



# INTERNATIONAL CONFERENCE

on

## TOWARDS IMPROVED URBAN WATER FOR SUSTAINABLE DEVELOPMENT IN GLOBAL SOUTH

November 24th – 25th | Nashik, Maharashtra

# Conference Report







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### Conference Report

IN ASSOCIATION WITH



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# FOREWORD

As International Director of Indian Water Works Association (IWWA), it is my privilege to introduce the Report of the International Conference on "Towards Improved Urban Water for Sustainable Development in Global South."

Water, the life-sustaining force for communities and ecosystems, stands at the heart of our collective pursuit of sustainable development. The theme of this conference, which focuses on the challenges and opportunities within developing-country water utilities, epitomizes our commitment to fostering fundamental interactions and catalysing actionable solutions.

Throughout this conference, renowned experts and influential figures from myriad fields converged to engage in dynamic discussions, sharing their insights and experiences. From delving into the complexities of sustainable water management to exploring innovative technologies, financing mechanisms, and governance models, the comprehensive scope of this conference mirrored the diversity of challenges faced by water management systems in the Global South.

At its core, this conference served as a platform for identifying challenges and extending solutions, from addressing the impacts of climate change on water utilities to spotlighting success stories within the water systems. The resonance of our collective efforts was felt through the tangible outcomes envisioned listed below:

- **Building Collaborative Networks:** A pivotal outcome of this conference was establishing a robust network comprising practitioners, policymakers, researchers, and key stakeholders. This coalition is poised to drive meaningful change and elevate urban water utility management in the Global South.
- **Facilitating Collaborations:** By fostering meaningful discussions and peer learning among utility operators, this conference-initiated collaborations that surpass geographical boundaries, nurturing a culture of knowledge exchange and the sharing of best practices.
- **Innovative Solutions for Sustainability:** The exploration of innovative solutions underlined our commitment to sustainable and efficient urban water management practices, essential for overcoming challenges and enhancing access to clean water in regions facing scarcity.
- **Contribution to Effective Frameworks:** Our collective endeavors aimed to contribute visibly to the development of effective frameworks and initiatives, ensuring a positive impact on water resources, ecosystems, and communities across the Global South.

This report encapsulates the wealth of insights, recommendations, and collaborative initiatives born from our collective aspirations. I extend my heartfelt gratitude to all who contributed—participants, organizers, speakers, and sponsors—for their unwavering commitment and dedication to this cause.

May the essence of this conference perpetuate and inspire a legacy of positive change in the realm of urban water management, transcending borders and empowering communities.

Warm regards,

**Dr. Parag Sadgir**

**Director, International**

**Indian Water Works Association (IWWA)**

# MESSAGE



## Chief Engineer, Maharashtra Jeevan Pradhikaran & President, Indian Water Works Association

As President of the Indian Water Works Association (IWWA), it brings me immense pleasure to express the resounding success of our recent International Conference focused on "Towards Improving Urban Water for Sustainable Development in the Global South."

Water, most vital element of our existence, is pivotal in sustaining life, nurturing ecosystems, and propelling socio-economic progress. Yet, the challenges posed by the global water crisis demand continuous efforts and innovative solutions. Our conference, centred on this urgent need, underscored the importance of collaboration and cooperation to address water-related issues.

Throughout our discourse, the speakers and the delegates delved deep into the intricate challenges faced by water management systems, particularly in the Global South. We emphasized the undeniable right to access clean and safe water, a privilege that many in these regions still lack. Moreover, the presentations of successful water utility projects highlighted the transformative power of collaboration and partnerships.

The conference was more than a gathering; it was a platform for meaningful discussions, knowledge sharing, and ideation among experts, policymakers, practitioners, and stakeholders. Our shared objective was crystal clear:

- **Discussing challenges faced by water utility systems**
- **Proposing viable solutions for improved water management**
- **Showcasing success stories of water systems**
- **Examining the impact of climate change on water utilities**

I am sure the outcome will be truly remarkable. We have succeeded in fostering collaborations among utility operators, facilitating peer learning, exploring innovative effective frameworks. However, the path forward remains crucial.

The pressing global water crisis demands a radical shift in our approach. We must view and operationalize Sustainable Development Goals (SDGs) through a lens of water security. This transformation necessitates governance reinforcement, technological innovation embracing AI and ML, a nexus approach integrating water, food, and energy, and a proactive engagement with communities.

Similarly, our discussions on wastewater treatment and management have illuminated the potential of resource recovery, circular economies, and public service approaches. Together, through innovation, collaboration, and systemic change, we can transform wastewater from a burden into a valuable resource.

Climate change- adaptation and resilience have emerged as key imperatives. We must prioritize climate resilient infrastructure, leverage AI and ML for innovation, and formulate policies that incentivize sustainable water management practices.

Furthermore, the social and economic aspects of water and wastewater management demand our attention. It is time to quantify the true cost of inadequate sanitation, prioritize investments, ensure equitable access, unlock economic potentials, and strengthen governance through collaborative partnerships.

The way forward is clear: Keep On Doing , a commitment to innovation, and a shared vision for a future where water and sanitation are not privileges but fundamental rights accessible to all.

In closing, I extend my deepest gratitude to all participants, speakers, and stakeholders for their invaluable contributions.

Let us continue this journey with renewed vision, working hand in hand to transform our aspirations into tangible actions, making water security a reality for generations to come.

**Er. Subhash B. Bhujbal.**

# MESSAGE



## Director - Utility, Indian Water Works Association & Director, Ecosan Services Foundation, Pune

I extend my sincere gratitude to each one of you for contributing to the resounding success of the recent International Conference on "Towards Improved Urban Water for Sustainable Development in the Global South," organized by the Indian Water Works Association (IWWA).

IWWA stands as a testament to collective professionalism and commitment, boasting over 54 years of purposeful existence in India. With headquarters in Mumbai and 36 centres nationwide, we have connected over 12,000 professionals from diverse sectors under one umbrella, striving towards water supply enhancement and tackling associated challenges across municipal, industrial, and agricultural domains.

Our association, with a primary focus on the holistic water cycle, encompasses environmental, social, institutional, and financial aspects. Through the dissemination of knowledge via handbooks, guidelines, manuals, and documents, we have aimed to consolidate expertise and arrive at unified opinions for smarter, better-planned cities.

The recent International Conference held in Nashik, Maharashtra, in collaboration with Nashik Municipal Corporation, MEETRA Nashik, and supported by esteemed partners such as the Ministry of Jal Shakti, Maharashtra Urban WASH-ES Coalition, and AILSG - RCUES Mumbai, and technically supported by Ecosan Services Foundation was a testament to our collective dedication to address water challenges.

Our thematic focus on "Towards Improved Urban Water for Sustainable Development in the Global South" delineated crucial aspects of water and sanitation through a series of technical sessions encompassing nine pivotal subthemes. These sessions were designed to delve into multifaceted challenges, opportunities, and solutions surrounding water utilities in developing countries.

The participation of experts from various fields, including key representatives from countries across the Global South such as Malaysia, Sri Lanka, Nepal, Thailand, Bangladesh, and India, enriched our discussions with invaluable insights and best practices in water utility sectors.

The conference served as an invaluable platform for learning, collaboration, and exchange of innovative ideas. It has been a privilege to witness the engagement of government organizations, industry leaders, policymakers, academia, and various stakeholders committed to fostering collaborations, sharing knowledge, and exploring solutions to enhance water management practices sustainably.

Your collective involvement has been pivotal in shaping actionable strategies that aim to promote sustainability and address the pressing water challenges faced by communities in the Global South.

Once again, I express my heartfelt gratitude to all participants, speakers, partners, and stakeholders for their unwavering support and contributions towards making this conference an outstanding success.

Let us continue our journey of collaboration, innovation, and partnership in advancing sustainable water utility services for the betterment of communities worldwide.

# Conference At a Glance

## ABOUT THE CONFERENCE

Water is a fundamental resource for sustaining life, supporting ecosystems, and driving socio-economic development. However, the global water crisis poses immense challenges that require collective efforts and innovative solutions. The theme of the International Conference reflected the urgency to tackle water-related issues and emphasizes the importance of collaboration and cooperation.

Water is a precious resource, essential for life and fundamental to sustainable development. Yet, in many parts of the world, access to safe and reliable water services remains a challenge. This is particularly true in the Global South, where rapid urbanization, population growth, and climate change are putting increasing pressure on already strained water resources.

Ensuring universal access to clean and safe water is an inherent human right, yet a significant number of individuals in the Global South continue to grapple with the absence of this essential resource. Water management serve as crucial catalysts in guaranteeing reliable and sustainable water supplies for communities. Nonetheless, the obstacles encountered by water utilities in the Global South are intricate and diverse. This conference aimed to delve into the multifaceted challenges faced by these water management systems and shed light on the innovative solutions that have been implemented to tackle these issues. Additionally, compelling case studies of successful water utility projects were presented to emphasize the pivotal role of collaboration and partnerships in attaining positive outcomes. The conference aimed to address these challenges by bringing together experts, practitioners, policymakers, and other stakeholders to share knowledge, exchange ideas, and develop innovative solutions.

The International Conference on "Towards Improved Urban Water for Sustainable Development in the Global South" was successfully conducted on November 24th-25th, 2023, at MEETRA, Nashik (Maharashtra). Hosted by the Indian Water Works Association (IWWA) in collaboration with the Nashik Municipal Corporation and MEETRA, the conference garnered support from the Ministry of Jal Shakti, MAHARASHTRA URBAN WASH-ES COALITION, and AILSG - RCUES Mumbai. Held at the Maharashtra Environmental Engineering Training and Research Academy (MEETRA), the event centered around the theme aimed at addressing challenges in water and sanitation. Throughout the conference, experts from diverse fields engaged in technical sessions, exploring nine subthemes encompassing various aspects of water utilities in developing countries. Discussions delved into improving water management, climate change impacts, innovative technologies, governance models, and success stories from nations in the Global South like Malaysia, Sri Lanka, Nepal, Thailand, Bangladesh, and India. The event served as a platform for learning about the latest trends, innovations, and best practices in the water utilities industry, facilitating connections, collaborations, and knowledge exchange among stakeholders from government organizations, industry leaders, policy makers, academic institutes, NGOs, community representatives, and others. The conference aimed to foster collaborations, share knowledge, explore innovative solutions, improve water management practices, promote sustainability, and devise actionable strategies for implementation in addressing pressing water challenges faced by communities in the global South.

# CONFERENCE OBJECTIVE

The primary goal of the International Conference – "Towards Improving Urban Water for Sustainable Development in the Global South" was to assemble experts from diverse fields to discuss and exchange their expertise regarding water utilities in developing countries. The conference aimed to pinpoint challenges and opportunities encountered by water management systems in the global south while exploring potential solutions. Throughout the conference, participants had the opportunity to delve into various subjects, including sustainable water management, innovative technologies, financing mechanisms, and governance models. Keynote speeches, discussions, and interactive sessions were key features of the conference, offering invaluable insights into the most recent trends and best practices within the water utilities sector.

- **Discussing the challenges faced by water Utilities systems**
- **Proposing solutions for improving water management**
- **Highlighting the success stories of water system**
- **Examining the impact of climate change on water utilities**

## Outcome

The International Conference aimed to establish a network among practitioners, policymakers, researchers, and other key stakeholders committed to enhancing urban water utility management in the Global South. Its specific goals included facilitating meaningful discussions and collaborations among utility operators, fostering knowledge sharing and exchanging best practices through peer learning among Global South countries, exploring innovative solutions for sustainable urban water management, addressing water scarcity, contributing to effective frameworks and initiatives, and creating positive impacts on water resources, ecosystems, and communities in the Global South. The event drew over 300 participants from various regions of India and the Global South, representing diverse urban local bodies, corporate entities in the water sector, water professionals, government organizations working on WASH in India, and counterparts in the Global South. The conference also saw an outstanding response from exhibitors, with 10 stalls showcasing offerings from government agencies, private suppliers, contractors, and vendors in the water sector.



# AGENDA

Friday, 24th November 2023			
Timing	Session Details	Speaker	Session chair
9.30 am to 11.30 am		<b>Inauguration Session</b> Welcome of Guest Conference Inauguration Publication of Souvenir Address by Guest of Honour Address by Chief Guest Vote of Thanks	
<b>Tea/ Coffee Break</b>			
12.00 pm to 1.30 pm	<b>Session I</b> Water Conservation and Demand Management Water Governance and Policy Policy, Governance, Approach, Technologies, Capacity Building and Practice	<ul style="list-style-type: none"> <li>Mr. Anuj Kanwal, Commissioner (CADWM and BWUE), Department of Water Resources, River Development and Ganga Rejuvenation, Government of India</li> <li>Mr. Narendran Maniam, CEO, Indah Water, Kuala Lumpur, Malaysia</li> <li>Mr. V. K. Madhavan, Chief Executive, Water Aid India, New Delhi</li> <li>Prof. Hamanth C. Kasan, International Water Association, President nominated</li> <li>Dr. Jagan Shah, Resident Senior Fellow, Artha Global</li> </ul>	Dr. Parag Sadgir, Director, International, IWWA and HoD, Dept of Civil Engg., CoEP Technological Institute
<b>Lunch</b>			
2.30 pm to 3.30 pm	<b>Session II</b> Water Quality Aspects Wastewater Management and Resource Recovery	<ul style="list-style-type: none"> <li>Mr. Uday Shankar Prasad, PME Coordinator, WaterAid India</li> <li>Ms. Isha Basyal, Deputy Chief Operating Officer, Global Water and Sanitation Centre, Asian Institute of Technology, Thailand</li> <li>Dr. DoL Prasad Chapagain, Deputy Engineer, Waste Water Operation Division, Kathmandu Upatyaka Khanepani Limited (KUKL), Kathmandu, Nepal.</li> <li>Mr. Satyajeet Raut, Director Strategy at Vishvaraj Group</li> <li>Mr. S.S. Balaji, Water Management, Larson and Toubro Pvt. Ltd.</li> </ul>	Mr. Amar Supate, Former Principal Scientific Officer, Maharashtra Pollution Control Board
<b>Tea/ Coffee Break</b>			
4.00 pm to 5.30 pm	<b>Session III - Themes</b> Effective Operation and Maintenance for Utility assets management 24x7 Water Supply	<ul style="list-style-type: none"> <li>Mr. Nicolas Bockhoff, Chief Operating Officer Suez India Ltd., Bangalore</li> <li>Dr. M. Satyanarayana, Executive Director, Hyderabad Metropolitan Water Supply and Sewerage Board</li> <li>Mr. Dilip Sharma, Senior Advancement Manager, Water (South Asia), Bentley Systems India</li> </ul>	Dr. Dayanand Panse, Director, Utility, IWWA
7.30	<b>Social Dinner</b>		

7.30 Onwards	Social Dinner		
Day 2 - Saturday, 25th November 2023			
Timing	Session Details	Speaker	Session chair
10.00 am to 11.30 am	<b>Session IV - Themes</b> <b>Circular Economy for Strengthening Urban Water Management</b> Policy, Governance, Approach, Technologies, Capacity Building and Practice	<ul style="list-style-type: none"> <li>Mr. Vishwanath S., Advisor, Biome Environmental Trust</li> <li>Mr. Depinder Kapur, Director, Water Program, Centre for Science and Environment (CSE), New Delhi</li> <li>Mr. Ajit Savadi, Senior Vice-President, NJS Engineers India Private Limited</li> <li>Mr. Abhishek Jadhav, Founder Director, Water and Sewage Environment Engineering Private Limited, India</li> <li>Mr. Sagar Patil, Sr. Technical Officer, RCUES of AILSG-Mumbai</li> <li>Mr. V. K. Sawant, Chairman, IWWA Goa centre</li> </ul>	Er. Anil K. Gupta, Hon. Director (Technical), IWWA
<b>Tea/ Coffee Break</b>			
12.00 pm to 1.30 pm	<b>Session V - Themes</b> <b>Climate Change Adaptation and Resilience</b> Impacts of climate change on water resources in the Global South Climate-resilient water infrastructure Adaptation strategies for water scarcity and extreme events Water-sensitive urban design and planning	<ul style="list-style-type: none"> <li>Dr. Renu Vyas, Professor and Head of Institute, MIT School of Bioengineering Sciences and Research</li> <li>Dr. Prasanna Jogdeo, South Asia Operations Manager, International Water Association, Chennai</li> <li>Dr. Dineshwar Prasad Singh, Former Engineer in chief cum special secretary and Past President, IWWA</li> <li>Dr. Pawan Labhassetwar, Chief Scientist and Head, Water Technology and Management Division, CSIR-National Environmental Engineering Research Institute, Nagpur</li> </ul>	Mr. Rajesh Gupta, Professor and Head at VNIT Nagpur
<b>Lunch</b>			
2.30 pm to 3.30 pm	<b>Session VI - Themes</b> <b>Socio-economic Aspects of Water Management</b> Water and livelihoods in the Global South Gender perspectives in water management Water pricing and	<ul style="list-style-type: none"> <li>Dr. Ravikumar Joseph, Senior water and sanitation specialist and Consultant, World Bank</li> <li>Mr. Azuan Ahmad Zahdi, Business Transformation and Strategic Planning, Indah Water, Malaysia</li> <li>Mr. Sudhakar N. Hande, Executive Engineer, Water Supply Project Department, Municipal Corporation of Greater Mumbai</li> <li>Mr. A.K. Shahu, Chief Engineer, Public Health and Engineering Department, Chhattisgarh</li> </ul>	Mr. K. K. Songaria, Chairman IWWA Bhopal Center

	Economic valuation of water resources Water-related conflicts and cooperation	PHED, Chhattisgarh	
<b>Tea/ Coffee Break</b>			
4.00 pm to 5:00 pm	<b>Valedictory Function</b>	<ul style="list-style-type: none"> <li>• Dr. Parag Sadgir, Director, International, IWWA and HoD, Department of Civil Engg, CoEP Technological Institute</li> <li>• Mr. Dhawal Patil, General Manager, Ecosan Services Foundation - Conference at a Glance and Way Forward</li> <li>• Mr. M. Mathiyalagan, Vice President, IWWA</li> <li>• Mr. Subhash B Bhujbal, President, IWWA</li> <li>• Mr. Nandkishor Jagtap, Chief Engineer, Pune Municipal Corporation</li> <li>• Mr. Chakradhar Hiralal Kandalkar, Deputy Municipal Commissioner (Special Engineering), Municipal Corporation of Greater Mumbai – <i>Chief Guest</i></li> <li>• Dr. Dayanand Panse, Director, Utility, IWWA</li> </ul>	
<b>High Tea</b>			



# THE INAUGURAL SESSION

Day 1 | November 24<sup>th</sup>, 2023



Mr. Anuj Kanwal |  
Commissioner (CADWM and  
BWUE) Department of water  
resources



Mr. Narendra Maniam |  
Chief Executive Officer, Indah  
Water Konsortium Sdn Bhd



Dr. Jairaj Phatak (IAS) | Retd.  
Director General and  
Secretary, All India Institute of  
Local Self Government



Prof. Hamanth C. Kasan | Vice  
President, International Water  
Association



Mr. Subhash B. Bhujbal |  
President, IWWA



Dr. Dayanand Panse |  
Director, Utility, IWWA



Dr. Parag Sadgir | Director,  
International, IWWA and HoD,  
Department of Civil  
Engineering, CoEP  
Technological Institute

# The Inaugural Session

Indian Water Works Association (IWWA) hosted an International Conference on November 24th–25th, 2023 at MEETRA, Nashik (Maharashtra) in association with Nashik Municipal Corporation and (Maharashtra Environmental Engineering Training and Research Academy) MEETRA. The international conference was supported by the Ministry of Jal Shakti, Maharashtra Urban WASH – Environmental Sanitation Coalition, and AILSG – RCUES Mumbai. The venue – MEETRA is a pioneering Water Supply and Sanitation training institute located in Maharashtra with a strong focus on Information and Knowledge Management. The theme of the conference was “Towards Improved Urban Water for Sustainable Development in the Global South”. There were six technical sessions on 9 subthemes, covering various aspects of the Water and Sanitation sector.

- **Water for Life: Addressing the Global Water Crisis Together**
- **Empowering Water Infrastructure and Utilities**
- **Water Conservation and Demand Management**
- **Water Governance and Policy**
- **Wastewater Management and Resource Recovery**
- **Climate Change Adaptation and Resilience**
- **Innovation, Technology, and Capacity Building**
- **Socio-economic aspects of Water Management**
- **Circular Economy Approaches in Water System**

Mr. Anuj Kanwal, commissioner (CADWM and BWUE) Department of Water Resources, River Development and Ganga Rejuvenation, Government of India, inaugurated the event as a chief guest in presence of Mr. Narendran Maniam – Chief Executive Officer, Indah Water Konsortium Sdn Bhd, Prof. Hamanth Kasan – Vice President, International Water Association, Dr. Jairaj Pathak – Director General and Secretary, All India Institute of Local Self Government as a Guest of Honor. Mr. Subhash B. Bhujbal – IWWA President, Dr. Dayanand Panse – Director Utility and Dr. Parag Sadgir – Director, International IWWA also graced the dais as IWWA council member.

## Dr. Dayanand Panse | Director, Utility, IWWA



Dr. Panse extended a warm welcome to the Chief Guest, Mr. Anuj Kanwal, the Guest of Honor, and all other dignitaries present. He provided a succinct overview of IWWA’s journey and the conference’s objectives. The conference, he emphasized, is more than just a meeting. It is a vibrant platform for networking with speakers and dignitaries, a celebration of connection, learning, and re-engagement with the wealth of information and experiences related to water worldwide.

## Mr. Subhash B. Bhujbal | President, IWWA



Mr. Bhujbal cordially introduced the Chief Guest and Guests of Honor, expressing his gratitude towards the Ministry of Jal Shakti, Government of Maharashtra, Maharashtra Jeevan Pradhikaran, MEETRA, Ecosan Services Foundation, and all the organizations that generously supported the event. As the President of IWWA, he outlined the organization's successful journey, emphasizing its focus on the entire water cycle and related environmental, institutional, social, and financial issues.

IWWA's mission is to disseminate knowledge by preparing and publishing handbooks, guidelines, manuals, and documents on a variety of topics related to water and wastewater, beneficial for the public. To achieve this, IWWA aims to unite all professionals associated with the water and wastewater sector on a single platform. This platform facilitates the exchange of experiences, views, and knowledge, leading to a consensus on water management subjects and solutions for better planned and smarter cities.

Water, a vital resource that sustains life and supports economic development, remains a significant challenge in many parts of the world, particularly in the global south. Access to clean and safe water and its management are areas where IWWA intends to contribute solutions by organizing international events. Attendees can anticipate learning about key aspects such as sustainable water management, innovations, technologies, financing mechanisms, and governance models.

The conference will host keynote speeches, discussions, and interactive sessions featuring speakers from various countries of the global south, including Malaysia, Sri Lanka, South Africa, Nepal, Thailand, Bangladesh, and India.

## Mr. Narendra Maniam | Chief Executive Officer, Indah Water Konsortium Sdn Bhd

Mr. Maniam, the CEO of Indah Water Konsortium, Malaysia, had the honor of inaugurating the event. He provided an overview of Indah Water Company, detailing its role as a utility sector organization in Malaysia. Recently, the company has embarked on a circular economy initiative, which includes water recycling and the development of a master plan for fertilizer production, biogas, and other green initiatives. Mr. Maniam also discussed the process of incremental tariff adjustment, explaining how the company navigates government agency approvals and engages key stakeholders, including elected representatives, during the planning and execution of their master plans.



## Prof. Hamanth C. Kasan | Vice President, International Water Association



Mr. Kasan, as a Guest of Honor, inaugurated the event. He introduced the Centre of Excellence in South Africa, a testament to his 22 years of dedication to the water utility sector on the African continent. He passionately expressed his belief that every Indian should have access to clean water and proper sanitation.

'Water is life, and sanitation is dignity.  
We cannot rest until these challenges are overcome.'...Prof.  
Kasan

## Dr. Jairaj Phatak (IAS) | Retd. Director General and Secretary, All India Institute of Local Self-Government

Dr. Pathak, the Director General and Secretary of the All India Institute of Local Self Government (AIIILSG), inaugurated the event as a Guest of Honor. He introduced AIIILSG-RCUES Mumbai, highlighting its association with municipalities in India. Recognized as a Key Resource Centre by the Ministry of Housing and Urban Affairs, the organization is renowned for providing training on urban programs in western India. In states like Maharashtra, Gujarat, and Madhya Pradesh, municipalities are directly responsible for water supply and sewerage.



Dr. Pathak shared his insights on societal structures, stating that while capitalist societies strive to provide equality of rights and opportunities, wealth and water consumption remain unequal. He emphasized that water is a commodity and suggested that the affluent should cross-subsidize the less fortunate. He proposed a progressive water pricing system, with higher rates for increased consumption. However, he acknowledged that achieving perfect equality is challenging.

# Mr. Anuj Kanwal | Commissioner (CADWM and BWUE) Department of Water Resources



Mr. Kanwal, the Commissioner (CADWM and BWUE) of the Department of Water Resources and a representative of the Ministry of Jal Shakti, Government of India, had the honor of inaugurating the event as the Chief Guest. He delved into discussions on policies, issues, and the management of single water sources, addressing the current situation in India and the Global South.

‘Day Zero,’ a scenario where there is no water to meet the basic demands of the population, emphasizing that water is a valuable, finite, shared resource that is not renewable. In India, 9 out of 20 river basins, which support 600 million people, are experiencing water stress. A staggering 54% of India faces high to extremely high-water stress....Mr. Anuj Kanwal

Mr. Kanwal pointed out that even if all utilized water were stored, it would still be insufficient. Climate change is impacting the water cycle, leading to longer dry spells and extreme precipitation events. Groundwater, a major source for agricultural and domestic use, needs conservation. The increased stress on surface water is a primary concern, and water use efficiency is seen as a potential solution to water stress.

Water use efficiency funnel
Water availability
Measurement
Standardization
Penalty

Sustainability Principles: Circularity
“ONE WATER”- “Water cycle is life cycle”
Reduce
Reuse
Recycle

# SESSION 1



# Water Conservation and Demand Management, Water Governance and Policy

Day 1 | November 24<sup>th</sup>, 2023

## SESSION 1



Mr. Narendra Maniam |  
Chief Executive Officer, Indah  
Water Konsortium Sdn Bhd



Mr. V. K. Madhavan |  
Chief Executive, WaterAid, India



Prof. Hamanth C. Kasan | Vice  
President, International Water  
Association



Dr. Jagan Shah | Resident  
Senior Fellow, Artha Global

# Water Conservation and Demand Management, Water Governance and Policy

Policy, Governance, Approach, Technologies, Capacity Building and Practice

**Mr. Narendra Maniam | Chief Executive Officer, Indah Water Konsortium Sdn Bhd**



Mr. Maniam, who has been the CEO of Indah Water Konsortium Sdn Bhd (IWK) since 2019, is spearheading efforts to provide Malaysians with a clean and healthy environment through a well-managed sanitation system, both sewered and non-sewered. He elaborated on how Indah Water operates as a utility service provider for Malaysia, with strategic plans extending up to 2040. These plans are designed in phases to address all the challenges the country faces, from stakeholder engagement to incremental tariff increases, while also introducing new circular economy concepts.

Towards the end of his presentation, Mr. Maniam showcased the company's innovative interventions. These include managing sewerage sludge by converting it into biochar, generating biogas through the co-digestion of food waste and sewage sludge, and experimenting with Black Soldier Flies. He also highlighted how biosolids, the byproduct of sewage sludge, can be utilized as biofertilizer, creating a potential revenue stream for the company.



# Why do we need to transform the water sector?

- **People:**  
Increasing appreciation towards water and providing sufficient engagement platform to create a mindset shift for collective well-being.
- **Governance:**  
Empowering water governance at the Federal, State, and Local Government levels towards Integrated Water Resources Management (IWRM).
- **Infrastructure and Technology:**  
Application of smart technology and sustainable water infrastructure to support long-term development and resilience in the water sector.
- **Information and RDIC:**  
Enable data access and integration of data to promote data-based decision-making and encourage research and development in the water sector.
- **Alternative financing:**  
Enhancing public and private cooperation towards making water a dynamic economic sector.

Mr. V. K. Madhavan | Chief Executive, Water Aid, India



Mr. Madhavan, a seasoned professional with over three decades of significant experience in development and social change, currently holds the position of Chief Executive at Water Aid India. He discussed various facets of water management, categorized into hopes, concerns, and desires.

He expressed hopes for the conservation of green assets, resource recovery and reuse, and the application of technology and artificial intelligence for the benefit of humanity.

His concerns revolved around groundwater management, water quality management, and financial viability. Lastly, he shared his desires for the future of utility management, emphasizing the need for autonomy, efficiency, and the implementation of a circular economy.

Hope

- Growing recognition of the urban water crisis.
- SMART Cities/AMRUT 2.0
- Jal Jeevan Mission–Urban
- Wetlands/Urban water bodies
- Recycling and reuse of water
- New emerging enterprises in water space- Technologies, AI

Concern

- Groundwater in urban India- Significant reliance yet ignored.
- Water quality.
- Financial viability of our urban utilities.
- Leaky pipes and creaking infrastructure.
- Solid and liquid waste management.
- Equitable access
- 24\*7 water supply
- Climate resilient infrastructure/structure

Desire

- State of our utilities- professionalization, autonomy, efficiency, and effectiveness.
- Willingness to charge
- Customer/citizen-centric- Ensuring accountability
- Data and transparency
- Conservation, recharge, and the circularity of water
- SMART cities and rural India lies between?
- Independent regulator
- Changing behaviors reducing consumption

## Water and wastewater services in uncertain times: Dealing with global crisis

### Prof. Hamanth C. Kasan | Vice President, International Water Association



Prof. Kasan, who holds esteemed positions as the Vice President and Distinguished Fellow at the International Water Association, a Senior Fellow at the Water Institute of Southern Africa (WISA), and an Honorary Research Professor at Durban University of Technology, addressed the critical issue of ‘Uncertainty.’ He underscored the vital lessons to be learned from the COVID-19 pandemic and its impact on supply patterns.

His discussion also encompassed climate change-related issues such as rising temperatures, droughts, and flood impacts. He warned that the adaptation gap is expanding and stressed the urgency of immediate action to prevent it from becoming too late or too costly to address. Furthermore, he conveyed a crucial message: for the well-being of our society and planet, it is imperative to phase out the use of fossil fuels as soon as possible.

#### Impact of climate change

- Higher temperature, need more water
- Drought impacting food production
- Flood Impact on infrastructure and food production
- Changes in water quality
- Damage to Wastewater plant, reduced waste water carrying capacity

#### What should we do to sustain water and sanitation services delivery?

- Improving governance, Accountability
- Breaking institutional silos
- Innovate nature-based sustainable solution
- Attract private investment in water by enabling a digital future quickly
- Making inclusion central to all efforts

### Dr. Jagan Shah | Resident Senior Fellow, Artha Global



Mr. Shah, a Resident Senior Fellow at Artha Global and a distinguished architect and urbanist, has previously served as a Senior Infrastructure Advisor in the UK government. He discussed the importance of economic growth and prosperity in securing water resources, emphasizing the link between water and productivity. Therefore, he argued, addressing financial and data issues is crucial for ensuring water security.

He pointed out that India faces shortages in water supply, health and infrastructure, housing, and mobility. He underscored the role of Geographic Information Systems (GIS) and digital twins in urban and regional planning. For effective capacity building, he stressed the need for collaboration among urban planners, environmental engineers, economists, finance experts, social development experts, and behaviour change experts.

Mr. Shah asserted that urban planning cannot persist with a business-as-usual approach if we aim for orderly urban development. A paradigm shift is necessary. He identified the governance, management, and economy of water as top-priority issues. He also highlighted the significant role of the agricultural economy, noting that the growth in agricultural jobs has outpaced the rate at which cities are providing jobs.

### Issues and Challenges

- Sustained economic transition (primary > tertiary).
- Financing the transition: adaptation, resilience, sustainability.
- Urban and regional planning: enabled by GIS and digital twins
- Integrated capacity building: urban planners + environment engineers + economists + finance experts + social development experts + behaviour change experts

## SESSION 2



# Water Quality Aspects, Wastewater Management and Resource Recovery

Day 1 | November 24<sup>th</sup>, 2023

## SESSION 2



Mr. Uday Shankar Prasad |  
PME Coordinator,  
Water Aid, India



Ms. Isha Basyal |  
Deputy Chief Operating  
Officer, Global Water and  
Sanitation Centre, AIT Thailand



Dr. Dol Prasad Chapagain |  
Deputy Engineer, Wastewater  
Operation Division, Kathmandu  
Upatyaka Khanepani Limited  
(KUKL), Kathmandu, Nepal.



Mr. Satyajeet Raut |  
Director – Strategy,  
Vishvaraj Group



Mr. S. S. Balaji |  
Water Management,  
Larson and Toubro Pvt. Ltd

# Water Quality Aspects, Wastewater Management and Resource Recovery

## Monitoring Drinking Water Quality, Crowd Sourcing of Data and the Role of Water Utilities

Mr. Uday Shankar Prasad | PME Coordinator, Water Aid, India



Mr. Uday Shankar, the PME coordinator for Water Aid India, brings over a decade of specialized experience in WASH (Water, Sanitation, and Hygiene) infrastructure and the leadership of large-scale water programs. His proficiency in strategic planning, thorough monitoring, and rigorous evaluation sets exceptional standards, propelling sustainable development initiatives forward.

In his presentation, Mr. Shankar underscored Water Aid's extensive efforts to monitor water sources across India. He emphasized the critical role of transparency in ensuring the quality of drinking water. This involves making information about water quality readily available and understandable to the public, which can help foster trust and encourage community participation in water management.

Mr. Shankar introduced an innovative concept—a crowdsourcing framework aimed at swiftly enhancing and maintaining water quality across its trajectory. Crowdsourcing, in this context, involves engaging the wider community in monitoring water quality. This could include reporting issues, suggesting improvements, and even participating in water quality testing. By leveraging the collective intelligence and resources of the community, this approach can lead to more rapid and sustainable improvements in water quality. It's a testament to Mr. Shankar's forward-thinking approach to water management, highlighting the potential of community engagement and technology in addressing water issues.

### Crowdsourcing of water quality data

- **Concept:** The crowdsourcing framework offers a methodology to involve citizens in assessing and comprehending the quality of their drinking water.
- **Goal:** Cultivating awareness and educating citizens about drinking water safety, identifying significant contaminants in localities, and monitoring service level benchmarks.
- **Key Components:** Involvement of citizens, water utilities, and the telecommunications network.
- **Requirements:** Training participants, defining water quality parameters for testing, and employing Field Test Kits (FTK) or laboratory testing methods.

## Public service approach for citywide inclusive sanitation and resource recovery

Ms. Isha Basyal | Deputy Chief Operating Officer, Global Water and Sanitation Centre, AIT Thailand



Ms. Isha, the Deputy Chief Operating Officer at the Global Water and Sanitation Centre, AIT Thailand, plays a significant role in the field of sanitation. In addition to her primary role, she also serves as the Regional Technical Coordinator for the Citywide Inclusive Sanitation Technical Assistance Hub in South Asia. Her work involves coordinating efforts across various cities in the region to implement inclusive sanitation solutions that cater to the needs of all residents.

In her discussion on citywide inclusive sanitation, Ms. Isha emphasized the importance of having both sewerred and non-sewerred sanitation systems coexist. This is crucial for effective wastewater management in cities. Sewerred sanitation refers to systems where wastewater is collected from households and other establishments through a network of underground sewer lines and transported to a central treatment facility. On the other hand, non-sewerred sanitation systems involve the onsite collection, treatment, and disposal or reuse of wastewater.

Ms. Isha underscored a significant statistic that highlights a major disparity in the distribution of subsidies: '56% of subsidies benefit the wealthiest 20%, while only 6% reach the poorest 20%.' This stark imbalance is alarming and calls for urgent action. As practitioners in the field, the focus should be on incorporating these subsidy schemes into broader programs. This would ensure that the truly needy, the impoverished population, are the actual beneficiaries. It is about making sanitation services more affordable and accessible to those who need them the most.

She advocates for a public service approach in the sanitation sector. This approach emphasizes the need to ensure and strengthen functions that guarantee the results of any interventions. It's about making sure that the implemented sanitation solutions are not only effective but also sustainable in the long run. This involves regular monitoring and evaluation of the systems, timely maintenance, and making necessary adjustments based on feedback and changing needs.

In conclusion, Ms. Isha's work and insights provide valuable guidance for addressing the challenges in the sanitation sector. Her emphasis on inclusive sanitation, equitable distribution of subsidies, and a public service approach offers a comprehensive strategy for improving waste water management in cities.

## Advancing Innovation for Accelerated Efforts

- **Existing Disposal Practices:** Landfilling and Agricultural Utilization
- **Emphasis on Discharge Standards:** Primarily targeting effluent quality, with limited focus on dewatered sludge
- **Benefits of Object-Oriented Programming (OOP) Application:** Diminished reliance on landfills, production of pathogen-free output, nutrient reclamation, environmentally friendly in combating climate impact, and cost-efficiency
- **Objective:** Achieving Zero Waste Discharge (Towards Sustainable Environmental Practices)

## Resource recovery: Application

- Crop irrigation
- Industrial processing
- Aquifer replenishment
- Construction site
- Toilet flushing with recycled wastewater
- Vehicle washing
- Wetland restoration and the creation of new habitats

## Wastewater management status in Kathmandu Valley: Lessons learned and way forward

Dr. Dol Prasad Chapagain | Deputy Engineer, Wastewater Operation Division, Kathmandu Upatyaka Khanepani Limited (KUKL), Kathmandu, Nepal.



Dr. Dol Prasad, a seasoned professional with 19 years of experience in the urban water sector, is known for his expertise in planning, designing, monitoring, and evaluating water supply projects. He currently serves as a manager at Kathmandu Upatyaka Khanepani Limited (KUKL), where he has demonstrated exceptional skills in construction supervision, financial and economic analysis, research, and water utility management.

In his insightful presentation on wastewater management in the Kathmandu Valley, Dr. Prasad emphasized the need for governance arrangements that are specifically tailored to address the unique challenges and needs of the valley's population. This approach recognizes that effective wastewater management requires solutions that are sensitive to the local context and responsive to the specific issues faced by the community.

Dr. Prasad provided a comprehensive overview of the current state of sewerage systems and river interceptors in the valley. According to reports, a staggering 98% of wastewater is either directly discharged into the river or dumped onsite, with only 2% being treated. This situation presents significant challenges, making wastewater management a pressing concern in the valley.

The untreated wastewater not only pollutes the river, affecting the quality of water and the health of aquatic ecosystems, but also poses health risks to the local population. Moreover, the valuable resources in the wastewater, such as nutrients and energy, are wasted instead of being recovered and reused.

To address these challenges, Dr. Prasad elaborated on KUKL's plan for efficient wastewater management. The plan involves setting up state-of-the-art sewage treatment plants that can effectively treat the wastewater, removing harmful pollutants and recovering valuable resources. These plants would employ advanced technologies and processes to ensure high treatment efficiency and resource recovery.

By implementing this plan, KUKL aims to significantly increase the proportion of wastewater that is treated, thereby reducing pollution, protecting public health, and contributing to sustainable development in the Kathmandu Valley. This initiative represents a significant step forward in addressing the wastewater management challenges in the valley and serves as a model for other regions facing similar issues.

### Concern

- Legal framework
- Political instability
- Poor physical infrastructure development
- Lack of technical capacity
- Inability to pay
- Lack of water resources
- Finance
- Lack of commitments

## Wastewater management and resource recovery

### Mr. Satyajee Raut | Director – Strategy, Vishvaraj Group



Mr. Raut, who holds the prestigious position of Director of Strategy at Vishvaraj Group, plays an instrumental role in shaping and implementing the group's strategies. His work is pivotal in steering the group's direction and ensuring its continued growth and success.

In his discussion on wastewater management and reuse, Mr. Raut highlighted the potential benefits of resource recovery and reuse for both public and private entities. This approach involves treating wastewater to make it safe for reuse, thereby conserving water resources and reducing the demand for fresh water. This could be particularly beneficial in addressing the water security issues faced by Indian towns, many of which are grappling with water scarcity and inadequate access to clean water.

Mr. Raut emphasized that reusing water can help bridge the gap between demand and supply. With increasing population and industrialization, the demand for water is growing rapidly. However, the supply of fresh water is limited and is further strained by factors such as climate change and pollution. By reusing treated wastewater, we can supplement the supply of water and help meet the growing demand.

However, Mr. Raut also pointed out the significant challenges in this area. Inadequate sewage treatment is a major issue, with only 5-25% of sewage in India being treated. This means that a large proportion of wastewater is discharged into the environment without treatment, leading to pollution of water bodies and posing health risks.

Furthermore, less than 5% of the treated water is reused. This represents a missed opportunity, as this treated wastewater could be used in various sectors. For instance, it could be used for irrigation in agriculture, reducing the reliance on fresh water. It could also be used in industries and refineries, where large quantities of water are required for various processes. Even railways could use this water for cleaning and other purposes.

In conclusion, while there are significant challenges in wastewater management and reuse, there are also immense opportunities. With strategic planning and implementation, as well as technological advancements, we can overcome these challenges and make the most of our water resources. This would not only benefit the economy but also contribute to sustainable development and improved water security.

#### Scaling up REUSE in India

- **A 'Reuse Mission' like AMRUT 2.0 or smart city by government:** Government funding as a VGF to bring treated water tariff close to fresh water tariff.
- **Trust on PPPs:** Private investment instead of government funds.
- Incentivize industries for the use of treated water by giving water credit (similar to carbon credit).
- Special funding/scheme for agricultural reuse from existing operational STP.

#### Sewage treatment with Reuse: Win-Win model

- Creating fresh drinking water for over ~12 crore citizens as a first step
- Boosting Swachh Bharat Mission- Saving our rivers/lakes/wells, improving the environment dramatically.
- With tariff incentives many more industries will opt for this green option- releasing millions of liters of fresh water, helping get drinking water security for millions more.

## Water management: Water quality | Urban management | Solution

### Mr. S. S. Balaji | Water Management, Larson and Toubro Pvt. Ltd.



Mr. Balaji, a representative from Larson and Toubro Private Limited, gave an in-depth presentation on urban water management solutions and water quality. His focus was on assessing contamination within pipelines using an endoscopic camera. This innovative approach allows for a detailed examination of the internal conditions of the pipelines, helping to identify potential areas of contamination that may affect water quality.

He brought attention to several pressing challenges in water management. One of these is the increase in unaccounted water, which refers to water that has been produced and is “lost” before it reaches the customer. This could be due to leaks, theft, or metering inaccuracies. Addressing this issue is crucial for efficient water management and conservation.

Another challenge he highlighted is the need for real-time network monitoring. This involves continuously tracking the performance of the water supply network to detect issues such as leaks or disruptions in a timely manner. This can help in prompt issue resolution, ensuring a consistent water supply.

He also pointed out the problem of network leakages, which not only lead to water wastage but can also cause damage to the surrounding infrastructure. Unpredictable water supply schedules were another concern he raised, emphasizing the need for reliable and consistent water supply for the convenience of consumers.

The identification of buried utilities is another significant challenge. These utilities, such as water and gas pipelines or electrical cables, are often not mapped accurately, leading to difficulties during construction or maintenance activities.

Among his insights, Mr. Balaji introduced the concept of digital twins. A digital twin is a virtual model of a process, product, or service. This pairing of the virtual and physical worlds allows analysis of data and monitoring of systems to head off problems before they even occur, prevent downtime, develop new opportunities and even plan by using simulations. In the context of water management, digital twins can be used to create detailed simulations of the water supply network. By applying AI to these models, it's possible to enhance hydraulic analysis, leading to more efficient utility management. This can help in predicting and addressing potential issues, optimizing resource use, and improving service delivery. This innovative approach showcases the potential of technology in transforming urban water management.

## Technologies for equitable supply

- GEM (Geospatial Event Management):  
For leakage reporting
- Former Gas Leak detection which pinpoints  
the leak location
- Hydraulic analysis with Artificial intelligenceassisted  
Digital twin
- NRW reduction theme: Infinity model

## Benefits of Integrated Water Management

- Water security
- Livability
- The health of waterways  
and landscape

## SESSION 3



# Effective Operation and maintenance for Utility Assets Management

Day 1 | November 24<sup>th</sup>, 2023

## SESSION 3



Mr. Nicolas Bockhoff | Chief Operating Officer, Suez India Ltd.



Dr. M. Satyanarayana | Executive Director, Hyderabad Metropolitan Water Supply and Sewerage Board



Mr. Dilip Sharma | Sr. Advancement Manager, Water (South Asia), Bentley Systems India

# Effective Operation and Maintenance for Utility Assets Management, 24 x 7 Water Supply

## Effective Operation and Maintenance for Utility Management

Mr. Nicolas Bockhoff | Chief Operating Officer, Suez India Ltd.



Mr. Nicolas, a Master's Degree holder in Engineering from Ecole Centrale Paris and Technical University of Vienna, is the COO of Suez India Ltd. in Bengaluru. His role is instrumental in fostering innovation and regional growth across environmental services, which includes business development, operational strategies, and sustainability initiatives.

In his presentation, Mr. Nicolas delved into the nuances of their digital transformation journey. He stressed the importance of not just digitizing, but truly digitalizing systems to enhance utility services.

His primary focus was on harnessing digital techniques for operational efficiency and maintenance. This included promoting a safety-oriented culture, enhancing network navigation, implementing digital complaint mechanisms, refining technical specifications, optimizing flow and pressure measurements, and improving leak repair procedures.

Moreover, Mr. Nicolas highlighted the importance of GIS surveys, consumer feedback surveys, physical asset evaluations, and hydraulic modeling using Water Gems software. These tools are crucial in establishing and sustainably maintaining robust systems.

### Innovations to accelerate and optimize the design

- CAPEX plan for an existing project
- Monitor and improve water equality
- To reduce water loss and contamination
- Helium leak detection

## Innovative technologies in water management, circular economy approaches and empowering water and wastewater infrastructure

### Dr. M. Satyanarayana | Executive Director, Hyderabad Metropolitan Water Supply and Sewerage Board



Dr. Satyanarayana has devoted many years to transforming the water and wastewater sector in Hyderabad. His significant contributions include formulating a comprehensive sewerage master plan for the city of Hyderabad. This plan serves as a roadmap for the development and management of the city's sewerage infrastructure, ensuring efficient wastewater collection, treatment, and disposal.

Currently, Dr. Satyanarayana holds the position of Executive Director at the Hyderabad Metropolitan Water Supply and Sewerage Board (HMWSSB) in Telangana.

In this role, he oversees the board's operations and guides its strategic direction. His leadership has been instrumental in driving the board's mission of providing reliable and sustainable water and sewerage services to the residents of Hyderabad.

In his presentation, Dr. Satyanarayana took the audience through the journey of the HMWSSB. He discussed the board's evolution, its achievements, and the challenges it has faced over the years. This provided valuable insights into the complexities of managing water and sewerage services in a large and rapidly growing city like Hyderabad.

He also talked about the innovative technologies that the HMWSSB is using to improve the water supply system. While he did not provide specific details, these technologies likely include advanced water treatment processes, smart meters, and data analytics tools. These technologies can help enhance the efficiency and reliability of the water supply system, reduce water losses, and improve customer service.

Dr. Satyanarayana also touched upon broader issues related to sanitation, cleanliness, and the world economy. He highlighted the impact of poor sanitation on children's health and well-being, and the importance of cleanliness in preventing diseases. He also discussed the economic implications of water, emphasizing its role as a critical resource in various sectors of the economy.

One of the key concepts he introduced was CIPP (Cured in Place Pipe) technology. This is a trenchless rehabilitation method used to repair existing pipelines. It involves inserting a resin-saturated felt tube into the damaged pipe and curing it in place to form a new pipe within the old one. This technology eliminates the need for extensive road cutting, reducing disruption and making the rehabilitation process more efficient and cost-effective.

In conclusion, Dr. Satyanarayana's work and insights offer a valuable perspective on the challenges and opportunities in the water and wastewater sector in Hyderabad. His dedication and innovative approaches continue to drive progress in this critical area.

## Innovations

- **Naanyatha Application:** Water quality monitoring
- **JALapp (Jaldi Action Le):** Quick Grievance Redressal
- **Safe Protocol Teams:** Work safety measures
- **System Monitoring:** Real-Time data
- **Sewer challenges:** Removal of hardened chokage- crocs and cameras
- **Sewer maintenance:** Mechanization mode
- Other IT-based innovations like GIS, LoRaWAN-AMR metering, sewer inspection cameras - QIWPS, Self-billing app, revenue monitoring app, water quality sensors, OCEMS (Online Continuous Effluent Monitoring System)

## Circular economy approach

- Recycling of treated water
- Sludge utilization
- Gas utilization

## Digital twin: An effective tool for operations and maintenance of utilities

### Mr. Dilip Sharma | Sr. Advancement Manager, Water (South Asia), Bentley Systems India



Mr. Dilip is a seasoned business leader in the field of water management and utilities, boasting over a decade of industry experience. He spearheads business development for water solutions in India, providing invaluable assistance to users grappling with complex water challenges.

Representing Bentley, a renowned software development company, Mr. Dilip presented on the concept of a 'digital twin' for the planning, design, construction, and maintenance of utility services.

A digital twin is a virtual replica of a physical product, process, or system that can be used for various purposes. It allows engineers and developers to simulate, predict, and optimize the product or process, thereby improving its performance and efficiency.

In his presentation, Mr. Dilip discussed the 'digital line of sight', which refers to a continuous thread of data that spans an asset's entire lifecycle. This digital thread ensures the integrity, accuracy, and timeliness of information, enabling stakeholders to access up-to-date and reliable data at any point in the asset's lifecycle. This can significantly enhance decision-making, improve operational efficiency, and reduce risks.

The digital twin approach, as Mr. Dilip explained, promotes interoperability, collaboration, transparency, and consistency. Interoperability ensures that different systems can work together seamlessly, while collaboration facilitates effective teamwork and coordination. Transparency ensures that all relevant information is readily accessible and understandable, promoting accountability and trust. Consistency ensures that standards and procedures are uniformly applied, enhancing the reliability and predictability of outcomes.

In conclusion, Mr. Dilip's insights offer a compelling glimpse into the future of water management and utilities, highlighting the transformative potential of digital technologies. His work is a testament to the power of innovation in addressing complex challenges and driving sustainable progress in the industry.

## Challenges

- Reduce non-revenue water losses
- Comply with regulations
- Deliver reliable clean water and sanitation system
- Climate Adaptation and Sustainability
- Operational efficiency and effectiveness
- Digital transformation

## Outcomes of digital twin

- Improve customer service and resilience
- Reduce non-revenue water
- Improve energy efficiency
- Improve capital planning
- Ensure water quality

## SESSION 4



# Circular Economy for Strengthening Urban Water Management

Day 2 | November 25<sup>th</sup>, 2023

## SESSION 4



Mr. Vishwanath S. | Advisor,  
Biome Environmental Trust



Mr. Depinder Kapur | Director,  
Water Program, Centre for  
Science and Environment



Mr. Ajit Savadi |  
Sr. Vice President,  
NJS Engineers India Pvt. Ltd



Mr. Abhishek Jadhav |  
Founder Director, Water and  
Sewage Environment  
Engineering Pvt. Ltd., India



Mr. Sagar Patil |  
Sr. Technical Officer,  
RCUES of AILSG, Mumbai



Er. V. K. Sawant | Chairman,  
India Water Works Association,  
Goa

# Circular Economy for Strengthening Urban Water Management

Mr. Vishwanath S. | Advisor, Biome Environmental Trust



Mr. Vishwanath, a distinguished environmental advocate and expert at the Biome Environmental Trust in Bengaluru, is known for his ability to harmonize urban development with ecological preservation. His work involves striking a balance between the needs of a growing urban population and the imperative to conserve natural resources and protect the environment.

In his presentation, Mr. Vishwanath turned the spotlight on Devanahalli, a region in Bengaluru, where he highlighted a significant water body. This water body, like many others, plays a crucial role in the region's ecology and is a vital resource for the local population.

One of the innovative approaches that Mr. Vishwanath and his company have adopted is the use of treated wastewater to rejuvenate this lake. Wastewater, once treated to remove harmful pollutants, can be a valuable resource. By redirecting this treated wastewater to the lake, they are not only preventing the waste of a valuable resource but also helping to maintain the lake's water levels and ecosystem. This approach demonstrates the potential for sustainable water management practices that benefit both people and the environment.

In addition to this, Mr. Vishwanath discussed the use of shallow aquifers to augment Devanahalli's water supply. Shallow aquifers are underground layers of water-bearing permeable rock from which groundwater can be extracted. By tapping into these aquifers, it is possible to enhance the region's water supply and ensure access to safe drinking water for its residents.

Mr. Vishwanath also touched upon the standards for categorizing surface waters based on their usage. These classifications are significant as they guide the management and protection of water bodies, ensuring that they are used in a manner that is sustainable and appropriate to their ecological status.

Lastly, he delved into the assessment of open well and filter bore well yields. These assessments, based on meter readings, provide valuable data on the amount of water that can be extracted from these wells. This information is crucial for water resource management, helping to prevent over-extraction and ensure the sustainable use of groundwater resources.

In conclusion, Mr. Vishwanath's work and insights offer a valuable perspective on sustainable water management. His innovative approaches and commitment to balancing urban development with ecological conservation serve as an inspiration for others in the field.

## Circular economy for strengthening urban water management

### Mr. Depinder Kapur | Director, Water Program, Centre for Science and Environment



Mr. Kapur, a renowned expert in development and WASH (Water, Sanitation, and Hygiene), currently serves as the director of the water program at the Centre for Science and Environment. His contributions to the field are extensive, including leading the sanitation capacity-building platform at the National Institute of Urban Affairs (NIUA), developing national strategies, and pioneering frameworks for capacity development and resilient urban sanitation response effectiveness.

In his presentation, Mr. Kapur focused on the concept of the circular economy, a model that aims to eliminate waste and the continual use of resources. He explored its purpose, which is to design out waste and pollution, keep products and materials in use, and regenerate natural systems, and its beneficiaries, which include the environment, economy, and society at large.

He delved into the dynamics of centralized and decentralized, sewerage and non-sewerage sanitation systems. Centralized systems involve collecting wastewater from various sources and treating it at a central location, while decentralized systems treat wastewater at or near the point of generation. Sewerage systems involve the use of sewer networks to collect and transport wastewater, while non-sewerage systems manage wastewater onsite. Mr. Kapur offered a nuanced perspective on these systems, highlighting their respective strengths and challenges and the need for a balanced, integrated approach to sanitation.

Mr. Kapur's discussion extended to the comprehensive coverage of a city through these diverse sanitation infrastructures. He emphasized the importance of ensuring that all parts of a city, including underserved or marginalized areas, have access to adequate sanitation services.

He extensively referenced the research and publications by the Centre for Science and Environment, particularly focusing on biosolids, which are nutrient-rich organic materials resulting from the treatment of sewage sludge, and the performance assessment of Faecal Sludge Treatment Plants (FSTPs). FSTPs are facilities designed to treat faecal sludge, which is the byproduct of onsite sanitation systems like septic tanks and pit latrines.

Mr. Kapur underscored the commitment of cities towards ensuring just and equitable access to water supply. He emphasized the importance of effective sewerage, septage, and stormwater management in achieving these objectives. These aspects of water management are crucial for protecting public health, preserving the environment, and ensuring the sustainability of urban water systems.

In conclusion, Mr. Kapur's insights offer a comprehensive understanding of the complexities of urban water and sanitation management and the potential of innovative approaches like the circular economy in addressing these challenges.

## CSE Water Program

- "Ear to the ground": Practice to policy programs
- The policy requires a long-term conceptual view: prioritizing medium- and short-term actions
- Programs require an understanding of how it is to be done- An assessment of what exists
- Planning followed by designing

## Circular economy for urban water management

Mr. Ajit Savadi | Sr. Vice President, NJS Engineers India Pvt. Ltd.



Mr. Savadi, a chartered civil engineer and a distinguished fellow of the Institution of Civil Engineering, has an impressive leadership record spanning over 32 years. His roles in senior corporate positions have covered a wide range of areas within India's water and urban infrastructure engineering realm, including commercial, contractual, operational, and technical aspects.

During his presentation, Mr. Savadi emphasized a crucial shift in mindset for practitioners in the field. He advocated for moving away from a narrow focus on individual wash basins to a broader perspective that encompasses entire river basins. This holistic approach requires considering the complete urban water cycle, from the source of the water, through its use and treatment, to its eventual return to the environment.

To illustrate this philosophy, Mr. Savadi presented a compelling case study highlighting the reuse of wastewater within a thermal power plant in Nagpur. This example demonstrates how treated wastewater, often considered a waste product, can be reused in industrial processes, thereby conserving water resources and reducing the environmental impact of the plant.

In addition to this, Mr. Savadi outlined plans to initiate a pilot project in Colaba aimed at enhancing water quality. While he did not provide specific details about this project, it likely involves implementing advanced water treatment technologies and practices to improve the quality of the water supply.

Furthermore, Mr. Savadi underscored the potential of the circular economy as a solution to significant challenges in the water sector. The circular economy is a model that aims to minimize waste and make the most of resources. In the context of water management, this involves viewing waste not as a problem, but as a resource that can be leveraged to create economic value. For example, nutrients recovered from wastewater can be used as fertilizers, and energy generated from the treatment process can be used to power facilities.

In conclusion, Mr. Savadi's insights offer a valuable perspective on the future of water and urban infrastructure engineering. His emphasis on a holistic approach, wastewater reuse, and the circular economy highlights the innovative strategies needed to address the complex challenges in this field.

## Water circular economy mantra

- **Reduce:**  
Avoid, minimize waste, and determine alternatives
- **Resource:**  
Better resource utilization, maximize recycling, multiple usage
- **Recovery:**  
Maximise resource recovery, creation of economic value

## Potable water reuse

- De-facto reuse
- Indirect potable reuse
- Direct potable reuse

## Pre-fabricated packaged water treatment plants

### Mr. Abhishek Jadhav | Founder Director, Water and Sewage Environment Engineering Pvt. Ltd., India



Mr. Abhishek, a representative from WS2EPL, introduced an innovative concept in the form of a packaged drinking water treatment plant. This is not just any ordinary water treatment plant, but a marvel of engineering and design that has been scaled down into a compact, transportable unit.

The idea behind this innovation is to make water treatment plants more accessible and easier to implement, especially in areas where such facilities are lacking or inadequate. By condensing the complex processes of a multi-level water treatment plant into a compact unit, it becomes possible to transport and install these units in a variety of locations, from urban neighborhoods to remote rural areas.

This streamlined design has several advantages. Firstly, the compact size makes transportation easier, reducing the logistical challenges associated with installing a water treatment plant. This means that these units can be rapidly deployed to areas in need, providing a swift response to water quality issues.

Secondly, the design allows for rapid implementation. Traditional water treatment plants can take a considerable amount of time to construct and become operational. In contrast, these compact units can be set up and start treating water within a remarkably short timeframe. This is particularly beneficial in emergency situations or in areas where access to clean drinking water is a pressing issue.

In conclusion, Mr. Abhishek's presentation showcased an intriguing innovation that has the potential to revolutionize the way we approach water treatment. By rethinking the design and implementation of water treatment plants, we can make clean drinking water more accessible to communities around the world.

#### Key Features:

- Ready-to-erect plant, offering an appealing and efficient alternative for swift execution of water supply schemes.
- Utilizes a standardized modular treatment system, facilitating quick transportation and delivery.
- Adheres strictly to CPHEEO manual guidelines across all unit processes.
- Compact, simple, yet robust and portable, requiring minimal space.
- Manufactured in shops to ensure quality assurance.
- Offers cost-effective on-site treatment solutions while meeting quality standards outlined in IS norms.
- Implements a 'plug-and-play' system at the site, simplifying installation processes.

## Opportunities in optimum utilization of existing fecal sludge and used water management facilities

### Mr. Sagar Patil | Sr. Technical Officer, RCUES of AILSG, Mumbai



Mr. Sagar Patil, a Senior Technical Officer at Maha UWES-C, RCUES of AILSG Mumbai, provided an insightful overview of the Maharashtra Urban Wash Environmental Sanitation Coalition's efforts. His primary focus was on establishing connections between urban and rural areas in the context of Faecal Sludge and Septage Management (FSSM), a key objective of the Maharashtra state government.

FSSM involves the collection, transportation, and treatment of faecal sludge (the solid or semi-solid part of the waste that collects in pit latrines, septic tanks, or other onsite sanitation systems) and septage (the liquid sludge that accumulates in septic tanks over a period of time). Effective FSSM is crucial for maintaining public health, preserving the environment, and ensuring the sustainability of sanitation systems.

Mr. Patil outlined strategies to extend urban utility services to rural areas within Maharashtra. This is an important initiative, as many rural areas lack access to adequate sanitation services. By extending urban utility services to these areas, the government aims to improve sanitation conditions and enhance the quality of life for rural residents.

He cited a research study and showcased the refurbishment of a faecal sludge treatment plant in the Indapur council. The refurbishment of this plant likely involved upgrading its infrastructure and enhancing its treatment processes to improve its efficiency and effectiveness. This example demonstrates the practical application of FSSM strategies and the positive impact they can have on local communities.

Additionally, Mr. Patil highlighted the co-treatment of faecal sludge and septage at the Sewage Treatment Plant (STP) in Sangli city. Co-treatment involves treating faecal sludge and septage along with sewage in a centralized treatment facility. This approach can enhance the efficiency of the treatment process and make better use of existing infrastructure.

In conclusion, Mr. Patil's presentation offered valuable insights into the efforts being made to improve sanitation services in Maharashtra. His emphasis on urban-rural linkages, FSSM, and the extension of urban utility services to rural areas highlights the innovative and inclusive strategies being employed to address sanitation challenges in the state.

## Key outcomes of Refurbishment of FSTP

- Enhanced efficiency of treatment
- High quality of outputs-Treated water and biosolids (Reuse)
- Reduced environmental pollution
- Complements U-R convergence

## Urban-Rural convergence

- Increased awareness for safe desludging and disposal of faecal sludge
- Optimized desludging charges for rural HHs
- Equity in service delivery
- Revenue generation prospects for ULBs

## Role of water in biosphere

### Er. V. K. Sawant | Chairman, India Water Works Association, Goa



Mr. Sawant, the chairman of the Indian Water Works Association (IWWA), Goa Centre, delivered a comprehensive presentation on the multifaceted role of water in the biosphere. His talk covered a wide range of perspectives, reflecting the complexity and importance of water in our lives and ecosystems.

Water, as Mr. Sawant emphasized, is not just a resource; it is an essential service and commodity. It is fundamental to life, playing a crucial role in various biological and ecological processes. It is also indispensable for numerous human activities, from agriculture and industry to domestic use.

In his view, water utilities have a critical responsibility to supply water that is safe, measurable, affordable, responsive, and tech-based. 'Safe' means that the water must be free from harmful contaminants and suitable for its intended use. 'Measurable' refers to the ability to accurately measure the quantity of water supplied, which is essential for billing, conservation, and management purposes. 'Affordable' means that the cost of water should be within the means of all consumers, ensuring equitable access. 'Responsive' implies that the service should be reliable and responsive to the needs and feedback of the consumers. 'Tech-based' suggests the use of modern technologies to enhance the efficiency, reliability, and sustainability of the water supply.

Mr. Sawant also touched upon the concept of 'invisible dual pricing of water'. This refers to the difference in the pricing of 'visible' piped water, which we buy at a subsidized price, and 'invisible' water that is built into manufactured products, which we buy at the prevailing market rate with no subsidy. The 'invisible' water refers to the water used in the production process of the products. This concept highlights the often overlooked cost of water embedded in goods and services and underscores the need for more sustainable and efficient water use in production processes.

In conclusion, Mr. Sawant's presentation offered valuable insights into the complexities of water management and the challenges and opportunities in ensuring a safe, reliable, and sustainable water supply. His emphasis on the multifaceted role of water, the responsibilities of water utilities, and the concept of invisible dual pricing of water, provide food for thought for policymakers, water utilities, and consumers alike.

## The net result of dual pricing of water on utility

- Less finance for O&M
- Inadequate finance for infra upgradation.
- The entire system turns to the inefficient enterprise where NRW is 40-50%
- No accountability for losses, cause the value of water perceived is very small

## SESSION 5



# Climate Change Adaptation and Resilience

Day 2 | November 25<sup>th</sup>, 2023

## SESSION 5



Mr. Azuan Ahmad Zahdi |  
Business Transformation and  
Strategic Planning,  
Indah Water, Malaysia



Dr. Renu Vyas |  
Professor and Head of Institute,  
MIT School of Bioengineering  
Sciences and Research



Dr. Prasanna Jogdeo |  
South Asia Operations Manager,  
IWA Chennai



Dr. Dineshwar Prasad Singh |  
Former Engineer in Chief cum  
special secretary and  
Past President of IWWA



Dr. Pawan Labhassetwar |  
Chief Scientist and  
Head Water Technology and  
Management Division NEERI

# Climate Change Adaptation and Resilience

Tariff management: Crafting win-win tariff solutions in sewerage services- The Malaysian experience

## Mr. Azuan Ahmad Zahdi | Business Transformation and Strategic Planning, Indah Water, Malaysia



Mr. Zahdi, is a dedicated leader with over 15 years of experience in corporate transformation, strategic planning, business development, and stakeholder management within government-linked companies, listed groups, and conglomerates. He discussed how the Indah Water Konsortium manages tariffs for water supply and sewerage management, highlighting the challenges they face in recovering the cost of maintaining these services. He outlined the steps involved in planning for stakeholder engagement and discussed the company's strategy and implementation. He also shared how a database called "E-Kasih" is being used to improve services to the population of Malaysia. "E-Kasih" serves as both a national poverty data bank and a platform that holds data about poverty, tracks assistance applications, and evaluates the effectiveness of aid programs.

### IWK's challenges

- Uneconomical sewerage tariff rate
- Increase in operational cost
- Reduction of government subsidy
- Illegal discharge

### Strategy and Implementation

- Stakeholders' engagement
- Strategic approach to tariff revision implementation
- Benchmarking exercise
- Holistic communication program

### Outcomes and impacts

- Business sustainability
- Reducing dependency
- Continuous development and improvement

### Lessons learned

- Engage stakeholders actively
- Execute phased implementation and targeted rebate model
- Benchmark against other countries and utilities

## AI and ML solutions for climate-resilient urban water technologies

### Dr. Renu Vyas | Professor and Head of Institute, MIT School of Bioengineering Sciences and Research



Dr. Vyas is a highly skilled professional in molecular modeling, with expertise in machine learning, artificial intelligence, and various fields such as bioinformatics, cheminformatics, organic chemistry, and drug design. She holds national and international patents in software, senior tech, synthetic chemistry, and fingerprinting algorithms. Her contributions to the field have been significant, including organizing national workshops on cutting-edge bioinformatics research.

In her presentation, Dr. Vyas discussed how artificial intelligence (AI) and machine learning (ML) can contribute to the design of more climate-resilient urban water technology. Climate resilience refers to the ability to anticipate, prepare for, and respond to hazardous events, trends, or disturbances related to climate. Applying AI and ML to urban water technology can help predict and mitigate the effects of climate change on water resources, ensuring a reliable supply of clean water even under changing environmental conditions.

Dr. Vyas also highlighted how AI and ML can improve the design and operations of water and wastewater utility services. These technologies can optimize various aspects of water management, from predicting water demand and detecting leaks to optimizing treatment processes and managing infrastructure assets.

She pointed out several urban water challenges that can be addressed using AI and ML, including climate variation, rapid urbanization, low pressure, aging infrastructure, intermittent water distribution, water tankers, and non-revenue water (NRW). NRW refers to water that has been produced and is “lost” before it reaches the customer, either through leaks, theft, or metering inaccuracies. AI and ML can help detect and reduce NRW, improving the efficiency and sustainability of water services.

According to Dr. Vyas, AI is a game-changer in urban water management. It can synchronize various aspects of water management, enabling a more integrated and effective approach. Some applications of AI in urban water technologies that she mentioned include smart water meters, sensor networks, and AI-driven analytics for demand fluctuations. Smart water meters can provide real-time data on water use, helping consumers manage their water consumption and utilities identify leaks or anomalies. Sensor networks can monitor various parameters in the water supply and distribution system, providing valuable data for decision-making. AI-driven analytics can analyze this data to predict demand fluctuations, optimize operations, and improve service delivery.

In conclusion, Dr. Vyas’s insights offer a glimpse into the future of urban water management, where AI and ML play a pivotal role in addressing challenges and improving services. Her work exemplifies the potential of these technologies to transform the way we manage our water resources, making our cities more resilient, sustainable, and efficient.

## Role of AI and ML to Optimize Water Management

- Predictive Analytics for Water Supply and Demand
- Optimization of Water Distribution Networks
- Water Quality Monitoring
- Remote Sensing for Water Resource Monitoring

### Dr. Prasanna Jogdeo | South Asia Operations Manager, IWA Chennai



Dr. Jogdeo is a passionate environmentalist, with a Ph.D. in Marine Biotechnology. He has dedicated his career to designing biological wastewater treatment systems and strategies to ecologically restore polluted water bodies. He co-founded Lemnion Green Solutions Pvt Ltd., a company that collaborates with government and private organizations to address water-related ecological issues.

In his presentation, he provided more information about the International Water Association (IWA) and the activities conducted under the umbrella of IWA South Asia. The IWA is a global network of water professionals striving for a world in which water is wisely managed to satisfy the needs of human activities and ecosystems in an equitable and sustainable way.

He discussed the impact of climate change on water, including disrupted weather patterns and extreme weather events such as floods and droughts. He also mentioned the effects of shrinking ice sheets on water availability and how rising sea levels are causing the salinization of groundwater. These changes pose significant challenges to water management and require urgent action.

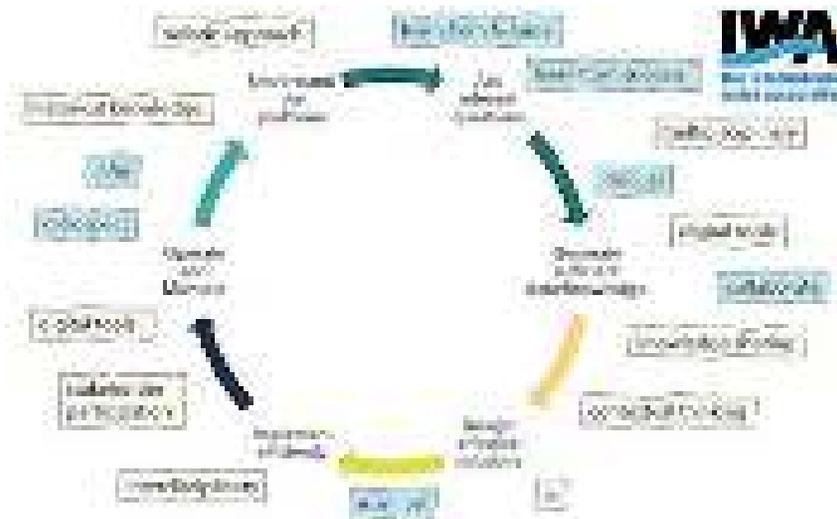
To mitigate these situations, he emphasized the need to be “climate-smart”. This involves improving resilience to adapt to climate change, assessing and aiming to reduce impact, and leading and inspiring others to take climate-smart action for a water-wise future.

Improving resilience means enhancing the ability of water systems to withstand and recover from climate-induced shocks. This could involve diversifying water sources, improving infrastructure, or implementing more flexible water management strategies.

Assessing and aiming to reduce impact involves understanding the potential effects of climate change on water resources and taking steps to minimize these effects. This could include reducing water use, protecting and restoring natural water bodies, or implementing more sustainable water management practices.

Leading and inspiring others to take climate-smart action involves advocating for sustainable water management practices, sharing knowledge and best practices, and encouraging others to take action. This could be done through education, communication, policy advocacy, or demonstration projects.

In conclusion, his work and insights offer a valuable perspective on the challenges and opportunities in water management in the face of climate change. His emphasis on ecological restoration, climate-smart strategies, and collaborative action provides a roadmap for a more sustainable and water-wise future.



## To tap the untapped

- Water reuse
- Sustainability in the water sector
- Membrane technology
- Efficient urban water management

## Approach

- Understand the problem
- Ask relevant questions
- Generate sufficient data
- Design effective solutions
- Implement efficiently
- Operate and maintain

## Climate change impacts on urban water resilience

**Dr. Dineshwar Prasad Singh | Former Engineer in Chief cum special secretary and Past President of IWWA**



Dr. Singh is a highly respected adviser and expert in the field of water, wastewater, and environmental management. He is also an empaneled arbitrator for government, private, and multilateral agencies. His work involves materials scheduling, implementation, asset management, and stakeholder coordination across a range of projects. These projects encompass river pollution abatement, water and wastewater engineering, and sanitation.

In his discussion, Dr. Singh addressed the issue of climate change and its impact, particularly focusing on greenhouse gas (GHG) emissions associated with sewered and non-sewered sanitation. GHG emissions contribute to global warming and climate change, and their sources are diverse. He pointed out that GHG emissions is result from burning fossil fuels, which is a common practice in many industries and households. Emissions can also come from energy use, as the production of electricity often involves burning fossil fuels.

Another source of GHG emissions is the decay of pit soil. When organic matter in the soil decomposes, it releases GHGs into the atmosphere. Similarly, the removal of carbon dioxide (CO<sub>2</sub>) from the atmosphere through processes like photosynthesis can be reversed when plants die and decompose or are burned, releasing the stored CO<sub>2</sub> back into the atmosphere. Biomass burning, such as forest fires or the burning of agricultural residues, also contributes to GHG emissions.

Dr. Singh highlighted that GHG emissions due to waste hold a larger percentage than other sources, making waste management a serious concern. Waste, particularly organic waste in landfills, produces methane, a potent GHG, as it decomposes. Therefore, improving waste management practices, such as increasing recycling and composting, reducing waste generation, and capturing and utilizing gases from landfills, can significantly reduce GHG emissions.

In conclusion, Dr. Singh's work and insights underscore the interconnectedness of water management, sanitation, and climate change. His emphasis on the role of GHG emissions in climate change and the potential for improved waste management to mitigate these emissions provides a valuable perspective on the challenges and opportunities in achieving sustainable water and environmental management.

## Key issues for urban water

- Rising temperature, heat stress
- Water security and pollution
- Sea level rise and storm surges
- Extreme weather events
- Heavy rainfall and strong winds
- Inland flooding
- Ocean acidification
- City development over natural drainage system

## Climate change mitigation, adaptation, and resilience

- **Mitigation:** Actions to reduce the emission of GHG
- **Resilience:** Capacity of cities to function so that the people living and working in the cities particularly the poor and vulnerable.
- **Adaptation:** Natural and human system adjustment in respect of actual and climatic stimuli or their effects which moderate harm/exploit beneficial opportunities

## Climate change and water technology needs

### Dr. Pawan Labhassetwar | Chief Scientist and Headwater Technology and Management Division NEERI



Dr. Labhassetwar, the Chief Scientist at CSIR-NEERI, is a renowned leader in environmental science with an impressive career spanning over 31 years. His work is dedicated to ensuring the well-being of communities and ecosystems while addressing environmental factors that impact public health. He is a driving force in research and innovations, consistently striving for a sustainable and healthier environment.

In his presentation, Dr. Labhassetwar discussed the impact of climate change, particularly focusing on water scarcity and water quality. Climate change, characterized by global warming, changing precipitation patterns, and rising sea levels, has significant implications for water resources. Changes in precipitation patterns can lead to altered water availability, with some areas experiencing more frequent and severe droughts, while others face increased flooding. Rising sea levels can lead to the salinization of coastal freshwater resources, affecting their quality and usability.

Dr. Labhassetwar presented a few case studies from the state of Maharashtra, specifically from the districts of Latur and Nagpur. These case studies likely highlighted the real-world impacts of climate change on water resources and how communities are adapting to these changes.

He emphasized that each degree of global warming is projected to decrease the availability of renewable water resources by at least 20% for an additional 7% of the global population. This statistic underscores the urgency of addressing climate change and implementing strategies to manage water resources more sustainably.

In conclusion, Dr. Labhassetwar's work and insights offer a valuable perspective on the challenges and opportunities in managing water resources in the face of climate change. His emphasis on community well-being, public health, and sustainability provides a comprehensive approach to environmental science and highlights the interconnectedness of these issues.

## Impacts on water supply

- Increased water scarcity
- Change in source water quality
- Rise in water demand and evapotranspiration losses due to higher temperature
- Higher risk of inundation of water and sanitation infrastructure
- Higher risk of saline intrusion into coastal freshwater due to the thermal expansion of the oceans

## Adaptation technologies for water supplies

- **Supply-side:** Increase reservoir capacity, desalinate, make inter-basin transfer
- **Demand side:** Use grey water, reduce leakage, use non-water-based sanitation, enforce water standards

## SESSION 6



# Socio-economic Aspects of Water Management

Day 2 | November 25<sup>th</sup>, 2023

## SESSION 6



Dr. Ravikumar Joseph |  
Senior water and sanitation  
specialist and consultant,  
World Bank



Mr. Ajay Kumar Sahu |  
Chief Engineer, Public Health  
Engineering Department,  
Jagdalpur, Chhattisgarh



Mr. R. N. Gupta |  
Former Chief Engineer,  
PHE Chhattisgarh and  
past president of IWWA



Mr. Sudhakar N. Hande |  
Executive Engineer,  
Water Supply Project  
Department, MCGM

# Socio-economic Aspects of Water Management

Socio-economic aspects in sanitation infrastructure management

**Dr. Ravikumar Joseph | Senior water and sanitation specialist and Consultant, World Bank**



With over 25 years of expertise in sewage and industrial effluent treatment, this individual brings a wealth of consulting, execution, and maintenance experience to the table. His work spans across multiple countries, including India, Sri Lanka, Bangladesh, and Maldives, where he has been involved in various sanitation projects.

He is a strong advocate for non-network sanitation as a part of City-Wide Inclusive Sanitation. His work in this area centres on septage management, which involves the safe collection, transportation, and treatment of septage, the liquid and solid material pumped from septic tanks. He also emphasizes wastewater reuse, a practice that involves treating wastewater to a suitable standard so it can be used for other purposes, such as irrigation or industrial processes. Another key aspect of his work is financial sustainability in urban sanitation systems, ensuring that these systems are not only effective in managing waste but also economically viable in the long run.

In his presentation, he discussed the importance of urban sanitation services in sustaining the functionality of a city. Access to toilets among different socio-economic classes was a significant point of discussion. He emphasized that access to sanitation facilities is not just a matter of convenience, but a fundamental human right that has significant implications for public health, dignity, and social equality.

He highlighted the safety of sanitation workers, who play an integral role in maintaining sanitation systems. These workers often face hazardous working conditions and are exposed to various health risks. Ensuring their safety is not only a moral imperative but also crucial for the sustainability of sanitation systems.

He also touched upon the economic cost of inadequate sanitation, which is estimated to be equivalent to 6.4% of GDP. This figure underscores the economic burden of poor sanitation, which can manifest in various ways, such as healthcare costs due to sanitation-related diseases, lost productivity due to illness, and decreased tourism due to pollution.

In conclusion, his work and insights offer a comprehensive understanding of the challenges and opportunities in sanitation management. His emphasis on non-network sanitation, septage management, wastewater reuse, financial sustainability, equitable access to sanitation, and worker safety provides a holistic approach to addressing sanitation issues.

## Gains from improving sanitation

- Good water quality
- Adequate water quantity
- Hygiene behavior
- Safe confinement and disposal
- Huge market for sanitation goods and services

## Inadequate sanitation: Losses

- Economic impacts at the household level:  
Direct health impact
- Impact on water resources: Groundwater,  
surface water quality, biodiversity
- Foregone economic revenue: Tourism

## Drinking water source security and sustainability by adopting scientific techniques using remote sensing and GIS tools

### Mr. Ajay Kumar Sahu | Chief Engineer, Public Health Engineering Department, Jagdalpur, Chhattisgarh



Mr. Sahu, serving as a Chief Engineer at the Public Health Engineering Department in Jagdalpur, Chhattisgarh, brings a wealth of knowledge and experience to his role. His work involves overseeing various public health engineering projects, with a particular focus on water management.

In his discussion, Mr. Sahu highlighted several flagship programs such as the Jal Jeevan Mission and AMRUT 2.0. The Jal Jeevan Mission is a government initiative aimed at providing safe and adequate drinking water through individual household tap connections.

AMRUT 2.0, or Atal Mission for Rejuvenation and Urban Transformation, is a program focused on establishing infrastructure that could ensure adequate robust sewerage networks and water supply.

An interesting concept he introduced is the idea of doubling farmers' income to ensure food security through effective groundwater management. This involves both community involvement and technical household support. The goal is to use groundwater resources more efficiently and sustainably, which can increase agricultural productivity and, consequently, farmers' income.

Mr. Sahu emphasized the importance of groundwater management and discussed specific actions and interventions under initiatives like JAL SHAKTI ABHIYAN and ATAL BHUJAL YOJANA. JAL SHAKTI ABHIYAN is a campaign for water conservation and water security, while ATAL BHUJAL YOJANA is a scheme to improve groundwater management through community participation.

He stressed that appropriate planning and design of the system, adopting scientific techniques using remote sensing and GIS tools, are key to success. Remote sensing allows for the collection of data about the earth's surface without making physical contact, while GIS, or Geographic Information System, is a framework for gathering, managing, and analyzing data.

The planning process, according to Mr. Sahu, should include all aspects of surface and groundwater interaction, groundwater recharge scenario, and the groundwater withdrawal regime. Understanding these elements can help in developing strategies that protect groundwater resources and ensure their sustainable use.

Lastly, he underscored that groundwater level monitoring is crucial to ensure sustainability. Regular monitoring can provide valuable data on changes in groundwater levels, which can inform management decisions and help detect and address issues such as over-extraction or contamination.

In conclusion, Mr. Sahu's insights offer a comprehensive understanding of the complexities of groundwater management and the strategies being employed to address these challenges. His emphasis on community involvement, scientific planning, and regular monitoring provides a roadmap for sustainable groundwater management.

## Solutions

- Need to identify sustainable drinking water source
- Use of HGM (Hydro Geo Morphological) maps
- Implementation of sustainability measures like rainwater harvesting, artificial recharge, etc.
- HGM maps also can be used for the identification of site-specific recharge structure locations.

## Challenges

- Depletion of groundwater table level
- Future water demand

## Initiatives

- **Jal Shakti Abhiyan:** Catch the rain
- **Atal Bhujal Yojana:** Demonstrate community-led sustainable groundwater management
- **MNREGA:** Enhance the livelihood security of the household in rural areas

## Success story: Restoration of traditional water bodies in Chhattisgarh

### Mr. R. N. Gupta | Former Chief Engineer, PHE Chhattisgarh and past president of IWWA



Mr. Gupta, a former Chief Engineer of the Public Health Engineering (PHE) department in Chhattisgarh and past president of the Indian Water Works Association (IWWA), is a respected figure in the field of water management.

In his presentation, Mr. Gupta delved into the historical significance of ponds, referencing their existence in Treta Yug (approximately 12 lakh years ago) and Radha Kund in Dwapar Yug (approximately 8 lakh years ago). These timeframes, drawn from Hindu cosmology, underscore the long-standing importance of water bodies in Indian culture and ecology.

He then shifted focus to the cultural significance of ponds in Chhattisgarh. In this region, ponds are not just physical entities but also social and cultural landmarks. All festivals in Chhattisgarh are celebrated on the banks of ponds, reinforcing the integral role of these water bodies in community life and cultural practices.

Mr. Gupta emphasized the need to conserve, reserve, and recharge rainwater. This message is particularly relevant in a time when the importance of traditional water bodies is often overlooked. Conservation involves protecting existing water bodies from pollution and encroachment. Reservation refers to setting aside certain water bodies or volumes of water for specific uses or for use during specific times. Recharge involves enhancing the natural process by which water moves from surface water bodies into groundwater, ensuring the sustainability of water resources.

He also provided insights into the social aspects of water management in Chhattisgarh. While he did not provide specific details, this likely involves considering the needs and perspectives of different social groups, promoting equitable access to water, and encouraging community participation in water management.

In conclusion, Mr. Gupta's presentation offered a rich blend of historical, cultural, and practical perspectives on water management. His emphasis on the conservation, reservation, and recharge of rainwater, and his insights into the social aspects of water management, provide valuable guidance for sustainable and inclusive water management practices.

## Activities for restoration

- Detailed survey
- Catchment clearance
- Removing encroachment
- Rehabilitation of displaced household
- Deweeding
- Desilting
- Repairing of bunds and provision for
- Plantation and creation of buffer zones
- Provision for Dhobi Ghat

## Advantages of water bodies restoration

- Healthy environment
- Employment generation
- Fertile soil after desilting
- Health place for moving and physical exercise
- Place of entertainment
- Water conservation and ground water recharging
- Income generation for local bodies

## Economic analysis of existing water resources of Mumbai city

### Mr. Sudhakar N. Hande | Executive Engineer, Water Supply Project Department, MCGM



Mr. Hande, an Executive Engineer at the Brihanmumbai Municipal Corporation, has a wealth of experience in executing a wide range of projects, including the construction of reservoirs, pipelines, pumping stations, tunnels, and recycling plants. His expertise is currently being utilized in ambitious projects such as the design, construction, and operation of twin tunnels from Film City Goregaon to Khindipada (Amar Nagar) Mulund, which includes a box tunnel at Film City.

In his presentation, Mr. Hande conducted an economic analysis of the existing water resources of Mumbai city. This analysis likely involved assessing the costs associated with water extraction, treatment, and distribution, as well as the revenues generated from water tariffs. It may also have considered the economic value of water in terms of its contribution to various sectors of the city's economy.

The Municipal Corporation of Greater Mumbai (MCGM) is planning to cater to the water demand of Mumbai, a bustling metropolis. The city relies on several sources for its potable water supply, including the Vaitarana, Ulhas, Patalganga, and Amba rivers. However, the city is facing a demand deficit of 250 million liters per day (MLD).

To address this deficit, MCGM has envisaged five proposals. The first four proposals involve the construction of a series of weirs using Inflatable Rubber Weir technologies on the Vaitarna and Tansa River System. A weir is a barrier across a river designed to alter its flow characteristics, and in this case, it would be used to enhance the city's water supply. These weirs are expected to have a total capacity of 156 MLD.

In conclusion, Mr. Hande's work and insights offer a valuable perspective on the challenges and opportunities in managing Mumbai's water resources. His emphasis on innovative engineering solutions, economic analysis, and strategic planning provides a comprehensive approach to addressing the city's water demand.

# THE VALEDICTORY SESSION

Day 2 | November 25<sup>th</sup>, 2023



Mr. Chakradhar H Kandalkar |  
Deputy Municipal Commissioner  
(Special Engineering),  
Municipal Corporation of  
Greater Mumbai



Mr. Nandkishor Jagtap |  
Chief Engineer,  
Pune Municipal Corporation



Mr. Subhash B. Bhujbal |  
President, IWWA



Er. Basant Kumar Parida |  
Hon. General Secretary  
(International), IWWA



Dr. Dayanand Pansa |  
Director, Utility, IWWA



Dr. Parag Sadgir | Director,  
International, IWWA and HoD,  
Department of Civil Engineering,  
CoEP Technological Institute



Mr. Dhawal Patil |  
General Manager,  
Ecosan Services Foundation



# The Valedictory Session

The International Conference, meticulously organized by the Indian Water Works Association (IWWA) in collaboration with Nashik Municipal Corporation and MEETRA, came to a successful culmination on November 25th, 2023. Supported by the Ministry of Jal Shakti, Maharashtra Urban WASH – Environmental Sanitation Coalition, and AILSG – RCUES Mumbai, this significant event unfolded at MEETRA, a renowned institution in Maharashtra dedicated to Water Supply and Sanitation, emphasizing Information and Knowledge Management. The conference centred around the pivotal theme, "Towards Improved Urban Water for Sustainable Development in the Global South," and was marked by six technical sessions exploring nine subthemes across various aspects of the Water and Sanitation sector. The presence of esteemed dignitaries, including Chief Guest Mr. Chakradhar H Kandalkar, Deputy Municipal Commissioner (Special Engineering), Municipal Corporation of Greater Mumbai, and Guest of Honor Mr. Nandkishor Jagtap, Chief Engineer, Pune Municipal Corporation, added immense value to the conference. Their insights and contributions enriched the discussions, making this gathering a confluence of expertise and perspectives.

## Dr. Parag Sadgir | Director, International, IWWA and HoD, Department of Civil Engineering, CoEP Technological Institute



Dr. Sadgir warmly welcomed Mr. Chakradhar H Kandalkar, Deputy Municipal Commissioner (Special Engineering), Municipal Corporation of Greater Mumbai, along with Mr. Nandkishor Jagtap, Chief Engineer, Pune Municipal Corporation, and esteemed dignitaries to the final session of the conference. Their presence acknowledged and honoured the stage as they extended a collective welcome to all participants. Dr. Sadgir provided a comprehensive overview of the two-day conference, highlighting the various sessions and keynote addresses that had taken place during this significant event.

## Mr. Dhawal Patil | General Manager, Ecosan Services Foundation

Mr. Patil provided comprehensive insights to all participants and guests regarding the conference sessions conducted over the last two days. These sessions, focused on various subthemes and led by esteemed speakers from India and multiple Global South countries, were elucidated to underscore key points and outcomes. His presentation encapsulated the significant highlights from each session, summarizing the key takeaways and future implications from the speakers' presentations. Additionally, Mr. Patil emphasized the strategic direction outlined in the report's forward-looking section. He emphasized leveraging available data from countries like India



and other nations in the Global South to aid in city and town infrastructure planning. This strategic utilization of data could optimize revenue generation from water utility services while concurrently supporting the maintenance of WASH infrastructures. Addressing the collection, storage, and organized accessibility of such data stands poised to alleviate fundamental challenges within the water utility sector.

## Mr. Subhash B. Bhujbal | President, IWWA



Mr. Bhujbal extended a gracious invitation to all guests and participants while acknowledging his commitment to steering the conference forward since assuming the presidency of IWWA in January 2023. He emphasized the collaborative effort involved in orchestrating such an event, recognizing the collective contributions of various agencies, teams, and individuals that culminated in the conference's success. Expressing deep appreciation, he conveyed gratitude to key supporters such as the Ministry of Jal Shakti, Nashik Municipal Corporation, MEETRA, Maharashtra Urban WASH – Environmental Sanitation Coalition, and AILSG – RCUES Mumbai for their unwavering support.

Highlighting the distinctiveness of MEETRA and MJP team as a government training institute in Maharashtra, Mr. Bhujbal recognized the team led by Mrs. Sunanda Narawade, Mrs. Mouha Banerjee, Mrs. Vaishali Patil, Mr. Lalit Tripathi, and others, underscoring their pivotal role in fostering an environment conducive to a technical conference, setting it apart from conventional venues. He expressed immense gratitude to all event sponsors whose contributions elevated the conference, making it both substantial and captivating. Acknowledging the technical and event management support rendered by the Ecosan Services Foundation team headed by Dr. Dayanand Panse, Mr. Dhawal Patil and Ms. Radhika Boarganekar, Mr. Bhujbal commended the efforts of Mrs. Vaishali Awate, Mr. K. N. Pate, Mr. Milind Chaware, and Mr. Anant Nampurkar from the Pune center office, specifically citing their role in managing logistics and orchestrating souvenir arrangements for the conference. Furthermore, he expressed gratitude to the Principal Secretary, Member Secretary of the Ministry of Water Supply and Sanitation Department, Government of Maharashtra, and all patrons whose invaluable guidance significantly contributed to the conference's success. Lastly, Mr. Bhujbal highlighted discussions held during the conference aimed at furthering the collaboration between IWWA and IWA for the mutual benefit of water professionals.

## Mr. Nandkishor Jagtap | Chief Engineer, Pune Municipal Corporation

Mr. Jagtap, a seasoned civil engineer and Chief Engineer in the water supply department of the Pune Municipal Corporation, plays a pivotal role in spearheading initiatives aimed at ensuring equitable and round-the-clock water supply across Pune city. He conveyed appreciation to the esteemed speakers and organizers for orchestrating this impactful conference. Additionally, he expressed a keen interest in spearheading similar conferences focused on enhancing the water utility sector in the future.



## Mr. Chakradhar H Kandalkar | Deputy Municipal Commissioner (Special Engineering), Municipal Corporation of Greater Mumbai



As the esteemed chief guest, Mr. Kandalkar addressed the significant themes encompassed by the conference, emphasizing the criticality of water as a fundamental resource. He stressed the pressing need to tackle the escalating water crises, particularly in urban water supply, wastewater management, and stormwater management within the Global South. Asserting that access to safe and equitable water is a basic human right, Mr. Kandalkar highlighted the escalating global water demand, underscoring the necessity for a deeper comprehension of efficient water utilization, a pursuit facilitated by conferences of this nature, aimed at fostering sustainable water solutions.

He underscored the challenges ahead, noting the increasing complexity of achieving Sustainable Development Goal 6 (SDG 6) – universal access to water supply and sanitation, particularly in light of the projected urban population surge by 2050, where 70% of the global population will reside in urban areas.

Mr. Kandalkar raised concerns about the inadequate treatment of more than 80% of generated wastewater globally, emphasizing the vast scope for resolving this issue through strategic identification of solutions, robust planning, and implementation. Highlighting the pivotal role of water utilities in ensuring access to fundamental human needs while safeguarding public health, he called for a transformative approach to infrastructure maintenance and efficient operation. Mr. Kandalkar advocated for the integration of smart technologies with a skilled workforce, foreseeing a more resilient, efficient, and cost-effective future in the water supply and sanitation sector.

## Dr. Dayanand Panse | Director, Utility, IWWA

Dr. Panse expressed that end of the conference does not mean end but END “Efforts Never Die” and expressed vote of thanks from IWWA Headquarters. He thanked to all the organising team for their collective efforts for many months to make this conference successful and fruitful. He expressed his heartfelt gratitude towards Hon. Minister Mr. Gulabrao Pail, Minister of Water Supply and Sanitation, Government of Maharashtra who has given his best wishes for the conference and all the supporting organisation for their tireless support. He expressed special thanks to Dr. Jairaj Pathak, Ms. Utkarsha Kavadi and entire AILLSG team for their support and help for the conference.



He also expressed his gratitude towards Minister of Sri Lanka who wished to join conference virtually but gave his wishes as well for the success of the conference. He expressed his gratitude to all the speakers and session chairman who managed to finish the presentation within the give course of time and all session chairman Dr. Parag Sadgir, Mr. Amar Supate, Er. Anil K. Gupta, Mr. Rajesh Gupta and Mr. K. K. Songaria.

# Way Forward

The world stands at a critical juncture in its relationship with water. As populations surge and the climate shifts, the familiar rhythm of abundance is giving way to a stark reality: water scarcity. A staggering 3.6 billion people currently face water insecurity for at least a month each year, and this number is projected to balloon to over 5 billion by 2050. In India, the situation is even more dire, with NITI Aayog predicting water demand to double supply by 2030. This looming crisis demands a radical transformation of the water sector, a multi-faceted endeavor encompassing people, governance, infrastructure, technology, and sustainable financing.

Furthermore, viewing and operationalizing the Sustainable Development Goals through a water security lens is crucial. India's flagship programs for water supply, wastewater, and sanitation represent a significant step towards achieving SDG 6 by 2030. However, to truly turn the tide, we must embrace a paradigm shift from traditional development models to a future built on sustainability. This necessitates a move away from resource-intensive, linear systems towards circularity, resilience, and innovation.

The challenges confronting water utilities in Global South, such as high rates of unaccounted-for water, inadequate infrastructure mapping, and limited monitoring capabilities, call for a multi-pronged approach. Embracing digital solutions, real-time data analysis, and robust asset management strategies can transform water management into a data-driven, efficient process. Navigating the rising tide of water scarcity demands a collective effort. The time for action is now!

## Water Conservation, Supply and Management

The discussions at this conference have illuminated the critical need for a comprehensive and transformative approach to water conservation, supply, and management. The challenges are daunting, but the possibilities are immense. Moving forward, we must chart a course towards water security by prioritizing these key actions:

### 1. Governance and Investment

- **Reinforce water governance:** Strengthen institutions and regulations to ensure transparency, accountability, and efficient resource allocation. Foster collaboration between government, civil society, and private sector.
- **Mobilize sustainable financing:** Attract greater investment in the water sector through innovative mechanisms like public-private partnerships, green bonds, and impact investing.

### 2. Technological Innovation

- **Embrace digital transformation:** Integrate AI, ML, and data analytics into water management systems for real-time monitoring, leak detection, and optimized resource allocation.

### 3. Nexus Approach and Integrated Development

- **Adopt a nexus perspective:** Consider the interconnectedness of water, food, and energy in urban planning and development, promoting circularity and resource efficiency.
- **Implement integrated solutions:** Design and implement both centralized and decentralized infrastructure systems, adapting to local contexts and maximizing resource utilization.

## 4. Quality Monitoring and Citizen Engagement

- **Prioritize water quality:** Establish robust monitoring systems to ensure safe and reliable drinking water for all. Explore crowd-sourcing initiatives like the one mentioned by WaterAid to empower citizens in monitoring water quality.
- **Engage communities:** Foster active participation of citizens in water conservation and management efforts. Raise awareness and build capacity for responsible water stewardship.

By adopting these strategies, India and Global South can transform the water sector from a source of vulnerability to a symbol of resilience and sustainability. This is not simply a technical challenge, but a social and political imperative. It requires a collective effort, a commitment to innovation, and a shared vision for a future where water is not a privilege, but a right accessible to all.

## Wastewater Treatment, Management and Reuse

The discussions at this conference have laid bare the critical challenges and promising opportunities in wastewater treatment, management, and reuse. While significant strides have been made in establishing the linkages between Sanitation – Energy – Food, a vast portion of Global South struggles to introduce and scale up the concept to address the challenge of water and food security. This necessitates a transformative approach that prioritizes resource recovery, embraces innovation, and fosters systemic change.

### 1. Rethinking Wastewater: From Treatment to Resource Recovery:

- **Shift the paradigm:** Move beyond simply treating wastewater and focus on its potential as a valuable resource. Evaluate and implement cost-effective technologies for water reuse in agricultural irrigation, and industrial processes.
- **Embrace the circular economy:** Exchange the research and development and share learnings from countries from Global South of introducing innovative approaches and treatment technologies focusing on resource recovery and reuse. This can generate revenue, reduce dependence on nonrenewable resources, and contribute to a sustainable future.

### 2. Public Service Approach: Ensuring Outcomes, Not Just Outputs:

- **Focus on long-term impact:** Prioritize the effectiveness and sustainability of sanitation interventions, not just their construction. Strengthen public service institutions to ensure efficient operation and maintenance of existing infrastructure.
- **Empower communities:** Foster public participation in decision-making and implementation of sanitation projects. Promote awareness and build capacity within communities for responsible wastewater management.

### 3. Green Technology and Climate-Positive Solutions:

- **Research and develop innovative technologies:** Invest in research on biochar conversion, nutrient recovery from biosolids, and other climate-positive solutions for wastewater treatment and resource recovery.
- **Establish regulatory frameworks:** Develop clear and comprehensive regulations for promoting and fostering context specific safe reuse and disposal of the end/by products of wastewater treatment.

#### 4. Digital Transformation for Transparency and Efficiency:

- **Leverage digital tools:** Implement smart water management systems using AI, ML, and data analytics to optimize resource allocation, monitor performance, and ensure transparency in operations.
- **Foster collaboration and knowledge sharing:** Create digital platforms for data sharing and collaboration between stakeholders, promoting knowledge exchange and informed decision-making.

Countries from Global South can transform wastewater from a burden into a valuable resource. This will require a collaborative effort from governments, private sector, research institutions, and civil society. Through innovation, resource recovery, and a public service approach, we can create a future where wastewater is not just treated, but valued, reused contributing to a sustainable and circular economy.

## Climate Change Adaptation and Resilience

The conference provided a discourse on the challenges and opportunities facing urban water management in the face of climate change. While the role of water and sanitation in a green economy is clear, the rapid urbanization, rising demand, and climate complexities add a layer of urgency to this conversation. The following points outlines key actions to build urban water resilience and navigate the future of water security:

#### 1. Prioritizing Resilience and Inclusiveness:

- **Climate-proof infrastructure:** Design and develop smart water systems resilient to climate extremes. Invest in real-time monitoring and adaptive management to respond to changing conditions.
- **Inclusive solutions:** Ensure equitable access to safe water and sanitation for all, particularly vulnerable populations. Foster community engagement and participation in decision-making processes.

#### 2. Leveraging AI and ML for Innovation:

- **Optimize water management:** Utilize AI and ML for efficient water allocation, leak detection, and demand forecasting. Implement smart pumping and automation systems to reduce energy consumption.
- **Enhance data-driven decision making:** Invest in robust data collection and analysis platforms. Utilize data to inform policy development, infrastructure planning, and climate adaptation and resilience strategies.

#### 3. Climate Change Mitigation and Adaptation:

- **Reduce emissions:** Implement low-carbon technologies in water supply, wastewater treatment, and energy production. Promote renewable energy, carbon capture storage, and sustainable transportation options.
- **Build urban climate change resilience:** Develop urban water management plans that consider climate projections and incorporate adaptation measures like rainwater harvesting, conjunctive use of water resources, and flood-resilient infrastructure.

#### 4 . Building the Virtuous Circle:

- **Policy focus:** Develop policies that incentivize sustainable water management practices, emissions reduction, and disaster risk reduction.
- **Monitoring and evaluation:** Continuously monitor the effectiveness of adaptation measures and learn from successes and failures. Adapt and refine strategies as needed to ensure long-term water security.

Countries from Global South shall embrace these key actions which holds the potential to transform our cities into models of urban water resilience. This will require a collective effort, a shared vision, and a commitment to innovation and collaboration.

## Social and economic Aspects of Water and Wastewater Management

The conference has shed light on the profound social and economic costs of inadequate sanitation, while also highlighting the immense opportunities associated with investing in water and wastewater management. The following recommendation outlines key actions to unlock these opportunities and build a more equitable and prosperous future:

### 1. Recognizing the True Cost of Inadequate Sanitation:

- **Quantify and communicate:** Go beyond health impacts to demonstrate the economic burden of inadequate sanitation on households, communities, and national GDP. Highlight the financial losses due to decreased productivity, increase in healthcare costs, and environmental degradation.
- **Prioritize investments:** Allocate resources for sanitation interventions based on their comprehensive economic and social benefits. Invest in research and development of cost-effective and sustainable sanitation solutions.

### 2. Building Equitable Access and Inclusive Solutions:

- **Focus on underserved communities:** Address the specific needs and challenges of marginalized communities in rural and urban areas. Prioritize inclusive sanitation interventions that are affordable, accessible, and culturally appropriate.
- **Promote community participation:** Empower communities to play an active role in water and sanitation decision-making processes. Foster local ownership and responsibility for sustainable water resource management.

### 3. Unlocking the Economic Potential of Water and Wastewater:

- **Develop the sanitation market:** Foster a vibrant market for sanitation goods and services by promoting innovation, entrepreneurship, and private sector involvement. Facilitate access to finance for sanitation businesses and entrepreneurs.
- **Resource recovery:** Explore opportunities for resource recovery from wastewater and residuals. Utilize treated wastewater for irrigation, industrial processes, and other applications, creating a circular economy model.

### 4. Strengthening Governance and Partnerships:

- **Robust regulations:** Establish and enforce clear regulations for water quality, sanitation standards, and environmental protection. Ensure transparent and accountable governance practices in water and wastewater management.
- **Collaborative partnerships:** Foster collaboration between government, private sector, civil society, and research institutions to share knowledge, resources, and best practices. Promote joint initiatives for sustainable water and sanitation solutions.

By adopting these actions, the Global South can unlock the immense potential of water and sanitation to drive economic growth, improve public health, and create a more equitable and resilient future. Let us work together to invest in water and sanitation, not as a cost, but as a strategic investment in the well-being of our communities and planet.

# Glimpse of Conference



# Acknowledgement

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