Plantation requires less area under bunds/channels increases up to 8 to 10% area under the crop. It is also instrumental in reducing labor requirement for irrigation

Direct Seeding of Rice (DSR)

Seeds are sown in the field directly rather than transplanting the seedlings. A tractor powered machine is used to drill the seeds in to the soil. There is no nursery preparation in DSR technique. Sowing paddy using DSR methodology need 60-70% less water.

Impact

Total water savings through bed planter: 19,00,80,000 Litres

Water savings due to DSR: 1,08,00,000 liters of water on 50 acres of land

Increase water use efficiency and promoting environment friendly agriculture

Increased awareness and adoption of best practices of sustainable agriculture among farmers

Reduction in chemical input cost and environmental sustainability

Increased farmer's income and improved well being

Improved uptake of govt schemes/subsidies through government leverage and collaboration

Conserving Water for Future Generation

Saving Water through Water Conservation Techniques

Paddy cultivation in Punjab which has thrived in the past couple of decades due to the easy availability of resources and free electricity has resulted in over-exploitation of groundwater, polluted canals, and rivers, and deteriorating groundwater quality. According to estimates, Punjab had 2.44 million acre-feet (MAF) of groundwater in 1984 and within three decades, the groundwater shrank to minus 11.63 MAF[20]. The intensive groundwater extraction in the last five decades through installation of tube wells is reflected in tube well numbers which have increased by almost 200% in 35 years, from six lakh in the 1980s to 14.76 lakh in 2017-18[21]. Because of the depleted levels of groundwater, to avail the water for agricultural purposes, farmers end up deepening the tube wells using powerful motors which are costing farmers close to Rs. 1,100 crore per year[22]. The Draft Dynamic Ground Water Estimation Report-2017 highlighted that over 78 percent of the blocks of the state were in the "over-exploited "category and that the water table was declining in 80 percent of the area of the state[23]. The same report also revealed that 20%-30% of the groundwater was "moderately saline and of marginal quality" and about 15%-25% of the groundwater was "saline, alkaline and not fit for irrigation" which was most prevalent in southwestern districts like- Sangrur, Muktsar, Bathinda, and Mansa.

One of the key solutions to address the above-mentioned grave issue is through educating and training farmers on water conservation practices and encouraging them to adopt practices that are responsible for the environment and avoid over-exploitation of groundwater and other resources. The Navi Disha program through its participatory approach is training farmers in the Mansa region on various techniques of water conservation and providing technical consultations and guidance to the farmers so that they are determined to implement the best practices. The challenge existing at the grassroots levels is a diminished level of awareness and sensitivity about the judicious and optimum use of water as well as ignorance towards the fundamental problem of scarcity of water. The Navi Disha program by organising intensive camps, inviting experts for trainings, model farm trainings, and regular farm visits is educating farmers on different techniques for saving water, improving their soil & crop quality, and addressing the serious problem of groundwater depletion. Farmers through the program are informed about the detrimental impact that the traditional farming practices have on water levels and with the help of technical expertise provided by subject experts and the program team, farmers are introduced to sustainable and improved techniques like bed plantation, drip irrigation, sprinklerirrigation, direct seeding of rice (DSR), etc which not only save water but also reduce farmer's cost of irrigation, are timesaving and less labour intensive.

Bed plantation is one of the key techniques promoted under the program in which crops are sown on ridges, used to form the raised beds of appropriate dimension, seeding, and placing the fertilizer in one go using a bed planter machine. This system is often considered more appropriate for growing high-value

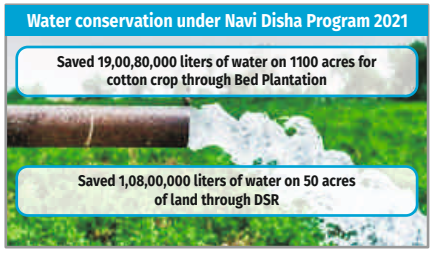
20. https://www.grainmart.in/news/punjabs-water-crisis-due-to-paddy-cultivation/
21. https://www.thehindu.com/news/national/other-states/paddy-tube-wells-and-depleting-groundwater/article29112950.ece
22. https://www.thehindu.com/news/national/other-states/paddy-tube-wells-and-depleting-groundwater/article29112950.ece
23. http://cgwb.gov.in/GW-Assessment/GWRA-2017-National-Compilation.pdf

crops that are sensitive to water-logging areas as this technique reduce water use, conserve rainwater, and improve productivity. Bed plantation is also promoted through the Farmer Resource Center (FRC) established under the program which is equipped with twobed planter machines that are availed by the farmers on rent on an hourly basis. Direct Seeding of Rice (DSR) is another technique promoted under the program in which the seeds are sown in the field directly rather than transplanting the seedlings from the nursery. It is done through DSR machines which are used for planting seeds of rice directly into the fields. DSR method saves a lot of groundwater as the crop does not need frequent irrigation as in the case of puddled paddy field. It is more economical, offers better weed control as well as addresses the shortage of farm labour[24]. Similarly, Sprinkler Irrigation is a technique that allows applications of water under high pressure with the help of a pump. It releases water like rainfall through a small diameter nozzle placed in the pipes[25]. Water is distributed through pipes and

Bed Plantation	DSR	Sprinkle Irrigation	Drip Irrigation
Saves water by 40-50% Reduce seed requirement Better weed control	Saves water by 60-70% Less labour intensive Soil aeration	Saves water by 50% Better yields Less labour intensive Soil aeration	Saves water by 70% Healthier foliage Maintains soil moisture

sprayed into the air and irrigate in the most of soil due to bad range of discharge capacity. This saves water up to 50 percent and is mainly used for vegetable cultivation and water-prone areas. Drip irrigation on the other hand is the most efficient water system for growing crops as it delivers water and nutrient directly to the plant root zones in the right amount at the right time so that each plant gets exactly when it needs to grow optimally[26]. It saves water up to 70 % and is mainly used in vegetables and gardens.

Bed Plantation Technique on farmland



Through Navi Disha's strategic interventions, farmers under the program adopted abovementioned water-conserving techniques in the Kharif season 2021 and have significantly contributed towards the larger goal of saving water and mitigating the ongoing water crisis in the Mansa region. 500 farmers implemented bed plantation on 1100 acres of land for the cotton crop which saves 40-50 percent of water in comparison to traditional methods. By adopting this technique, farmers in the project area saved a total of 19,00,80,000 liters[27] of water on 1100 acres for cotton crop. Out of the 500 farmers who practiced bed plantation, 49 farmers have availed the bed planters through the program by renting the equipment available at the FRC. Similarly, 50 farmers have adopted the DSR method, which requires 60-70 percent less water, to sow paddy and have saved 1,08,00,000 liters[28] of water on 50 acres of land. Apart from this, farmers under the program have also adopted water harvesting techniques like 7 farmers have developed a cavity in their field for water recharge, 6 farmers have developed ponds to save rainwater, 2 farmers are doing sprinkler irrigation and 2 have implemented drip irrigation. These techniques have not only resulted in saving many liters of water but have also helped the farmers in reducing their irrigation costs, improving their crop quality, and enhancing their agricultural productivity. The impact of the water conservation practices can also be understood through the following mentioned farmer testimonials/case stories-

24. https://www.thehindu.com/news/national/other-states/moving-away-from-traditional-practice-more-paddy-farmers-inpunjab-taking-to-dsr-technique/article35664587.ece
25. https://www.fao.org/3/s8684e/s8684e06.htm#:~:text=Sprinkler%20irrigation%20is%20a%20method,which%20fall%20to% 20the%20ground.
26. https://www.netafimindia.com/drip-irrigation/
27. This number was calculated by referring to expert Gurwinder Singh(PhD) and using the standard formula- Water needed for 1 Acre of Cotton crop= 108000Ltr, No of times water needed for crop =4 Times, Total Land=1100 Acre, Total Water needed for cotton crop =108000*4*1100=47,52,00,000, Bed plantaion saves 40% of water so total water saved =19,00,80,000 ltr.
28. This number was calculated by referring to expert Mr Surinder Kumar, TNF and Mansa team using the standard formula- Water needed for 1 acre of paddy = 72000, Total No of water needed=10-12, Total amount used in 1 Acre= 72000*10=720000, Amount used in DSR= 70 % of Traditional method, Water saved in 1 Acre of DSR= 30% of 7,20,000=2,16,000, Total water saved in 50 Acre of land=50*2,16,000=1,08,00,000 ltrs.

Farmer Harpreet Singh is one of the progressive farmers who has been associated with the Navi Disha Program since 2019 and is a resident of Raipur village. He is a medium-scale farmer and owns a total of 9 acres of land and is growing paddy on his farmland. He learned about various sustainable agricultural practices through the program and was thereby introduced to the process of DSR. The Navi Disha team members visited his field during their visits and educated him more on the overall benefits of DSR and how this technique is recommended by agricultural institutions such as PAU, especially for water scarce regions. He expressed his interest in adopting this technique on his farmland and agreed to implement DSR on 1.5 acres of his land using the technical expertise of the Navi Disha team members. He saved around Rs 7000 on his overall labour cost and his water consumption on the field was only one-third as compared to the traditional method of transplanting which he adopted earlier. This technique was highly successful, and Farmer Harpreet Singh thanked the Navi Disha team for encouraging him and guiding him throughout the process. The team used the experience of Farmer Harpreet Singh with DSR and a modal farm training was organised at Farmer Harpreet Singh's farm so that he can demonstrate the best practices and encourage other farmers to implement the same on their farmland.

Farmer Kulwant Singh who is a resident of village Jherianwali and is a medium-scale farmer having 7 acres of land says, 'I have been participating in Navi Disha program's activities since the year 2017. I was informed of the various techniques of water conservation and harvesting by the Navi Disha program's activities. Because of the encouragement of the team, I have prepared a pond for water harvesting on 0.25 acres of my land which would help in saving rainwater and extra canal water. This technique has many benefits as the saved water can be used whenever needed and it also protects the soil & crop quality since excess water is harmful to both soil and crop quality. In times of water crisis, this saved water can be used for any purpose and the groundwater quality has also been improved. I am thankful to TSPL and TNF for all the guidance and consultation and for always supporting farmers like me'.

The Navi Disha program is determined to continue its work in the domain of water conservation and educate farmers and sensitize them on the issue of water depletion, poor water quality, and the over-exploitation of water resources. The program team members ensure to bring in the discussion with the farmers on alarming levels of groundwater in the region & effective solutions to combat the problem through camps, individual visits, or farmer group meetings so that more and more farmers are informed and eager to adopt less intensive agricultural practices. By promoting good agricultural practices & water conservation amongst farmers in the Mansa region, the program is also contributing to various objectives of sustainable development goals like SDG 6[29] -which aims to substantially increase water-use efficiency across all sectors and ensure sustainable withdrawals and supply of freshwater to address water scarcity, and SDG 15[30] - which aims to ensure conservation, restoration and sustainable use of terrestrial and inland freshwater ecosystems and their services.

29. SDG 6-Clean Water and Sanitation for All. Read more
https://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/open_working_group_sdg.shtml#:~:text=6.3%20by%202030%2C%20improve%20water,safe%20reuse%20by%20x%25%20globally.
30. SDG 15-Life on Land- Read More
https://www.un.org/waterforlifedecade/waterandsustainabledevelopment2015/open_working_group_sdg.shtml#:~:text=6.3%20by%202030%2C%20improve%20water,safe%20reuse%20by%20x%25%20globally.

FICCI WATER MISSION

FICCI constituted a 'Water Mission' in 2011, to promote and provide thought leadership in the area of water efficiency and sustainable water management. It aims to facilitate the sharing and dissemination of best practices across industry sectors in order to encourage corporate and industry players to imbibe a culture of water conservation within their organizations. The Mission focuses on industrial water use efficiency, PPP in urban wastewater and corporate water stewardship.

The Mission is working to create awareness on the existing situation pertaining to water scarcity, quality and generate a discourse on sustainable use of water amongst various users. With growing and extensive depletion and pollution of our water resources, our current work is being restructured to bring this issue back in focus to provide a sense of urgency to the debate of water management.

The objectives of the Mission are:

- To advocate policy direction towards sustainable water management
- To document and disseminate best practices on water conservation, management, reuse and recycling across various sectors and create a forum to facilitate exchange of information and experiences in the country
- To promote through leadership and policy advocacy on sustainable water management including market for wastewater

FICCI Water Awards & India Industry Water Conclave

The FICCI Water Mission has instituted the India Industry Water Conclave and Awards on annual basis to recognize excellence in water conservation and sustainable water management practices. The Conclave and Awards brings together diverse stakeholders from the corporate sector, government, academia, non-governmental organizations, civil society, and financial institutions to showcase best practices, deliberate on policy issues, and propose solutions to surmount challenges in sustainable water management.

FICCI Water Mission Secretariat

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