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MY PAGE

Dear Friends,

We are entering into New Year 2024 after a fruitful year 2023 for India in general and IPA in particular. I hope last year was a great year for all of you also. New year brings new hopes with positivity along.

Last month only IPA successfully held 29th Indian Plumbing Conference 2023 in Ahmedabad along with Grand Finale of a successful 7th Indian Plumbing Professional League (IPPL) which was widely attended by professionals encompassing entire strata of building industry viz. real estate developers, architects, water and wastewater experts and research enterpreneurs, leaders from fellow building industry associations, academicians, officials from govt. departments including Gujarat Urban development and Urban Housing department, CPCB, Niti Aayog, NEERI, CPHEEO to name just a few. MEP consultants, plumbing contractors, design engineers were also present in big numbers.

The Theme of the conference was apt as 'Net Zero Water in Built Environment'. Our population has grown from 33 crores in 1947 to 143 crores in 2023 and in the same proportion is our water requirement. We have successfully managed the scenario up till now by constructing small and big dams and increasing our water storage. But now we have reached the stage where we will not be able to survive without reducing water consumption and recycling the water. As such all water is recycled but the cycle starts from sea and ends in the sea. Normally, when we say recycling of water we try to shorten this cycle. So, the discussions on Net Zero water at 29th IPC and 24*7 water supply were specifically appreciated by all conference participants.

The countries like Israel and Singapore treat the entire sewage to almost potable level and recycle the same to agriculture and to industries. In Israel, they collect entire sewage centrally and supply the treated water to agriculture. In Singapore, also they treat the entire sewage of the city at the Central Sewage Treatment Plant and treated sewage is supplied to industries for all non-potable uses. We only in India treat the sewage at society (Decentralized) level and reuse almost 40% of treated sewage for Flushing, Gardening, road washing and cooling towers. In India we have norms in place but no strict quality control and vigilance regime. We need to create the same at the earliest, before we face any adverse situation. We need to create training facilities so that we will have sufficient trained manpower to operate Sewage Treatment Plants. Furthermore, we need in India an extensive debate on Centralized V/S Decentralized STPs as Decentralized STPs create greater employment opportunities and quality control in Decentralized is much more effective.

If I look back at the achievements of the last year, I must say that the IPA Neerathons were arranged in Bengaluru, Chennai and Ahmedabad for the first time and all the Neerathons were successful. IPA could take the message of water saving to almost 6,500+ Neerathon participants from different walks of life. The message of water saving was widely broadcasted across various digital channels like social media and FM. I strongly feel that it is more important to take the message of Water Saving to the common people because in the absence of participation by everyone, water saving cannot be a successful mission.

Another major accomplishment was PLUMBEX Exhibition held at Bangalore International Exhibition Centre, Bengaluru from 27th – 29th April 2023 and it was a grand success. There were 9785 visitors, 121 exhibitors participated, 27 industry partners, 34 Start-ups, 9 Supporting Organizations and 110+ Speakers, Panelists & Dignitaries with 3 days of captivating sessions on "Bharat Tap – An Initiative – Implementation and Mandating of Sanitaryware and Sanitary Fittings as per IS 17650 Part 1 & Part 2".

Wish you all a very successful and joyous year on personal as well as professional front.

Rahul Dhadphale
IPA National Secretary and
Member, IPA Editorial Board

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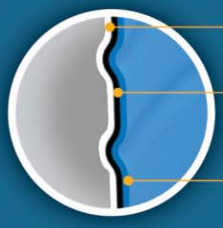

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A Very Happy & Prosperous New Year!!!

2024 brings in lot of challenges for the country, as we move forward in our resolve to improve the lives of others, through various ambitious projects and goals of the Govt. of India, including Open Defecation Free, Jal Jeevan Mission, Pradhan Mantri Awas Yojana (Housing For All), Catch The Rain, Atal Mission For Rejuvenation of Urban Transmission (24X7 Water supply), Swachh Bharat Mission 2.0, Energy Conservation & Sustainable Building Code (BEE) , achieving Carbon Circularity and so many programs to improve the living standards and health bill of our great Bharat.

For IPA we see these challenges as great opportunities not only to align with, but also help in many ways for our country's citizens, and in being part of the process in making our nation a five trillion-dollar economy, with the ultimate aim of making Bharat the second largest economy in the world when our nation turns young in 2047.

If you go through all our programs through the Vision document 2023, you will see that all our programs are interlinked like a chain. There is a saying that "A chain is as weak as its weakest link." In other words, all our programs need to perform with only one resolve that is to make IPA into a 25,000 strong community with the power to change things for Bharat. Of course, while we aim for higher ambitions, we must not lose sight of our short-term goals, keeping in mind our long-term focus. Our strength lies in implementation of what we decide, and in doing so, work with Govt. and other agencies, through the journey to make Bharat water positive and water borne disease free.

Let us pledge and resolve to follow and achieve all Annual Vision steps to move towards a strong, mighty and influential Indian Plumbing Association, leaving behind a more habitable planet.

I present to you, IPA VISION 2024 and request all members of IPA, NEC, all IPA Chapters and IPA HQto ensure that we achieve all aspects of **Vision 2024**.

PlumbexIndia Exhibition

To conduct the Plumbex exhibition at 'JIO World Convention Center', Mumbai, from 25th to the 27th of April, 2024 in 10,000 m^2.

Summit 2024

A building industry stalwarts meet, CEO's SUMMIT 2024 to be conducted on the 24th February 2024 in Mumbai for a close interaction based on sustainability and affordability

Indian Plumbing Conference

30th Indian Plumbing Conference & Exhibition will be held at Hyderabad from 21st-23rd November 2024.

Plumbing Laboratories

To complete the development work of both world class Plumbing Labs and Centre of Excellence at the Goa Engineering College, Farmagudi, Goa and College of Engineering, Pune (COEP).

World Plumbing Day

To celebrate World Plumbing Day (WPD) on the '11th March' with Blood Donation Drives, I Save Water Campaigns, Regional Language Webinars, Social Media contests, Painting & Drawing Competitions, so as to bring awareness on the depleting water condition in our country.

Water Audit Council (WAC)

- To launch water audit in built environment by May / June 2024.
- To build Water Audit team.
- To set up govt. support for Water Audit Council.

IPA Neerathon

- Conduct 5 IPA Neerathons starting with the first one in Delhi on 4th February, 2024 to spread awareness on water conservation and saving, with a total of 10,000 participants.

Editorial Content (IPT)

To strengthen the Indian Plumbing Today magazine by bringing in authors from various horizons on Water, Plumbing & Sanitation adding more content scope for readers to get a variety of topics to read and improve their knowledge base.

Technical Committees and Upgradation of Codes

- To revise the following Codes in 2024:
  a) Water Efficient Products India (WEPI) 2017
  b) Water Efficiency and Sanitation Standard for Built Environment (INDIA WE STAND)
  c) Uniform Swimming Pool Code of India 2019
- To publish Code on Reclamation of Water in Built Environment
- Convert 'A Guide to Good Plumbing Practices (AGGPP)' in two more languages

Indian Plumbing Professional League (IPPL)

To conduct the IPPL through 24 IPA chapters physically, with best of the Plumbing Gurus, to impart Codal based plumbing and to impart training based on Codes, culminating into quizzes to a minimum of 1,000 building industry professionals

Membership Growth

To increase membership by 1,777 members in 2024 to 8,000. The ultimate aim is to reach a total of 10,000 members by 2025.

Association Interaction

To initiate in conducting training sessions on the attributes of good and correct plumbing practices with designers and architects through IIA, IIID & Developers through CREDAI & NAREDCO.

Advocacy

It is important that IPA interacts with the Government and Developer community through CREDAI & NAREDCO and the Design community through IIA, IIID and COA to ensure that we move towards low water consumption and water conservation, reclamation of water ultimately moving towards our goal of neutrality in Water & Waste, building awareness on the depleting water condition in our country.

Centers of Excellence (CoE)

CoE to propagate Plumbing Education and Skilling based on current active Codes. Under COE, release another 12 Plumb Talk video series based on advanced level of plumbing with one video release every month starting January'2024

'I Save Water' Mission

To initiate saving of 2,000 Cr liters of water through all 24 chapters of the IPA, IPA Vanita & Naredco Mahi in 2024.

- To move towards Net Zero Water and Net Zero Waste, achieving neutrality.

National Special Projects

To help in special projects including provision of Toilets in children schools especially for the girl child.

New IPA chapters

To add 6 new Chapters in the calendar year 2024, making the total strength to 30 chapters.

Resource Management

To ensure that we are able to meet all our commitments as committed by Resource Team in toto.

Student Chapters

- To add 20 Student chapters across various Engineering & Architectural Colleges in 2024 to the current strength of 44
- To ensure that student chapters are engaged on a regular basis.

Webinars

To conduct a minimum of 4 Technical Webinars in the months, when there is no event.

Improve Local Chapter Activities

To improve the local chapter activities through better co-ordination between various sister organizations and within the plumbing fraternity and the Chapter & Headquarter

Knowledge Centres by IPA

Launch IPA Knowledge Centers across India to disseminate information about IPA and its activities.

IPA VANITA

- To define the scope and areas of working of IPA Vanita and undertake social impact projects in the defined areas.
- Install Aerators in hotels, schools and other projects across in pan India.
- Conduct water awareness programmes in schools

On the completion of 31 years of service to the Nation, IPA commits to be the Change, as we ensure that IPA stands tall reaching unprecedented heights never reached before.

IPA NEB and NEC join me in wishing each one of you, health & happiness with the hope that we act as the change agents, in increasing awareness on Plumbing - a crucial service among all building industry stakeholders, and are able to promote correct Codal based plumbing practices in the building sector, which is the second largest employer and contributor to GDP.

With My Best Regards for a robust 2024 !

Gurmit Singh Arora
National President
Indian Plumbing Association

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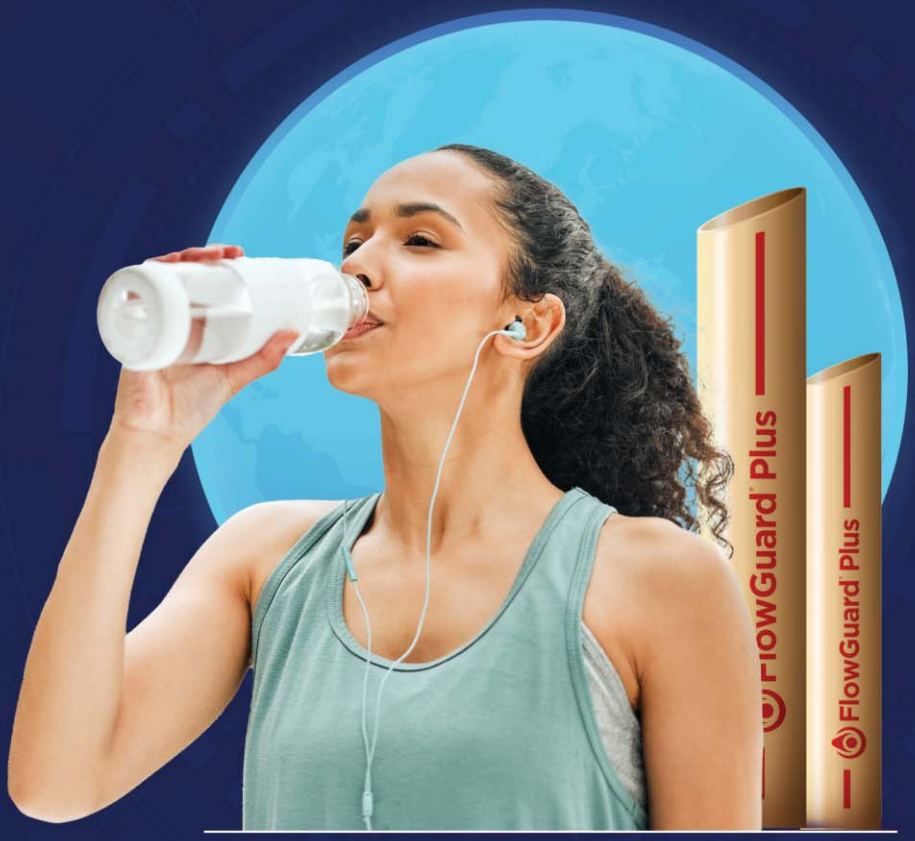

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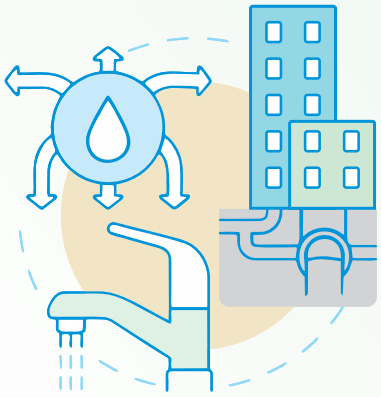

Significance of Scaled Decentralized Systems and the Role of Building Level Plumbing Systems for Sustainable and Resilient Urban Water Infrastructure

- Pradip P. Kalbar and Shweta Lokhande

Abstract

In the wake of international commitments of countries across the world to the Sustainable Development Goals (SDG), there is a dire need to plan resource-efficient and energy-efficient urban water infrastructure. Further, the emerging climate change crisis has necessitated the provisioning of resilient infrastructure i.e., the facilities should be capable of providing minimum services such as water supply and wastewater treatment even in times of disasters or extreme events. Decentralized infrastructure is becoming popular due to the numerous economic, environmental, and other intangible benefits as compared to the conventional approach of centralized systems, which has lately been challenged on the grounds of sustainability and resilience. However, deciding the scale of decentralization is a challenge. The present research identifies the trade-offs between centralized and decentralized configurations UWI and puts forth the concept of 'Scaled Decentralized Systems' as a means of attaining sustainable and resilient urban water infrastructure. Further, it suggests dual plumbing at the building level and discusses the benefits of the same.

1. Introduction

The prevailing linear economy of take-make-dispose is not sustainable for the urban water infrastructure, hence, a shift towards the circular economy is suggested to manage the water resources (Kakwani and Kalbar 2020). In recent times, climate change has emerged as a challenge of this century hence the other important aspect of infrastructure planning and development is resilience. which has become the focus of discussion recently (Lawson et al. 2020). Hence, the current approach to Urban Water Infrastructure (UWI) provisioning needs an assessment where sustainability and resilience aspects are evaluated simultaneously. Infrastructure systems presently face uncertainty emerging from the planning and design stage, which is magnified due to growing climate change-related stress (Bondank et al. 2018). Hence, environmental resource governance is observing a shift in focus from attaining only optimized and efficient systems to those capable of adapting during stress periods (Lawson et al. 2020). Moreover, it is not economically viable to design infrastructure to prevent failure from all possible disasters. Hence resilience has to be incorporated to achieve a good design strategy. From a systems and information engineering perspective, resilience has been defined as "the ability of the system to withstand a major disruption within acceptable degradation parameters and to recover within an acceptable time and composite costs and risks" (Ouyang et al. 2012). Adaptive and resilient approaches in all stages of an infrastructure project can minimize the effects of climate change and urbanization (Radhakrishnan et al. 2018).

While sustainable systems cannot necessarily be resilient and vice-versa, it is important for the UWI to full fill the expectations of both these aspects (Zhang and Li, 2018). Sustainability is essential to make the water infrastructure affordable, acceptable, environmentally prudent and relevant for the given location. Whereas resilience in the water infrastructure is essential to cope with the emerging hazards related to climate change. The water infrastructure should have flexibility, adaptability and reliability to deliver varying service levels expected during emergencies. However, hardly any studies have approached UWI planning that simultaneously addresses both sustainability and resilience.

1.1. Configurations of urban water infrastructure

Centralized and decentralized configurations are the two popular approaches in urban water infrastructure, the distinction of which is depicted in Fig.1. Every engineering system has its own scale of economy, which offers economic benefits during the construction and operation. Hence, the centralized treatment systems got popular due to this scale of economy. However, there are no further benefits associated with scaling up after achieving a particular scale in a given system. Too small systems also do not offer benefits due to the scale of economy nor attain the water quality standards; instead pose additional challenges related to the operation and governance of the system. With regard to integrated water and wastewater treatment systems, deciding an appropriate degree of decentralization for implementation has been identified as an engineering challenge (Woods et al. 2013). It is essential to plan the UWI so that maximum benefits of scale of economy are gained. Such a decentralized approach with an optimum scale of operation is essential for the smooth functioning of UWI (Kalbar and Gokhale, 2019).

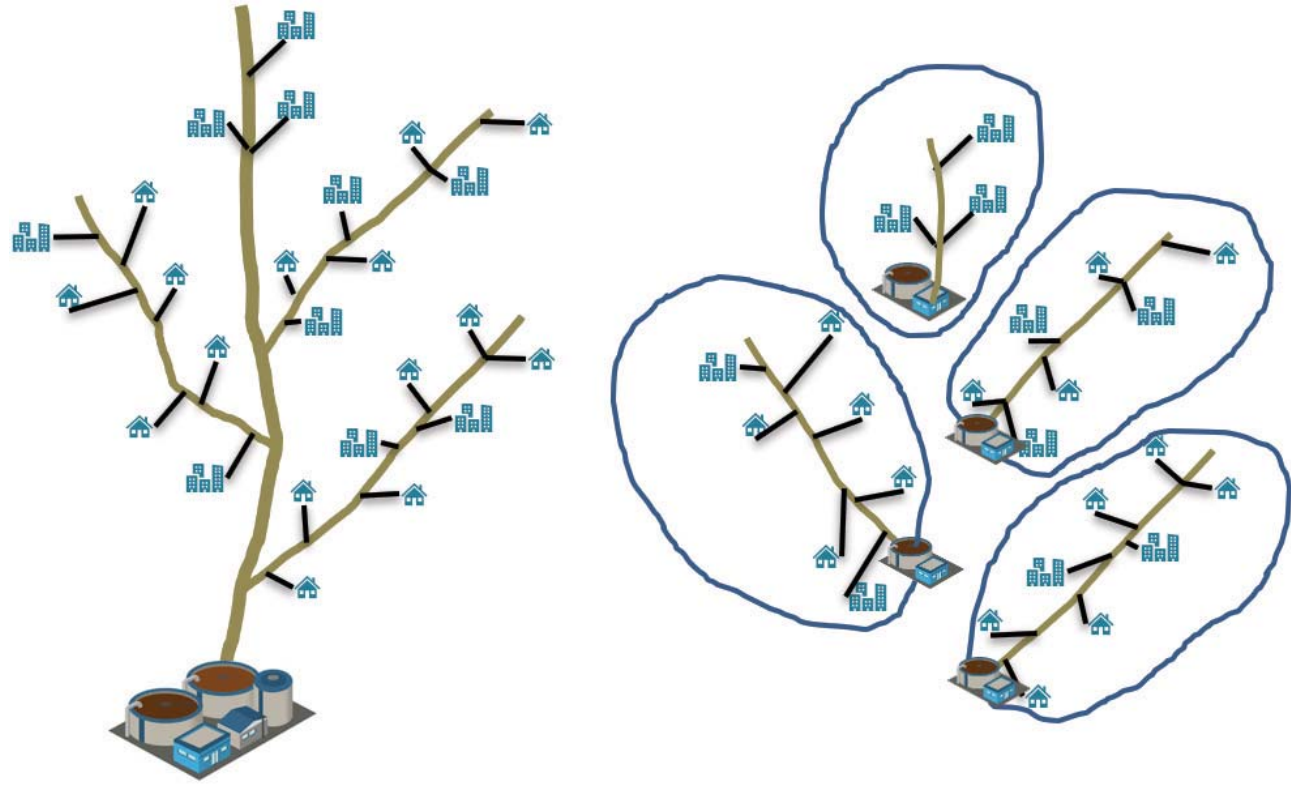

Figure-1: Centralized and decentralized infrastructure (Adopted from Kalbar and Lokhande, 2023)

1.2. Need of the study

The shrinking budgets for public infrastructures and lowering of subsidies amidst the massive cost of maintenance and restoration works make investments in centralized projects questionable (Eggimann et al. 2015). Mumbai city, withdrawing over 3220 Millions of Liter per Day (MLD) water from outside its boundary, ranked third in the list of top 20 urban agglomerations responsible for massive cross-basin water transfer to meet the needs of the urban population (McDonald et al. 2014). Centralized treatment systems are more vulnerable to extreme events and lack of alternate water supply arrangements can cause severe inconvenience to the users. The recent example of the failure of Asia's largest water treatment plant in the Bhandup water complex in Mumbai clearly shows the impact due to the failure of a centralized system (Hindustan Times 2021). Water supply to the entire Mumbai region was affected as this treatment plant got inundated for the first time in its life due to the sudden heavy rainfall. Thus, there is

a need to rethink on the traditional approach of planning centralized infrastructure.

In this regard, the present work puts forth the sustainability and resilience aspects of UWI individually and discusses the significance of decentralized systems in adopting both approaches throughout the planning, design, implementation and Operation and Maintenance (O&M) of UWI. This study identifies the drawbacks of the conventional approaches of centralized planning of UWI and proposes a shift towards decentralization for achieving the Sustainable Development Goals (SDGs) and mitigating climate change. Stormwater is excluded from the broad scope of the article and the scope of UWI in discussion is limited to water supply and sewerage. With this background, the article discusses the resilience aspects in decentralized UWI. Further, it introduces the concept of scaled decentralization in UWI and highlights its significance to achieve sustainability and build resilience in UWI.

2. Climate Change Aspects in Decentralized UWI

In the current scenario of India and other developing countries, the centralized approach has become a favorite of consultants, contractors, and politicians. It offers an opportunity to plan large projects, allowing all the stakeholders to utilize the funds in a single project proposal. Although this leads to great convenience for some stakeholders, such large projects result in wastage of financial and environmental resources due to the under-utilization of infrastructure in the initial years. For example, a recent report by the Central Pollution Control Board (CPCB), India shows that out of 1631 STPs (planned and installed) with a total capacity of 36668 MLD, only 1093 STPs are operational treating approximately 73% of sewage i.e., 26869 MLD sewage (CPCB, 2021). On the contrary, well-planned and phase-wise infrastructure development will completely utilize the infrastructure and reduce the operational costs. Despite decentralized infrastructures gaining popularity, inadequate efforts have been made in developing planning tools to harness these opportunities. Apart from efficient resource utilization, there are numerous other benefits associated with decentralization, whose understanding will only escalate the adoption of decentralized UWI. Hence, some of the drivers who may accelerate the use of decentralized systems have been identified from the perspectives of sustainability and resilience and are discussed in the following sub-sections.

2.1. Sustainability

The sustainability definition in the context of water infrastructure has been extended as "infrastructure designed and managed to fully contribute to the objectives of society, now and in the future, while maintaining their ecological, environmental and hydrological integrity" (Marques et al. 2015). The triangular framework of sustainability based on economic growth and efficiency, social justice, and environmental protection is widely used for managing natural resources (Sahely et al. 2005). Further, the sustainability of any product or system has been commonly associated with the Triple Bottom Line (TBL) approach, including social, environmental, and economic dimensions (Marques et al. 2015), which is inadequate in addressing sustainability issues. Hence, subsequent studies have also considered technical and functional aspects such as durability, reliability, performance and flexibility, evaluation of policy initiatives, governing institutions (Rathnayaka et al. 2016; Kalbar et al. 2016). Sustainability is, thus, a critical perspective to be considered by planners and decision-makers while creating UWI. Achieving sustainability is one of the main drivers for decentralized UWI and it is gained by virtue of various factors which are described in detail in the Table 1.

Table-1: Sustainability aspects of decentralized UWI (Adopted from Kalbar and Lokhande, 2023)

Driver	Description
Economic benefits	• Improved pressure in water supply networks • Energy savings due to phased and modular development of infrastructure • Easy operation of sewerage systems owing to less depth of excavation • Decentralized systems prove economical over the long operational life of the UWI • Create opportunity to adopt nature-based solutions for wastewater treatment

Driver	Description
Social benefits	• Equitable water distribution can be achieved in the tail-end of cities • Utilization of local labour and women can generate employment • Delegating O&M authority to community may imbibe a sense of ownership that sustains STPs • Modular designs of decentralized treatment units are relatively easy to install • Decentralized systems strengthen local government and achieve equity of resources
Market for recycled water	• The availability of treated water close to the end-use location avoids redistribution cost of reclaimed water (Point-of-sale reuse) • Decentralized systems suitable for mixed land-use pattern wherein a water exchange network can be established between residential, commercial and industrial thus reduce freshwater dependency
Resource recovery	• Wastewater and sludge, recognized as resource carriers amidst the energy-intensive production of nitrogen fertilizers and the depleting reserves of phosphorus rock, can be recovered in decentralized systems • Plant-based solutions for phosphorus recovery from wetlands or algal ponds are an attractive option • Adoption of natural treatment systems in a decentralized manner can generate useful by-products such as fish feed, biomass, animal feed, biodiesel
Environmental impacts	• Reduced operational energy in decentralized UWI results in reduced greenhouse gas emissions • Opportunity to create circular economy at local scale and closing the nutrient loops resulting in better water quality • Full capacity utilization happens in decentralized systems reducing unnecessary wastage of resources
Ease of governance	• Installation of decentralized systems involves less complexity due to lesser number of institutions involved • Tendency of delays in large infrastructure projects due to land acquisition, tendering etc. are avoided in decentralized systems

2.2. Resilience

Water sensitivity has become a key transition in urban areas, and accordingly, cities have begun to adapt to major changes happening in the world. The worldwide expansion of urban areas, population growth, limitations due to resource scarcity and the accompanying climate change have enhanced the need for resilient water systems. In the context of UWI, resilience refers to the ability of water systems to minimize the magnitude and duration of water supply service failure when subjected to extreme conditions (Diao 2021). In this regard, a paradigm shift occurred from fail-safe design strategies to safe-fail (resilient) design strategies, penetrating water infrastructure systems (Ahern 2011). Water infrastructure resilience is relatively a new topic in both research and industry and has been identified as a requirement for the future.

Resilient design systems aim to sense, absorb, and adapt to disturbances while maintaining essential functionalities (Leigh and Lee 2019). Resilience has been associated with characteristics such as robustness, rapidity or recovery, redundancy, reliability, buffering. The concept of resilience has multidisciplinary origins; hence leads to multiple interpretations. The changes appear to be gradual, with many cities still investing in traditional strategies. However, with a growing awareness of the importance of climate change, disasters, increased water demand, the urban communities are progressively expecting resilience in UWI to cater to the future uncertainties in urban water supplies. Spiller et al. (2015) have considered robustness, adaptive capacity and flexibility as the three main components of resilience.

The robustness of technical systems denotes their ability

to function and perform to meet the set objectives even amidst changing environments and vulnerable operating conditions (Spiller et al. 2015). Robustness is the capacity of a treatment system to withstand a disturbance without entering a phase of unsatisfactory performance (Cuppens et al. 2012). For example, a robust water supply and sewerage infrastructure is that which continues to function satisfactorily till the end of the design period amidst varying loads, influent characteristics, and effluent quality standards. Interestingly, a resilient system is allowed to fail under extreme conditions, but the ability to recover quickly from stress and sustain the minimum functionality and service is referred to as adaptability or adaptive capacity. The time taken by the system to recover from a perturbation and regain its satisfactory performance plays a key role and is referred to as rapidity (Cuppens et al. 2012). Further, the flexibility of a system denotes the ability of the infrastructure to cope with changing operational conditions in response to emerging circumstances by entailing changes in scale, functionality, structure and operational objectives (Spiller et al. 2015). Flexibility refers to the ability of UWI to meet the newer guidelines with minimum infrastructural changes. It facilitates the integration of unpredicted advances in technologies such as easy retrofitting for resource recovery options or capacity expansion (Spiller et al. 2015). The advantages of decentralized systems with regard to resilience have been outlined in Table 2.

3. Scaled Decentralized UWI

Kalbar and Lokhande (2023) have adopted the lens of sustainability and resilience to simultaneously assess the benefits of decentralization. Sustainability aspect is discussed through six parameters, namely life-cycle costs, the potential for recycling water, resource recovery, social benefits, environmental impacts, and ease of governance while the resilience aspect is indicated through three parameters namely robustness, adaptive capacity and flexibility.

3.1. Trade-offs between centralized and decentralized UWI

The trade-offs between adopting a highly centralized or highly decentralized UWI are depicted in Fig. 2 where the effect of these systems on sustainability and resilience are notionally depicted. The x-axis denotes the scale of decentralization for example, city-level or community or household level. The y-axis denotes the parameter representative of drivers, that are normalized on a scale of low to high. This section summarizes the notional trends of all parameters for sustainability and resilience based on the author's understanding of UWI.

With respect to sustainability, the life-cycle cost (comprising both capital and O&M costs) of highly centralized systems tends to be higher and it reduces towards decentralization (Tjandraatmadja et al. 2005) up to a certain point beyond which the treatment cost increases due to an increased number of STPs. The social

Table-2: Resilience aspects of decentralized UWI (Adopted from Kalbar and Lokhande, 2023)

Driver	Description
Robustness	• Decentralized systems less vulnerable to extreme weather events • Failure of centralized system performance affect entire region whereas decentralized systems allow to cater small regions and non-performance of single system doesn't affect another, hence more robust approach • Varying hydraulic loads and water quality emerging from future changes can be easily tackled in decentralized systems
Adaptive capacity	• Creating new infrastructure to continue the service provision in the case of failure can easily be achieved for decentralized systems of smaller capacity • Decentralized systems have greater adaptability and hence resilience as they can draw water from multiple water sources
Flexibility	• Decentralized systems facilitate flexibility by virtue of phasing out construction of wastewater treatment infrastructure with time • Decentralized systems are easy to retrofit and hence can be modified to achieve newer regulations. • The learnings from localized problems can be incorporated while designing the future phases of decentralized STPs

benefits in terms of community involvement, women participation and local labour employment are higher in decentralized systems (Lekshmi et al., 2020). Decentralization provides greater opportunities of a market for recycled water and further reducing the redistribution cost (Kobayashi et al. 2020a). Hence, the potential for recycling water is higher for decentralized UWI and is more economical as compared to centralized systems (Kavvada et al. 2018). Further, decentralized systems favor higher resource recovery ratio due to ease of source separation. Also, the resource recovery is economically viable at a larger level than at household levels (Libralato et al. 2012). Coupling the scale and source separation aspects, resource recovery is highest for an appropriate scale of implementation. Considering environmental impacts of wastewater treatment, centralized systems tend to consume more energy and hence emit more greenhouse gas emissions (Kavvada et al. 2016). The environmental impacts reduce towards decentralized systems up to a certain point beyond which a greater quantity of materials and resources consumed in treatment systems are associated with greater embodied emissions. Further, the coordination among the service providers is better managed in decentralized systems operating at a community scale as against individual households. The O&M of small-sized infrastructure systems is relatively easy. Also, the complexity involved in outsourcing infrastructure projects increases for highly centralized systems and causes inconvenience in implementation for example delays due to tendering, land acquisition, involvement of multiple agencies etc. Coupling the above trends, it is observed that the ease of governance is on the lower side for centralized systems, increases towards decentralization up to a point, beyond which it further reduces.

As far as resilience is concerned, decentralized systems function well amidst changing environments and can resume service in less time than centralized systems. Centralized systems are less robust and more vulnerable to failures. For example, water supply systems use natural water bodies as their source, which might be at greater risk of flood or drought or any case of water contamination (Liu et al. 2021). Decentralized systems can have multiple or localized water sources for example reclaimed water for non-potable purposes thus increasing their resilience. Hence, the robustness of centralized systems is lowest, and it increases towards decentralization. With regard to adaptive capacity, the time within which service can be provided after failure is crucial. This can be easily achieved for decentralized systems of smaller capacity, which can be installed in a few days or months as against large centralized systems that may take even years to get commissioned. Also, moderate investments are suggested to achieve increased recoverability which also result in an enhanced robustness (Liu et al. 2021). Additionally, the organizational aspect of resilience plays a key role in implementation. Decision-making during crisis can be better achieved at a community level than individual households, while it may get prolonged in highly centralized projects. Thus, adaptive capacity increases towards decentralization up to certain point, beyond which it decreases slightly. Further, need for large systems is suggested for increased resilience, however, a large capacity of such large systems remain idle in the initial years resulting in capital costs being futile. In this background, reducing investments by building infrastructure that provides service for only 10 years is suggested instead of planning the service provision for 50 years (Giordano, 2012). Implementing decentralized systems in a phase-wise manner proves to be cheaper, more efficient and also capable of responding to new developments occurring in the area, earning higher flexibility. Thus, the decentralized UWI provide greater flexibility than their centralized counterparts and hence is depicted by an increasing trend in Fig.2.

To holistically plan and implement UWI, the culmination of all the above parameters is needed. Hence, the notional trends of these parameters are collectively shown in Fig.2. In an ideal UWI, the sustainability and resilience of UWI should be the maximum, which can be only possible through appropriate level of decentralization. As Fig.2 depicts, the resilience of UWI increases towards decentralized systems and stabilizes after one size or scale, whereas the sustainability decreases beyond one point. It is observed that the most economical systems having maximum benefits tend to fall between the highly centralized and highly decentralized systems. Consequently, the mid-zone becomes most favorable from the perspective of simultaneously achieving sustainability and resilience. This hypothesis is supported by the results of a comparative life cycle assessment of centralized, community, neighborhood and household scale that has shown the community level to perform better among others for the same treatment technology and end-use (Kobayashi et al. 2020b). Also, amidst the high O&M costs making greywater reuse uneconomical at the household scale, the use of sewer mining at a neighborhood scale is suggested as a potential reuse scheme (Makropoulos et al. 2018).

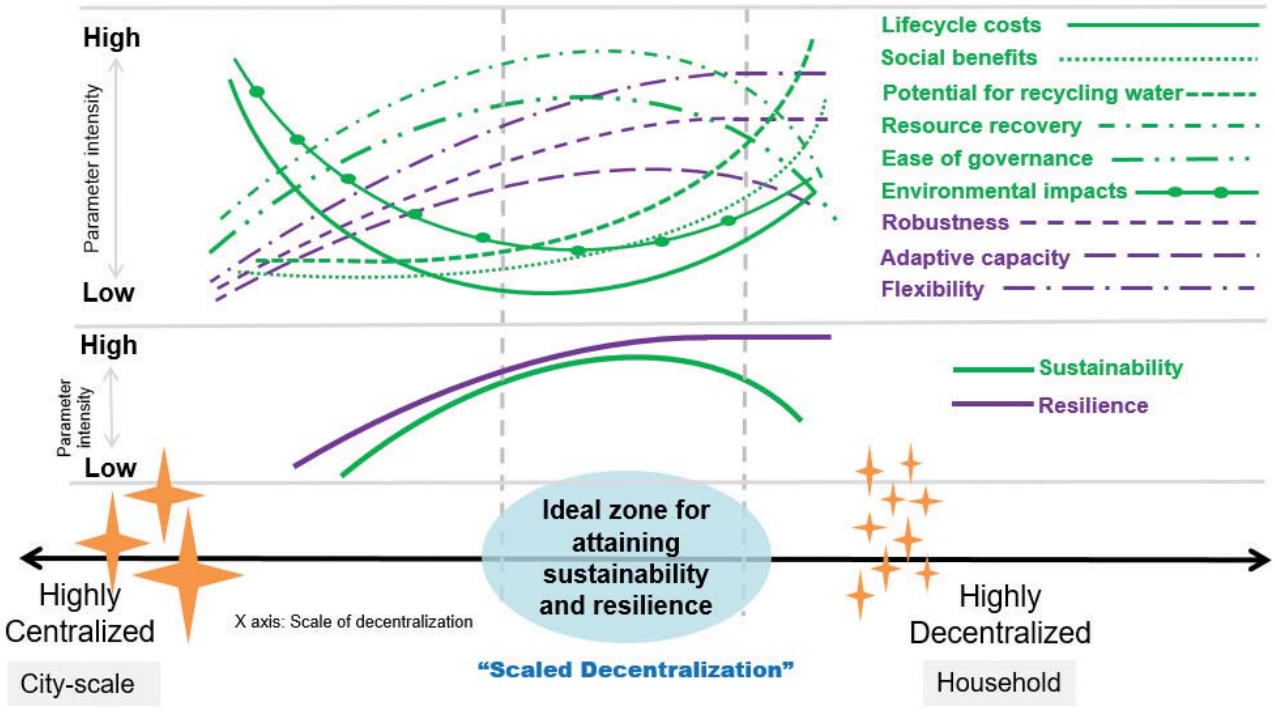

Figure-2: Ideal zone of UWI for achieving sustainability and resilience based on various parameters (Adopted from Kalbar and Lokhande, 2023)

3.2. The concept of scaled decentralization

Decentralization cannot always be deemed small scale and needs to be context-specific (Libralato et al. 2012). Cluster systems are often used in communities and keep a balance between on-site and centralized treatment facilities (Vedachalam et al. 2015). Similarly, a semi-centralized approach has been suggested as a viable solution for old city centres as well as the growing expansions and the guiding principle for scaling of semi-centralized systems is ''as small as possible as big as necessary'' (Böhm et al. 2011). In our study, the water supply or wastewater collection and treatment systems designed for a discretely selected population size to achieve the scale of economy which can maximize sustainability and resilience at a given location are referred to as "scaled decentralized systems". Scaled Decentralized Systems (SDS) should be designed considering population density, land availability, regulations, stakeholder interests and fund availability with the ULBs. SDS have the advantage of diffusing the risk of extreme weather events, making them more climate-resilient and the current study brings out the importance of planning and implementation of SDS to achieve sustainable and resilient UWI.

Several trade-offs are involved in the decision of deciding the scale of implementing decentralized infrastructure. Computing the tipping point where the advantages of peripheral water reuse will outweigh the benefits of centralized treatment is complicated (Woods et al. 2013). Amidst these practical difficulties, the present study proposes using the size of cities to determine the scale of decentralization for UWI. Based on the author's experience and discussion with experts, a scale of decentralization is suggested depending on the size of the city and estimated sewage generation. For example, as illustrated in Fig. 3, small cities can be regarded as those generating approximately 10 MLD of sewage as against a metro city generating sewage around or exceeding 2000 MLD. The authors propose the scale of decentralization to range from 1-2 MLD STP for small cities, whereas it can go up to as high as 50-60 MLD for metro cities. A centralized scale for a smaller city can be a decentralized scale for a metro city. Thus, it should not be the absolute magnitude of plant capacity but the relative magnitude with respect to the size of the city that decides the scale of decentralization in UWI planning. Unless such an appropriately scaled decentralization is adopted, equitable pressure distribution in water supply systems and cost-efficient sewage treatment cannot be achieved.

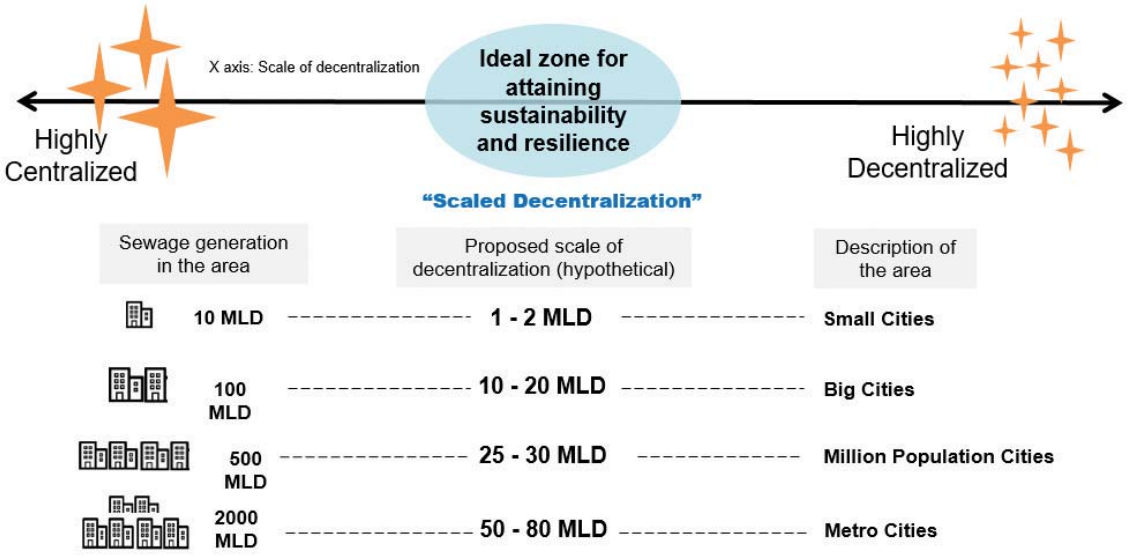

Figure-3: Scaled decentralized UWI for different size of cities (Adopted from Kalbar and Lokhande, 2023)

3.3. Role of building level interventions

The optimal scale for implementing decentralized sewage treatment by urban local bodies has been associated with the scale of cities i.e. the quantum of sewage generated in the cities. However, in today's times, the role of building level interventions in emerging urban areas has also become crucial. The residential societies have conventionally been discharging the domestic sewage in municipal sewers, which is ultimately taken to sewage treatment facilities situated far-away from the buildings. In such a scenario, no recycling takes place within the building and the water demand is entirely met by freshwater. Upcoming buildings are warned of the uncertainties in water provisioning due to severe water shortage.

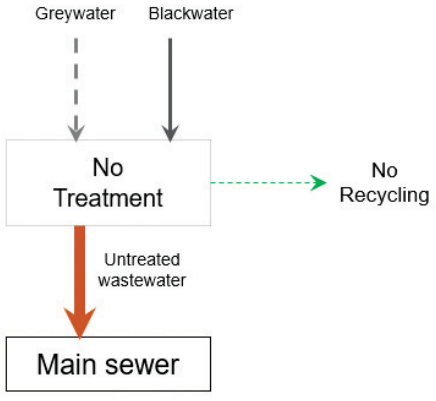

Figure-4: Conventional wastewater flows in residential societies

3.3.1. Issues in building scale recycling

Amidst the freshwater scarcity, there are mandates for high-rise buildings and upcoming residential societies to treat the wastewater generated within their premise. However, considering the scale of economy aspect as discussed in section 3.2, too small systems at household or building level, specifically treating combined blackwater from toilets and greywater coming from households, are not suggested due to difficulties in operating and maintaining small-scale STPs. The scale of economy is not attained in residential buildings, and there is no motivation for the societies to operate the plant. Also, sludge handling becomes a burden in small-scale STPs, and choice of treatment technology plays a key role in this regard. Moreover, there are regulatory aspects for example, due to lack of stringent monitoring, there is a tendency to bypass the sewage treatment and discharge the untreated wastewater in municipal sewers. In this case, even if recycling is planned initially, it does not materialize. Thus, there is a problem with sustenance of created infrastructure for sewage treatment.

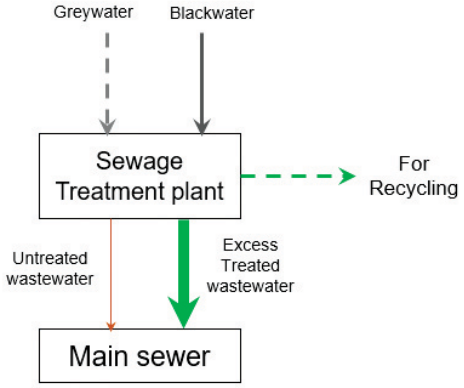

Figure-5: Sewage flows in residential societies amidst mandated wastewater recycling

3.3.2. Solutions for building scale water recycling

In the background of failing sewage treatment at building scales and pressing issues of water provisioning, the role of source separation and dual plumbing systems becomes crucial. Sewage treatment is complex chain of multiple treatment units, and often requires skilled manpower to operate the plants. Hence, the operation of STPs at small scale becomes challenging, due to difficulties in finding human resources of necessary caliber. In this background, source separation can be adopted and the greywater from bathrooms can be collected separately. The used bathroom water is relatively less polluted and can be treated using physico-chemical processes such as sand filtration. The treatment setup in this case will be simplified as no biological process is involved in the treatment and treated water can be recycled for toilet flushing. The contamination level of bathroom water will be substantially lower than that of blackwater, hence, treated bathroom water will be adequately safe for toilet flushing purpose and gardening. The blackwater can be diverted to the municipal sewers for treatment in municipal STPs as a part of scaled decentralization. In this scenario, circular economy will be attained by virtue of recycling and reduce, as the recycled wastewater used for toilet flushing will also reduce the freshwater demand at the building-scale. Further, the bathroom water treatment plant will have a higher sustenance rate due to less complexity in treatment units and lower pathogen and contamination level.

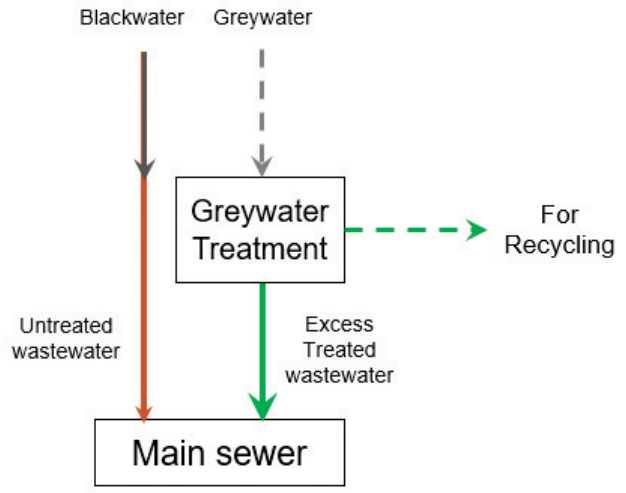

Figure-6: Proposed sewage flows in residential societies for sustaining wastewater recycling

To realize the above solutions, there is a need for paradigm shift in plumbing arrangements. The authors suggest the approach of 'dual drain and dual plumbing' for implementing bathroom water treatment and recycling. There should be separate pipelines fetching freshwater from municipal sources and recycled water from building-level treatment plant. Further, two drains should be joining the municipal main sewer. Considering the failure rate of sewage treatment plants at building level, it is suggested that blackwater is diverted to the main sewer whereas dilute bathroom water is used for recycling. Whenever required blackwater can be treated at building level without much changes in the plumbing system. There can also be provision for supplying the excess treated wastewater to the municipal sewer in case of lesser demand for recycling within the building premises. The role of plumbing associations, architects and consultants becomes crucial in realization of this solution. Additionally, relevant policies facilitating the approval of the same need to be formulated.

2. Conclusions

The evolution of water infrastructure historically is inclined towards planning and designing centralized infrastructure. The cities are currently going through changes such as urbanization and climate change that posed various stresses on the UWI. To cope with these challenges, there is a need for a paradigm shift in the way current UWI is planned, designed, implemented and operated. It is essential to consider sustainability and resilience perspectives while creating new UWI or retrofitting the existing UWI. The current centralized UWI does not allow enough opportunities for the water sector to practice a circular economy in the cities. Also, it is not economical and environmentally sustainable to recycle the treated water and create new water sources in the prevailing practice of centralized UWI. Moreover, centralized UWI does not offer any flexibility, adaptability and overall resilience, which have recently gained significance amidst the emerging extreme events due to climate change.

The present work argues that along with an emphasis on decentralization, there is a need for considering the appropriate scale of implementation in decentralized UWI. The trade-offs between governance aspects, redistribution costs, recycling opportunities, life-cycle costs and resilience between highly centralized and highly decentralized systems are highlighted in this work. Although it is difficult to establish a perfect

number for scaled decentralization in a given context, the approach of moving towards the optimal zone combining centralized and decentralized treatment systems is the take-away message of this study. Further, from the perspective of circular economy and resource recovery, wastewater segregation at source is suggested. Greywater and/or separated bathroom water treatment at building scale can ensure sustenance of treatment plants as well as reduce the load on the municipal sewerage facilities. In this regard, the role of dual plumbing and guidelines regarding the same becomes very relevant. We hope that this study reaches the appropriate target audience of researchers, practitioners, plumbing agencies and urban local bodies who will implement the learnings and further contribute to quantifying the economic scale of decentralization through optimization models, case studies and policy changes.

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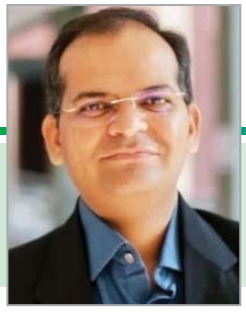
Disclaimer

The detailed version of this work can be found in the article titled 'Need to adopt scaled decentralized systems in the water infrastructure to achieve sustainability and build resilience' published in the IWA journal 'Water Policy'.

References

- Ahern, J. (2011). From fail-safe to safe-to-fail: Sustainability and resilience in the new urban world. Landscape and Urban Planning, 100(4), 341–343. https://doi.org/10.1016/j.landurbplan.2011.02.021
- Böhm, H. R., Schramm, S., Bieker, S., Zeig, C., Anh, T. H., & Thanh, N. C. (2011). The semicentralized approach to integrated water supply and treatment of solid waste and wastewater - A flexible infrastructure strategy for rapidly growing urban regions: The case of Hanoi/Vietnam. Clean Technologies and Environmental Policy, 13(4), 617–623. https://doi.org/10.1007/s10098-011-0378-9
- Bondank, E. N., Chester, M. V., & Ruddell, B. L. (2018). Water Distribution System Failure Risks with Increasing Temperatures. Environmental Science and Technology, 52(17), 9605–9614. https://doi.org/10.1021/acs.est.7b01591
- CPCB. (2021). National Inventory of Sewage Treatment Plants March 2021. March, 183. https://cpcb.nic.in/openpdffile.php?id=UmVwb3J0RmlsZXMvMTIyOF8xNjE1MTk2MzIyX21lZGlhcGhvdG85NTY0LnBkZg==
- Cuppens, A., Smets, I., & Wyseure, G. (2012). Definition of realistic disturbances as a crucial step during the assessment of resilience of natural wastewater treatment systems. Water Science and Technology, 65(8), 1506–1513. https://doi.org/10.2166/wst.2012.040
- Diao, K. (2021). Towards resilient water supply in centralized control and decentralized execution mode. Journal of Water Supply: Research and Technology-Aqua, 70(4), 449–466. https://doi.org/10.2166/aqua.2021.162
- Eggimann, S., Truffer, B., & Maurer, M. (2015). To connect or not to connect? Modelling the optimal degree of centralisation for wastewater infrastructures. Water Research, 84, 218–231. https://doi.org/10.1016/j.watres.2015.07.004
- Giordano, T. (2012). Adaptive planning for climate resilient long-lived infrastructures. Utilities Policy, 23, 80–89. https://doi.org/10.1016/j.jup.2012.07.001
- Hindustan Times (2021) Mumbai's water supply hit as Bhandup water complex inundates in heavy rainfall. https://www.hindustantimes.com/cities/mumbai-news/mumbais-water-supply-hit-as-bhandup-water-complex-inundates-in-heavy-rainfall-101626584402637.html (accessed 25 November 2021)
- Kalbar, P., & Gokhale, P. (2019). Decentralized infrastructure approach for successful water supply systems in India: Use of multi-outlet tanks, shafts and manifolds. Journal of Water Supply: Research and Technology - AQUA, 68(4), 295–301. https://doi.org/10.2166/aqua.2019.158
- Kalbar, P. P., Karmakar, S., & Asolekar, S. R. (2016). Life cycle-based decision support tool for selection of wastewater treatment alternatives. Journal of Cleaner Production, 117, 64–72. https://doi.org/10.1016/j.jclepro.2016.01.036
- Kalbar, P. P. and Lokhande, S. (2023). Need to Adopt Scaled Decentralized Systems in Water Infrastructure to Achieve Sustainability and Build Resilience. Water Policy. 25(4), 359-378. https://doi.org/10.2166/wp.2023.267
- Kakwani, N. S., & Kalbar, P. P. (2020). Review of Circular Economy in urban water sector: Challenges and opportunities in India. Journal of Environmental Management, 271(August 2019), 111010. https://doi.org/10.1016/j.jenvman.2020.111010
- Kavvada, O., Horvath, A., Stokes-Draut, J. R., Hendrickson, T. P., Eisenstein, W. A., & Nelson, K.L. (2016). Assessing location and scale of urban nonpotable water reuse systems for life-cycle energy consumption and greenhouse gas emissions. Environ Sci Technol 50:13184–13194.
- Kavvada, O., Nelson, K. L., & Horvath, A. (2018). Spatial optimization for decentralized non-potable water reuse. Environ Res Lett 13:. https://doi.org/10.1088/1748-9326/aabef0
- Kobayashi, Y., Ashbolt, N. J., Davies, E. G. R., & Liu, Y. (2020). Life cycle assessment of decentralized greywater treatment systems with reuse at different scales in cold regions. Environment International, 134(September 2019), 105215. https://doi.org/10.1016/j.envint.2019.105215
- Lawson, E., Farmani, R., Woodley, E., & Butler, D. (2020). A Resilient and Sustainable Water Sector: Barriers to the Operationalisation of Resilience. Sustainability, 12(5), 1797. https://doi.org/10.3390/su12051797
- Lekshmi, B., Sharma, S., Sutar, R. S. Parikh, Y. J., Ranade, D. R., & Asolekar, S. R. (2020). Circular Economy Approach to Women Empowerment Through Reusing Treated Rural Wastewater Using Constructed Wetlands. In: Ghosh S (ed) Waste Management as Economic Industry Towards Circular Economy. Springer, Singapore, 1–10
- Leigh, N., & Lee, H. (2019). Sustainable and Resilient Urban Water Systems: The Role of Decentralization and Planning. Sustainability, 11(3), 918. https://doi.org/10.3390/su11030918
- Libralato, G., Volpi Ghirardini, A., & Avezzù, F. (2012). To centralise or to decentralise: An overview of the most recent trends in wastewater treatment management. Journal of Environmental Management, 94(1), 61–68. https://doi.org/10.1016/j.jenvman.2011.07.010

- Liu, J., Shao, Z., Wang, W. (2021). Resilience assessment and critical point identification for urban water supply systems under uncertain scenarios. Water (Switzerland) 13:. https://doi.org/10.3390/w13202939
- Makropoulos, C., Rozos, E., Tsoukalas, I., Plevri, A., Karakatsanis, G., Karagiannidis, L., Makri, E., Lioumis, C., Noutsopoulos, C., Mamais, D., Rippis, C., & Lytras, E. (2018). Sewer-mining: A water reuse option supporting circular economy, public service provision and entrepreneurship. Journal of Environmental Management, 216, 285–298. https://doi.org/10.1016/j.jenvman.2017.07.026
- Marques, R. C., da Cruz, N. F., & Pires, J. (2015). Measuring the sustainability of urban water services. Environmental Science & Policy, 54, 142–151. https://doi.org/10.1016/j.envsci.2015.07.003
- McDonald, R. I., Weber, K., Padowski, J., Flörke, M., Schneider, C., Green, P. A., Gleeson, T., Eckman, S., Lehner, B., Balk, D., Boucher, T., Grill, G., & Montgomery, M. (2014). Water on an urban planet: Urbanization and the reach of urban water infrastructure. Global Environmental Change, 27(1), 96–105. https://doi.org/10.1016/j.gloenvcha.2014.04.022
- Ouyang, M., Dueñas-Osorio, L., & Min, X. (2012). A three-stage resilience analysis framework for urban infrastructure systems. Structural Safety, 36–37, 23–31. https://doi.org/10.1016/j.strusafe.2011.12.004
- Radhakrishnan, M., Pathirana, A., Ashley, R. M., Gersonius, B., & Zevenbergen, C. (2018). Flexible adaptation planning for water sensitive cities. Cities, 78(January), 87–95. https://doi.org/10.1016/j.cities.2018.01.022
- Rathnayaka, K., Malano, H., & Arora, M. (2016). Assessment of sustainability of urban water supply and demand management options: A comprehensive approach. Water (Switzerland), 8(12). https://doi.org/10.3390/w8120595
- Sahely, H. R., Kennedy, C. A., & Adams, B. J. (2005). Developing sustainability criteria for urban infrastructure systems. Canadian Journal of Civil Engineering, 32(1), 72–85. https://doi.org/10.1139/l04-072
- Spiller, M., Vreeburg, J. H. G., Leusbrock, I., & Zeeman, G. (2015). Flexible design in water and wastewater engineering - Definitions, literature and decision guide. Journal of Environmental Management, 149, 271–281. https://doi.org/10.1016/j.jenvman.2014.09.031
- Tjandraatmadja, G., Burn, S., McLaughlin, M., & Biswas, T. (2005). Rethinking urban water systems - Revisiting concepts in urban wastewater collection and treatment to ensure infrastructure sustainability. Water Sci Technol Water Supply 5:145–154. https://doi.org/10.2166/ws.2005.0031
- Vedachalam, S., Vanka, V. S., & Riha, S. J. (2015). Reevaluating onsite wastewater systems: Expert recommendations and municipal decision-making. Water Policy, 17(6), 1062–1078. https://doi.org/10.2166/wp.2015.159
- Woods, G. J., Kang, D., Quintanar, D. R., Curley, E. F., Davis, S. E., Lansey, K. E., & Arnold, R. G. (2013). Centralized versus Decentralized Wastewater Reclamation in the Houghton Area of Tucson, Arizona. Journal of Water Resources Planning and Management, 139(3), 313–324. https://doi.org/10.1061/(asce)wr.1943-5452.0000249
- Zhang, X., & Li, H. (2018). Urban resilience and urban sustainability: What we know and what do not know? Cities, 72(December 2016), 141–148. https://doi.org/10.1016/j.cities.2017.08.009



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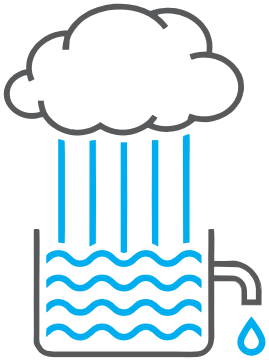


Does Rooftop Rainwater Harvesting Really Help???

- Dr. Anil Lalwani

India is the largest user of groundwater in the world and it is estimated that India uses 230 cubic kilometres of groundwater per year; this is more than one fourth of the global total. Groundwater in India is a critical resource. However, World bank report suggests, in 20 years about 60% of all India's aquifers will be in a critical condition if the current trend of an increasing number of aquifers are reaching unsustainable levels of exploitation.

More than 60% of irrigated agriculture and 85% of drinking water supplies are dependent on groundwater. Urban residents increasingly rely on groundwater due to unreliable and inadequate municipal water supplies.

Over the years, ill-informed Government decisions especially in the state of Maharashtra have actually been detrimental to groundwater, in terms of quantity and quality. Examples of which have been highlighted with Pune City, and Maharashtra state as a case study, but it holds true for almost all areas within the state.

In the initial days when the city was expanding and the basic infrastructure was inadequate hence untreated sewage or overflow from septic tanks were discharged in to the Nallahs within the neo-urban areas, as it was one of the easiest way of ensuring that the required gradient as well as easy access, with and assumption that it would get washed away during the monsoon and later on sewage lines were laid along the same lines and this led to contamination of the rivers and nallahs and also the groundwater near the rivers and Nallah.

Contaminated water being released into the river Mula-Mutha

Untreated sewage being disposed in the River Channel

The garbage disposal areas in the outskirts of the city were selected in areas where there was amygdaloidal rock exposed on surface with an assumption that it was non- permeable as there were no cracks and joints visible to the naked eye. During the monsoon season, the leachate seeped in to the ground as the rock contributed to the unconfined aquifer and had micro fissures and joints which are not visible unless seen under the microscope, eventually leading to the groundwater system getting contaminated; even when new sites were located the same mistake was repeated leading to more areas getting contaminated.

Open to sky Garbage Dump at Urli Devachi of Amygdaloidal basalt which contributes to the regional unconfined aquifer in that area.

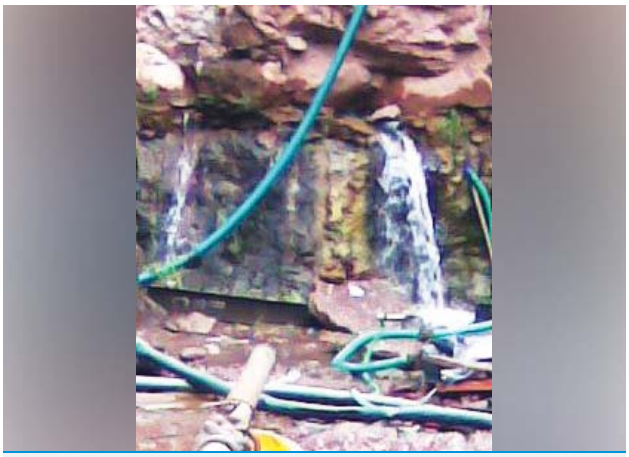
Then came the phase of concretization of the Nalliah's to reverse the effect of groundwater contamination, but that led to the reduction of natural recharge, as rivers and Nallah channels are usually developed along zones of weakness such as fractures and joints which usually facilitate downward movement of the water which eventually recharges the aquifer system when the Nallah and streams are flowing.

Photo of Modified stream channel, where the flow alignment is through paved concrete channel

Then, came the restricting of depth of drilling to only 60 m in Maharashtra to try and control the water table decline, which was taking place in the shallow unconfined aquifers, without really trying to restrict the quantum of water that is being abstracted from the system, where in the dug wells tapping shallow aquifers were subjected to higher abstraction due to the a much higher rate of the pumping systems installed which is also one of the reasons of water level decline within the shallow aquifer system.

The latest UDCPR (Unified Development Control and Promotion Regulations for Maharashtra State) has permitted almost 90% of the plot area to be excavated by the Infrastructure companies, leaving just 1.5 m along the boundaries. Obviously, this does not leave much space for natural ground where rainwater can percolate downwards.

Not only is there inadequate space for natural recharge to take place, the deep excavations down to 15-17 meters to accommodate three level Basement parking tends to exposing the shallow aquifers which in most areas is around 8-15 metres in depth. This in turn leads to a large volume of groundwater being pumped out on a daily basis during and also after the construction is completed this is essentially done just to ensure that the hydrostatic uplift pressure on the lower most basement slab is at its bare minimum and the lower basements do not get flooded.



Groundwater flow encountered in excavation of basement which needs to be pumped out during and after the construction is over

With no proper well informed planning on a long term basis and with just a rampant uncontrolled growth of urban centers, turning to Roof Rainwater harvesting to meet the ever increasing shortfall of clean drinking water is being projected as the means of achieving sustainability for meeting the demands of clean water and like all other norms that the government puts forth, it lacks the technical ability and man power to ensure that they are being implemented properly and are getting envisaged benefits.

Rooftop Rainwater Harvesting, is a social responsibility of every citizen, as it ensures that the natural groundwater system is maintained and the groundwater abstraction for daily use is replenished during the rainy seasons, as it normally takes place within the natural Hydrogeological cycle.

In urban areas it is essential as it also help reduces the surface runoff and water logging that happens due to the increase in surface runoff as a result of the change in land use pattern.

In almost all states implementation of Rainwater has been made mandatory, at the same time the individual state laws regarding implementation of rainwater harvesting are different, for e.g. in the state of Tamil Nadu, usually 1 or 2 recharge well are needed per building structure, so as to capture all rooftop & surface runoff and divert it for daily use and recharging the groundwater respectively. In Karnataka plots measuring 30x40 to install rain water harvesting plant is mandatory but using harvested water is not a must. In Maharashtra, 1 recharge structure for every 5000 Sq. m of Built-up is mandatory, and any Alteration of House or building also makes provision of Rainwater harvesting mandatory In Gujarat, it is mandatory to install RWH in

all new development permission for High rise building and plot area more than 4000 m2. Whereas, in Delhi in all new buildings on plots of 100sqm and above Rain Water Harvesting mandatory.

Rooftop Rainwater harvesting in urban areas is being projected as a very simple process where one needs to collect the water falling on the roof tops of buildings and divert this via channels or pipes through a filter media into the ground usually in a borewell/dug-well where ever it is convenient.

Principally speaking, this does define the process perfectly, except that not many people have a good knowledge of the subsurface environment, which is the preview of Hydrogeologists. Unlike the process above the ground which is visible, the process in the sub-surface is not.

The states and central agencies have suggested standard designs that can be adopted while implementing rainwater harvesting systems, which unfortunately get implemented by practicing engineers and architects. Unfortunately, none of the Rainwater harvesting designs suggested have made any mention on the periodicity and maintenance of these structures. More over none of the Rainwater harvesting designs that have been suggested give any indication as to which kind of Aquifer (hard rock or soft rock, unconfined or confined) it can be applied to, or what precautions need to be take while implementing Rainwater harvesting or the standard operating procedures for implementing it.

Due to this most rainwater harvesting projects are implemented with an assumption that whatever amount of water is being diverted from the roof tops into the ground is reaching the aquifers and is helping in raising the groundwater table. And the government has its statisticians who use these numbers and paint a rosy picture for the masses.

On paper, everything seems to be going very well and groundwater table is benefiting due to the multiple rainwater harvesting systems that are being put in to place due to then numbers of new infrastructural projects that are coming up.

The reality is very different, the subsurface aquifer system, especially in the basalts and other hard rocks is very complex and requires a thorough understanding before one can plan for water to be diverted into it. One needs to really locate specific areas only there the groundwater can be recharged and not just drill randomly at places that are convenient.

With the present way of implementation, probably not more than 10 percent of water really reaches the aquifer; rest of it probably is flowing off as over flow. The reason being that the majority of the borewell drilled for recharging purpose do not have the capacity to accept that quantity of water at the rate it is being injected, or there is little or no connectivity of the borewell with the aquifer.

Even though, the road network accounts for the maximum quantity of runoff that is being generated, no state nor the Central administration has thought of incorporating some sort of recharge mechanism in the storm water networks along the major roads and Highways.

In Maharashtra, which is underlined primarily by Basaltic Rock has the misfortune of being occupied by enigmatic Hard rock aquifer which is heterogeneous in nature both vertically and laterally, this makes the task of rainwater harvesting even more difficult.

Photo of a borewell drillied with a good connectivity to the aquifer and hence good place for atempting to recharge the groundwater

Dry borewell with no connectivity with the aquifer hence not the right place for attempting to recharge the groundwater

Ground water outflow as spring discharge at flow contacts

Within the basaltic terrain, as it is easier to encounter a dry borewell than to drill one which actually is in hydraulic continuity with the prolific aquifer, it got promoted that rainwater be diverted in to these dry borewells and it would help in recharging the groundwater and eventually rejuvenating these wells.

The fact is that rainwater can only be harvested in wells which are not dry but have encountered prolific aquifers, the simple reason for this being where there is avenue for water to enter the borewell from the aquifer, can there be a possibility of the water from rooftops which is being diverted for recharge to enter in to the Aquifer system.

Other than that The basaltic terrain has a multilayer aquifer system, hence when rainwater harvesting system is implemented without a proper study the water that is being injected into the well and which seems to be being accepted by the local aquifer tapped by the well lands up getting discharged as a spring a few meters below at the lower flow contact which is exposed along the slope or road cutting and therefore it hardly does any good where recharging the regional aquifer system is concerned or the groundwater table in general too.

The legislation in Maharashtra, regarding Rainwater harvesting is based not on the area of the plot or the capacity of the aquifer, but on the total Built-up area, which due to the increase in sanctioned FSI and NON-FSI makes it really difficult to be able to find suitable locations to fit the required number of recharge structures.

An acre of Plot when being used to its maximum potential will need as many as 9 or more recharge structures to be implemented. These, usually serve only as multiple avenues for groundwater contamination and nothing else

With Excavations being permitted to 1.5 m of the plot boundary, leaves hardly any space for the other services (cables, Pipelines, Landscape etc.) and rainwater harvesting structures. When executed these structures effectively, would probably harvest 100 % of rainwater falling on that plot only to be pumped out by the dewatering mechanism that has been put in to place to ensure that the basement slab has minimum uplift pressure. If such a system has not been put in place, then it would probably cause high water table conditions around the building structure which due to the back fill material having a higher porosity as compared to the excavated rock and eventually cause other technical problems to the building such as wet basement and weakening of the columns due to constant contact with moisture.

Secondly, in the recent times due to the high value of saleable space, it is very common for developers to convert the rooftop terrace area as a multi utility area, with part of it being used as a gym, or rooftop garden and part of it are used for installation of EV or Solar panels. This actually is not in favour of Rainwater harvesting, as human activity in the catchment area means increase in contamination which then leads to the deterioration of the groundwater quality in the long run.

Actually for Rainwater harvesting to really work in our favour one needs to set up certain standard operating procedures, which involve not only the exploration, execution but also monitoring and maintenance of the rainwater harvesting systems.

To start with, we need better infrastructural planning where in the city planners need to understand all the Pros- and Cons of the development rules that they implement, and it should not be with the sole aim of increasing the city revenue and the profits of developers leaving little or no space for an sustainable environment.

Hence, a minimum of 9 meters should be the offset from the plot boundary that should be permitted for excavation;

The excavation too should be permitted only to a depth which does not expose the shallow aquifer, which means the Architects should take in to account the depth of the water table in the area before recommending the depth of the basement.

No dewatering should be permitted at the time of construction or even after the construction is completed. Even with the Central Groundwater Authority restricting groundwater withdrawal to 100 cubic meter per day without detailed study this quantity of groundwater will take nearly 13 years to replenish if we were to consider that 100% of the yearly rainfall which is 700mm is getting recharged, which everyone knows is an impossible task.

Apart from this a minimum of 10% of the land should be reserved for green area. This must be so selected that there is a possibility to recharge the groundwater system within that area.

This means a through hydrogeological survey needs to be conducted to choose the best locations where

groundwater can be recharged, these investigations should include not only the surface non-destruction methods utilizing Geophysics viz. Earth Resistivity surveys, but should be followed by actually drilling to confirm that the possibility of encountering the aquifer does exist in that area.

After which that particular structure (Dug-Well, Borewell or Shaft well) should be tested for the rate at which it can accept the recharge, which can be done by simply pouring in a small quantity of water into it to make the water level rise and then measuring the time it takes to dissipate, using this one can make an estimate as to the quantity of water that will get accepted in to the aquifer at that location.

Water being poured in the borewell to test
Its recharge capacity

Not more than 2- 3 recharge structures should be recommended per acre of land, this would ensure that there are not too many avenues for surface contaminants to enter into the groundwater system thereby ensuring that the aquifer does not get contaminated.

To maintain, the environmental balance, one must only artificially recharge that quantity of water which is equal to the difference in increase in surface runoff between Post and Pre development.

If groundwater is being used to supplement the daily water requirements, care must be taken to ensure that it is not more than what can be annually recharged, otherwise it will lead to the aquifer slowly deteriorating and as time goes by it would get over exploited and would then finally no longer be of any benefit to the users and the community in general.

Trying to recharge 100% of rainwater can also lead to an environmental imbalance, due to zero surface runoff; this could affect the natural surface Nalliah's and stream ecology adversely.

Once the rainwater harvesting structures has been tested, the storage capacity of the structure for achieving the desired recharge quantity should be designed based on the recharge capacity of the aquifer.

Ideally it would be very helpful if one could install a monitoring system which records the quantum of water entering the recharge system and what exists it as overflow, unfortunately a system like this is very expensive to install and the cost to benefit ratio for the same in the current times is very low, but in future when availability of water becomes scarce it will be needed as it will give an exact quantity of water that has been recharged and not just and assumed value arrived at by way of arbitrary calculations of roof area and annual rainfall.

One can Install a rain gauge which is not very expensive and measure the quantity of rainfall on the roof catchment, and then get a better idea of quantifying the total water being diverted to the recharge system from the rooftops. If the recharge capacity of the system has been ascertained, then one can easily calculate the total recharge that may have taken place during that spell of rainfall. If this is done, then one can easily calculate the quantum of available groundwater one can pump out without adversely affecting the groundwater system.

The next stage is very crucial, the area around the rainwater harvesting structure should be cordoned off as an environmentally safe zone and it should be ensured that no chemical or other contaminants enter this zone so as to ensure the quality of groundwater is maintained.

Rainwater which falls on the Rooftop and terrace areas are clean but if the roof and terraces are not kept clean then the rainwater being corrosive will absorb whatever it comes in contact with and will get contaminated too and hence, the rooftop areas need to be properly maintained, and kept clean to ensure that there is no biological or chemical contamination of the rainwater that falls on the rooftops.

It will be ideal if no chemical fertilizers and chemical cleaning agents are used in areas where rainwater harvesting is being implemented, as these chemicals would eventually land up in our groundwater thus contaminating them.

The Groundwater quality in the area should be tested before implementing the rainwater harvesting and then it should be periodically tested (at least once every year after the rainy season has ended) to ensure that the

quality has not deteriorated due to water that is being injected in the system by virtue of rainwater harvesting.

Every year, after the first shower, the filter media that has been laid in the rainwater harvesting structure should be taken out cleaned, disinfected using chlorine and other disinfectant and water and re-laid this should be done to ensure that the rainwater harvesting systems is not clogged nor contaminated and is functional for the purpose it has been designed for.

Last but the most important aspect of Rainwater harvesting system implementation is maintaining and displaying the record right from the date of survey, its inferences, the drill time record, the original quality of Groundwater, the recharge capacity and the quantity of recharge achieved and the periodic quality of Groundwater.

While, implementing rainwater harvesting, it should be kept in mind that it can only help in maintaining the groundwater system, when you withdraw less than or equal to the amount you are recharging, and do not fall prey to false claims that once rainwater harvesting get implemented you do not need to have any restrictions on the quantity of groundwater you withdraw for use. We always need to remind our self that water is a precious commodity and it is the essence of life which needs to be used judiciously, and groundwater even if it is being tapped in your property, it really does not belong to you alone but it is a common property resource which belongs to everyone.

Dr. Anil Lalwani
Chief Technical Officer, Well & Water Works

A self-made professional geologist in a real sense. After achieving Master's Degree Science in Geology, in 1985 he has evolved himself and acquired most of the working skills.

A Ph.D. from University of Pune in 1995, he is the recipient of several awards.

He contributed to the preparation of a "Technical Manual" for Government of Maharashtra for a Rural Water and Supply & Sanitation Project, "JALSWARAJYA", with World Bank Assistance, (2002-2003), as a member of Team representing Gherzi Eastern Limited. He can be reached on anil_62@yahoo.com

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29th Indian Plumbing Conference and Exhibition

21-23 December 2023
YMCA International Centre, Ahmedabad

29th Indian Plumbing Conference focuses on achieving 'Net Zero Water in Built Environment'

29th Indian Plumbing Conference themed, "Net Zero Water in Built Environment" was inaugurated by Sh. Bhupendra Bhai Patel, Chief Minister of Gujarat at the YMCA International Centre in Ahmedabad on December 21, 2023.

The conference was also graced by Sh. Jagdishbhai Vishwakarma, Minister of State as the Guest of Honour. Dr. Bimal Patel, Director, HCP Design Planning and Management, renowned designer of iconic projects was the Keynote speaker during the Inaugural session.

The conference was widely attended by professionals encompassing entire strata of building industry viz. real estate developers, architects, water and wastewater experts and research enterpreneurs, leaders from fellow building industry associations, academicians, officials from govt. departments including Gujarat Urban development and Urban Housing department, CPCB, Niti Aayog, NEERI, CPHEEO to name just a few. MEP consultants, plumbing contractors, design engineers were also present in big numbers.

The event was conceptualized in line with Honourable Prime Minister, Sh. Narendra Modi's vision and commitment to make India carbon neutral by 2070, recognizing that buildings are responsible for 40% of the carbon emissions. The conference advocated for increased education and awareness on Net Zero Water in Built Environment calling for installation of low flow sanitary fixtures and sanitary ware, rainwater harvesting and reclamation of used water (black and grey) to establish a circular water loop.

Sh. Bhupendrabhai Patel congratulated the Indian Plumbing Association for organizing the 29th Indian Plumbing Conference on this crucial subject. He stated, "It is laudable that you are committed to solving crucial concerns such as water conservation and sustainability in built environment. This conference provides an important forum for industry leaders and professionals to co-operate on novel ideas".

He highlighted Gujarat's initiatives in developing green buildings and implementing a zero discharge system, aligning with the Prime Minister's principle that views water as a divine gift to be used judiciously, urging the acceleration towards a 'net zero water built environment.'

The Chief Minister stated that the insights and conclusions drawn from the three-day conference will prove beneficial for the government. He underscored the significance of Mission LiFE, a concept introduced by the Prime Minister, encouraging the adoption of a lifestyle that conserves water, electricity, and the environment in our daily lives.

Sh. Bhupendrabhai Patel, honourable Chief Minister of Gujarat addressing the audience

Sh. Jagdishbhai Vishwakarma, Minister of State for Cooperation and Small and Micro Industries speaks on water initiatives

Minister of State, Sh. Jagdishbhai Vishwakarma said, "The emphasis on reaching Net Zero Water in Built Environment demonstrates the IPA's dedication to sustainable practices. I applaud IPA's efforts to promote communication and collaboration among industry stakeholders".

Minister of State for Cooperation and Small and Micro Industries Shri Jagadish Vishwakarma remarked that Gujarat is currently undertaking commendable initiatives in rainwater conservation and water storage, crediting Prime Minister Shri Narendra Modi for the achievements. He highlighted that during a time when the Climate Change Department was operative in only three countries globally, Shri Narendra Modi initiated a dedicated Climate Change Department in Gujarat. The Minister also pointed out that when Shri Narendra Modi took office as Prime Minister, only 14% of the country's houses had water line connections. Under his successful leadership, most houses in Gujarat and India now have water line connections.

Welcome Address

Sh. Minesh Shah, Chairman, IPA Ahmedabad Chapter welcomed the honourable CM of Gujarat, Sh. Bhupendra Bhai Patel, Respected Minister of State, Sh. Jagdishbhai Vishwakarma, IPA National Executive Board, Natioanl Executive Committee, industry partners, delegates, sponsors and Gujarat Executive Committee members. Sh. Minesh Shah expressed that

Sh. Minesh Shah, Chairman, IPA Ahmedabad Chapter giving Welcome Address

he is elated to welcome plumbing professionals from across the country to this consortium where cutting edge technologies that contribute to Net zero Water buildings will be explored.

Presidential Address

Sh. Gurmit Singh Arora, IPA National President brought to light statistics of construction in India stating that we build to the tune of 1 Chicago every year. There are various schemes under progress through which Indian Govt. is propagating for better water infrastructure like AMRUT 2.0, Har Ghar Jal. All this calls for an increased emphasis on the cause of saving water. He further stated that through this conference IPA aims to disseminate information on technologies like low flow fixtures and sanitary ware, rainwater harvesting and reclamation of water so that this water cycle loop is aptly addressed in all buildings.

The IPA National President talked about "Bharat Tap-An Initiative" which was launched by Sh. Hardeep Singh Puri, Honourable Minister of housing and Urban Affairs in 2022 to popularize low flow sanitaryware and sanitary fittings as per IS 17650 Part 1 and Part 2. Using these low flow water efficient products can bring out a sea change in water use by reducing water at source by about 40-50%.

Sh. Gurmit Singh Arora, IPA National President delivering Presidential Address

KEYNOTE, Dr. Bimal Patel Director, HCP Design Planning and Management

Dr. Bimal Patel who is also the President & Acting Director of CEPT University along with being the Director of HCP Design, a leading architect firm which has designed iconic projects in India, was the Keynote speaker at 29th Indian Plumbing Conference. He has 40 years of experience in the building industry.

Dr. Bimal Patel, Director HCP Design Planning and Management giving the Keynote address

During his address, he mentioned that a lot of development has taken place in the Indian building industry in terms of scale and speed, but we still need to have a focus on delivering good quality projects. Therefore, architects have a responsibility to design simple buildings that can be constructed well.

As India thrives to be an economic superpower, it is very crucial to have our focus on pursuit of excellence. That needs to be achieved in every sphere including the building industry.

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Making India Water Positive

Technical Session on Making India Water Positive was the first session on the 1st day of the conference and it had experts and researchers from across the govt. and industry deliberating on this crucial topic.

From Left to Right: Sh. Avinash Mishra, Former Adviser, Niti Aayog, Dr. Mansee Bal Bhargava, Director, WforW Foundation, Sh. Ashwini Kumar (IAS), Principal Secretary, Urban Development and Urban Housing Department, Govt. of Gujarat, Prof. V. Srinivas Chary, Centre Director, ASCI

Dr. Mansee Bal Bhargava, Director, WforW Foundation and Research Entrepreneur at Environmental Design Consultants, Ahmedabad was the session Chair. She started the discussion by stating that Water positivity involves putting back more water into the water cycle than we withdraw. It can be accomplished by the following three action points.

a) Minimizing use of fresh water
b) Optimizing Alternate sources of water
c) Maximizing use of wastewater

After this she invited the other session speakers to express their views.

Avinash Mishra, Former Adviser (Water Resources, Environment & Forest, Climate Change, Tourism & Culture) NITI Aayog said Water positive measures in built areas involve strategies that aim to replenish more fresh water than is consumed. Here are some measures being taken in India:

Water Efficient Measures for Residential Townships: sustainable design options, technologies, operation and maintenance measures that can be adopted for water-related systems and infrastructure in the township. The aim is to help townships become net water positive.

Water Recycling/Reuse and Effluent Water Treatment: These are the

Sh. Avinash Mishra, Former Adviser, NITI Aayog expressing his views

most deployed measures in India. Recycled or treated water is used either in the process or for ancillary purposes such as dust suppression, green belt development, washrooms, etc.

Water Efficiency in Construction: It is estimated that buildings and construction use over 15% of global freshwater use. Some of the measures include upholding water-efficient practices during construction, consideration and mitigation of water footprint of materials, installing alternative water systems, installing water-efficient fixtures & fittings, metering & sub-metering, effective soil management etc.

These measures, when implemented effectively, can contribute significantly towards achieving water positivity in built areas.

Ashwini Kumar (IAS), Principal Secretary, Urban Development and Urban Housing Department presented an overview of the water positive initiatives in Urban Gujarat. He also spoke about shifting focus from individual actions to collective impact thereby encouraging collaboration between businesses, governments, and communities to attain goals. Building resilience was another factor that he highlighted. He said we need to create sustainable water systems, which are more resilient to droughts and other water-related challenges.

Ashwini Kumar (IAS), Principal Secretary, Urban Development and Urban Housing Department speaking at 29th IPC

Sh. Ashwini Kumar highlighted the actions taken in Gujarat for increasing water demand of industries and to reduce the burden on ground water resources :

- Surat Municipal Corporation (SMC) was the first city in Gujarat to establish Tertiary Treatment Plants in 2014 capacity of which is today around 115 MLD (plus 10% additional capacity on demand) for supply of Industrial Grade water.
- Ahmedabad is using total of 396 MLD of recycled wastewater
- Bhavnagar is supplying 45 MLD of tertiary treated water Gujarat State Electricity Corporation Limited (GSECL) - Bhavnagar Lignite Thermal Power Station

Prof. Srinivas Chary, Centre Director, Administrative Staff College of India and CEO Wash Innovation Hub spoke the need for a National Urban Water Policy. This NUWP policy is essential to amplify the need and urgency for reforms and innovations for making urban water systems net-positive and sustainable.

Prof. V. Srinivas Chary, Centre Director, ASCI and CEO, wash Innovation Hub giving a presentation

He highlighted that it is imperative to have a multipronged approach to this:

Creating enabling institutional/governance frameworks

1. Planning processes for IUWS&M – State & City
2. Ensuring universal access to piped water supply
3. Making water service operations efficient and sustainable
4. Strategies for reducing the urban water footprint

The Session was summed up by Dr. Mansee Bhargava by talking about the actionable points through which we can minimize the use of freshwater resources. This was an engaging Technical Session in which the audience participated in Q&A with great enthusiasm.

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Reclamation of Water in Built Environment

From Left to Right: Venkat Puranam, a Wastewater treatment consultant, Vinod Malaviya, MD, Shubham Enterprises
Ar. Jayesh Hariyani, CMD, INI Design Studio, Dr. Pawan Labhasetwar, Chief Scientific Officer and Head, Water Technology and Water Management Division, NEERI, Dr. Malini Reddy, Director, Governance and Service Delivery, Athena Infonomics

Reclamation of Water in Built Environment as the first Panel Discussion during 29th IPC. The topic is closely related to the conference theme of Net Zero Water in Built Environment and it is one of the indispensable things by which we can achieve Net Zero Water. The Panel had cross functional experts including architects, researchers, scientists and wastewater treatment consultants.

Ar. Jayesh Hariyani, CMD, INI Design Studio started the discussion by bringing a fact from Niti Ayog which states India's water demand will exceed supply by a factor of 2 till 2030. Across various cities in the country, there is a huge gap between the benchmarks for water treatment and the current achievement. With this, he started the discussion and requested the other panellists to add their view.

Ar. Jayesh Hariyani, CMD, INI Design Studio

Dr. Malini Reddy, Director, Governance and Service Delivery, Athena Infonomics shared her experiences from research in various parts of JJM (Jal Jeevan Mission) and 24*7 Water Supply in Tamil Nadu. She

Dr. Malini Reddy, Director, Governance and Service Delivery, Athena Infonomics

stated that 70% of the village water schemes that they researched were based on extraction of groundwater and had no greywater management or source sustainability in them, metering was very low. These are important things that have to be looked at while designing any water management projects. Another important factor is that we need to address the psychology for using treated water. Unless we address this, we will not be able to use reclaimed water to a large extent.

Dr. Pawan Labhasetwar, Chief Scientific Officer and Head, Water Technology and Water Management Division, NEERI cited multiple incidences from various industrial projects and refineries which are large guzzlers of water, but they were not treating water as they did feel the need. So awareness on th need is extremely crucial.

Dr. Pawan Labhasetwar, Chief Scientific Officer and Head, Water Technology and Water Management Division, NEERI

Vinod Malaviya, MD, Shubham Enterprises came up with Niti Ayog statement which says if you invest Rs 5 on your water budget for treatment, you save Rs 20 on your health budget as you need not treat people with water

Vinod Malaviya, MD, Shubham Enterprises

borne diseases, thereby leading to a Social impact through Water treatment. The other aspect which he touched upon was Economic impact and the ROI with wastewater treatment is better that borewell extraction and further treatment.

Venkat Puranam, a Wastewater treatment consultant added that awareness and public participation is the key to success of water reclamation. Economies of scale in STP Plants is one thing which is not being looked at in most of the townships and real estate projects.

Venkat Puranam, a Wastewater treatment consultant

This was a captivating panel which discussed various problems in the area of reclamation of water and put forward possible solutions. Audience also came up with a number of questions which were answered by the experts.

Water Use Efficiency

From Left to Right: Dr. Shireesh Pankaj, VP, Research and Development, Aliaxis India, BO Prasanna Kumar, Jt. Managing Director, Design Tree Service Consultants, Madhurima Madhav, Scientist D and Joint Managing Director, Bureau of Indian Standards, Sameer Sinha, Managing Director, Savvy Infrastructure

Given the current backdrop of water scarcity in India and the need to achieve Net Zero Water, Water Use Efficiency is a important tool by which we can reduce water efficiency at source without compromising on user comfort. The 2nd technical session at 29th Indian Plumbing Conference was therefore aptly based on this topic. BO Prasanna Kumar, Jt. Managing Director, Design Tree Service Consultants was the Moderator for the session with a scientist from BIS, a renowned developer from Ahmedabad and a researcher from the plumbing industry as the session speakers. BO Prasanna Kumar strongly advocated that we need water efficient plumbing products so that we can reduce water use in all our building projects. He then invited the other experts.

Madhurima Madhav, Scientist D and Joint Director, Bureau of Indian Standards (BIS) shared information on the BIS code IS 17650 Part 1 and Part 2. The standard, IS 17650 (Part 1) and IS 17650 (Part 2) covers additional requirements for assessment and water efficiency rating of the sanitary wares (such as water closets, squatting pans, flush valves, flushing cisterns and urinals) and sanitary fittings [such as faucets (taps) and showerheads] for their performance based on water efficiency. These standards will provide three types of water efficiency ratings namely, as 1 star, 2 star and 3 star; higher the number of stars, better would be the water efficiency rating of the product. This standard is suggestive and must be used in all new buildings.

She also mentioned that BIS is going the extra mile to spread information on water conservation and sustainability by conducting awareness programs at school level, technical institute level.

Madhurima Madhav

Sameer Sinha

Sameer Sinha, Managing Director, Savvy Infrastructure discussed experience of Net Zero project. He presented case studies of Net Zero or near Net Zero projects like Shapath, Hexa, Kensville by using Water Efficient fixtures, efficient landscape irrigation, Rainwater Harvesting, wastewater treatment and recycling, water meters and landscaping.

He presented some Key challenges and possible solutions. Listing below some challenges:

- Water Abstraction/ Groundwater balance/ Hydrological studies are not a part of the design.
- Water Meters are not Installed.
- Recharge wells and STP installations are not verified and Poor maintenance of system during operations

Proposed solutions:

Groundwater balance/ Hydrological studies should be part of the **Environment Clearance Policy.**

Installations of Water Meters at common Areas like Bore well, STP, Recharge Wells, and Reuse should be part of the **GDCR.**

Detailed Inspection of Installed Rain Water Harvesting System should be part of **BU Approval.**

Water Audit after 1/ 2 Years of operations should be compulsory.

Dr. Shireesh Pankaj referring to water as the new oil

"Water is the oil of the 21st century and this precious commodity determines the wealth of a nation" said Dr. Shireesh Pankaj, VP, Research and Development, Aliaxis India. As we encompass a multi-fold built environment in this era of economic growth, it is extremely crucial that we understand the importance of this resource and conserve it. Using water efficient plumbing products is a means of achieving this goal. This will help us do our bit towards achieving SDG 6 (Sustainable Development Goal).

BO Prasanna Kumar concluded the session by thanking all session speakers and said that IPA is propagating the adoption of water efficient products to all MEP consultants, plumbing contractors and Real estate developers through its network of 24 chapters across the country.

Case Studies on Zero Liquid Discharge

From left to right: Apurva Shah, Prashant Kumar Hota, SB Dangayach, D.M. Thaker, Puneet Pandey

SB Dangayach, Founder Trustee, Innovative Thought Forum, Session Chair for the session on Zero Liquid Discharge congratulated IPA for its great contribution to the water sector, resulting which IPA has become a major partner with the govt. in all policy making in the water sector. The session had experts from various field who presented their perspectives with Case studies on Zero Liquid Discharge particularly focussing on industries. The session speakers wewre:

- D.M. Thaker, Member Secretary, GPCB
- Prashant Kumar Hota, President and Group Head, CSR, Education and Sustainability, Head – Corporate Communication, Odisha, Jindal and Steel & power Limited
- Apurva Shah, Principal Consultant, Avani Enterprises
- Puneet Pandey, Manager- Sales & Marketing (Environment Solutions), Ion Exchange

Expressing his views on the crucial topic, DM Thaker said sustainability is extremely important so all development that happens should be in unison with environment. Honourable PM, Sh. Narendra Modi talks about "Lifestyle for environment". He also said that ZLD (Zero Liquid Discharge) should be completely accepted and Gujarat govt. is committed towards making this effective. He gave some important points that should be implemented to make ZLD successful.

- Identify areas of water conservation/optimisation in usage through Water Audit
- Use of Artificial intelligence and machine learning for optimizing processes
- Implement Water-Efficient Technologies for water recycling by adopting new technologies and equipment
- Implement closed-loop systems and Rainwater Harvesting

Prashant Kumar Hota the next expert speaker presented a Case Study on Zero Discharge, Jindal Steel & Power. Jindal Steel is doing ETP in its Power Plant, Process Boiler, CGP & Coke Oven, Plate Mill, Bar Mill, EAF, DRI, Blast Furnace, CTBD Plant.

Apurva Shah presented the Zero Liquid Discharge Case Study of Securemeters. He spoke about the following changes that have been done on this unit after ZLD.

a) Kitchen wastewater and waste water from toilets is treated separately in grey water treatment plant.
b) Reclaimed water from grey water treatment plant is used for toilet flushing, landscape irrigation and passive cooling.
c) **Decentralised treatments for Soil waste (Black) water.**
d) Meander type septic tank with 21 days retention time (Bio-reactor, pathogen removal)
e) **Poop/excreta and urine** is reject from human body, Biological waste, is treated on biological principles.
f) Septic tank effluent (STE) is filtered in Bio-Bed {Horizontal subsurface Flow treatment (Constructed) Wetlands}.

Puneet Pandey, Manager (Sales and Marketing), Environment Solutions discussed that an appropriate pre-treatment is very important for ZLD to be successful. He also said that Effluent parameters are different for different companies.

SB Dangayach, session chair concluded the session stating that water supply and drainage are interrelated and must be looked at together. We should welcome all innovations that are required for reducing the water use at source and recycle wastewater so that we are not returning any water in the drain while recycling and reusing the water in our premises only

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Jugal Bandi with Water - 5R's

(Respect, Reduce, Recharge, Recycle and Reuse)

If we follow 5R's to water management, we will not have to worry about this natural resource that is the very foundation of life as we know it. The Panel Discussion on this crucial topic was an intriguing discussion had the right mix of stakeholders –MEP consultants, an architect, a real estate developer and plumbing contractors constituting the entire funnel of water supply chain in an building project. They deliberated on some very important perspectives which can lead to better water management.

From left to right: Ashish Rakheja, Managing Partner, AEON Integrated Building Design Consultants, K. Bhaskar, Owner-Revolve Engineers, Anantha Siva Iyer, MD, Essaarvee Plumbing Engineering, Ar. Hiren Patel, Principal Architect, Hiren Patel Associates, Rushabh Patel, MD, Parswanath Corporation, Pankaj Dharkar, Founder-President, Pankaj Dharkar Associates, Sharat V Rao, Principal Consultant, Engineering Creations Public Health Consultancy

Ashish Rakheja, Managing Partner, AEON Integrated Building Design Consultants was the Moderator along with Ar. Hiren Patel, Principal Architect, Hiren Patel Associates, Pankaj Dharkar, Founder-President, Pankaj Dharkar Associates, Rushabh Patel, MD, Parswanath Corporation, Sharat V Rao, Principal Consultant, Engineering Creations Public Health Consultancy Pvt. Ltd., K. Bhaskar, Owner-Revolve Engineers, Anantha Siva Iyer, MD, Essaarvee Plumbing Engineering Pvt. Ltd. as panellists.

Ashish Rakheja expressed that it is good to see water conservation awareness spreading across the construction industry. He said, he is happy to see that ECBC (Energy Conservation and Building Code) is now expanded to ECSBC (Energy Conservation and Sustainable Building Code) and water is added as an element to it in addition to energy. Water has to be addressed along with energy as we cannot look at only energy to lead to efficient built environment.

Referring to the most important "R-Respect", Rushabh Patel said we only start respecting water when we see its scarcity. Respect does not come with abundance. Along with this, policies can play a very important role in advocating water efficient practices in buildings.

Complimenting this statement, Ar. Hiren Patel said that Respect is the most important "R" and with it every other R including Reduce, Reuse, Recycle, Recharge follows.

Pankaj Dharkar added to this saying that after abundance came in, people have started disrespecting water. Furthermore, he said that interlinking the rivers is the best solution to vagaries of water across Indian states.

Another important point that was raised by the Moderator was that in India do we really have a water scarcity problem or is it a man made problem with mismanagement. Sharat V. Rao expressed that it is both as our water resources are not commensurate with our population growth. At the same time, with non revenue water to the tune of 30-40%, 90% of our rainwater going to storm drains, no proper sewers in all cities, the problem lies with improper management also.

Both Plumbing contractors, K. Bhaskar and Anantha Siva Iyer added that recycling wastewater and using it supplements our water cycle can reduce the strain on our freshwater resources.

The Panel concluded with the statement that proper water management by following 5R's with metering and accountability is the actual solution to the water problems that our country is facing.

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24 x 7 Water Supply

The concept of 24x7 water supply came into focus in 2008, when the demonstration project in Karnataka commenced operations. In the demonstration zones, new water distribution pipes were brought into service, full metering was implemented, and the level of NRW reduced to around 7 per cent. Govt. has implemented 24X7 Water supply in several cities.

A session on 24x7 Water supply with Govt. experts, real estate developers, consultants was being held at 29th IPC where challenges and possible solutions were discussed.

From Left to right: Janki Jethi, Senior VP, GIFT City, Dr. Sanjay Dahasahasra, Former Member Secretary, Maharashtra Jeevan Pradhikaran & Member CPHEEO, Taral Shah, Managing Director, Shivalik Group, Biren Dalal, Project Director and Team Leader, Tata Consulting Engineers Limited, Dr. Dhimant Kumar B Vyas IAS (Retd), Former Regional Commissioner of Municipalities

Dr. Sanjay Dahasahasra first gave a presentation on 24x7 Water supply stating that 24x7 water supply has advantages like lesser incidence of diseases and subsequent reduction in medical bills, reduction in coping cost due to intermittent system.

Dr. Sanjay Dahasahasra

Water is life's matter and matrix, mother and medium, There is no life without water

Taral Shah expressed that it is heartening to know about the progress of 24x7 water supply and how cities like Nagpur will have 24x7 water supply in the next 6 months. But there are a few challenges due to which these projects are not getting executed fast.

Janki Jethi added to this point stating that for us to apply 24x7 water supply there are some pre-requisites like adequate source, infrastructure augmentation, change over of pipelines, valves and metering.

Biren Dalal added that there are various constrains like data and drawings for existing water infrastructure. He said, they are facing these problems in Gandhinagar, a smart city which is implementing 24x7 Water supply.

Dr. Dhimant Kumar B Vyas said retrofitting the infrastructure and metering are sensitive issues since water is currently available at negligible price.

The Panel concluded stating that Metering and educating people that this is for their benefit is the key to implementation of 24x7 Water Supply. They also came out with innovative ideas like metering water that households are sending to gutters. So, based on the water which a household is discharging, its tariff will be set, this way people will be motivated to discharge less water. This can further lead to a behavioural change towards water conservation.

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Unstoppable Bharat

From Left to right: Pravin Bora, Sharat V. Rao, Minesh Shah, Gurmit Singh Arora, Ambassador Dr. Deepak Vohra, Rahul Dhadphale, Chandra Shekhar Gupta, Dipen Mehta

"Unstoppable Bharat" was a captivating session by Ambassador Dr. Deepak Vohra. He is among India's iconic television figures. Not many know that when Indian oil workers were kidnapped in Sudan in 2007, Ambassador Dr Deepak Vohra offered himself in exchange for the victims. He is an ardent speaker who serves three African nations as Special Advisor.

Addressing the IPC delegates, Dr Deepak Vohra said that Bharat is going through a national renaissance.

He further expressed for any country to move towards development, we need 3 main things:

a) Self Confidence

b) Self Esteem

c) Self Dependence

Dr Vohra urged everyone to stay united and work together for the betterment of the nation. A recent UN report on India says there is unprecedented improvement in India in housing, electricity, water, cooking gas. In 2022, India ranked 10th in top destinations for foreign direct investment (FDI), a culmination of decades of economic and policy reforms. 2 out of the rural houses in India have supply of piped drinking water. There are many other achievements in education and health sector which are worth appreciation globally.

He further added, with our student and young population we are the youngest country in the world and we will stay like that for the next few decades to come. So we must make the most of this advantage. With a very emotional touch he added, we are not

Ambassador Dr. Deepak Vohra delivering the Motivational Session

A houseful of audience during motivational session

Indians because we live in India but because India lives in us.

Dr. Deepak Vohra concluded by urging all to be the writers of the destiny of our country. We are a Vishwa Guru so we must be proud about it. Contribution with an earnest effort in your respective area is the need of the hour.

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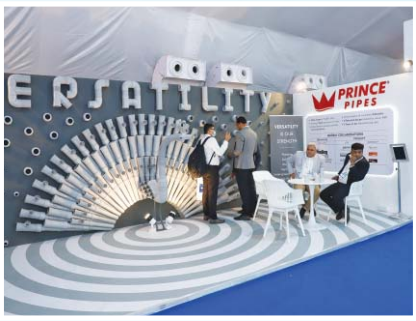
Exhibition at a Glance



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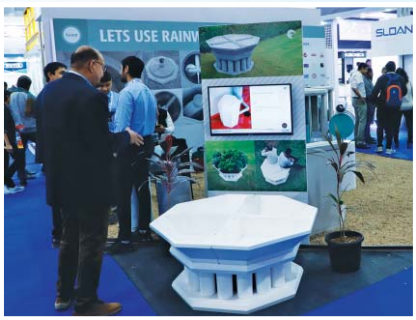

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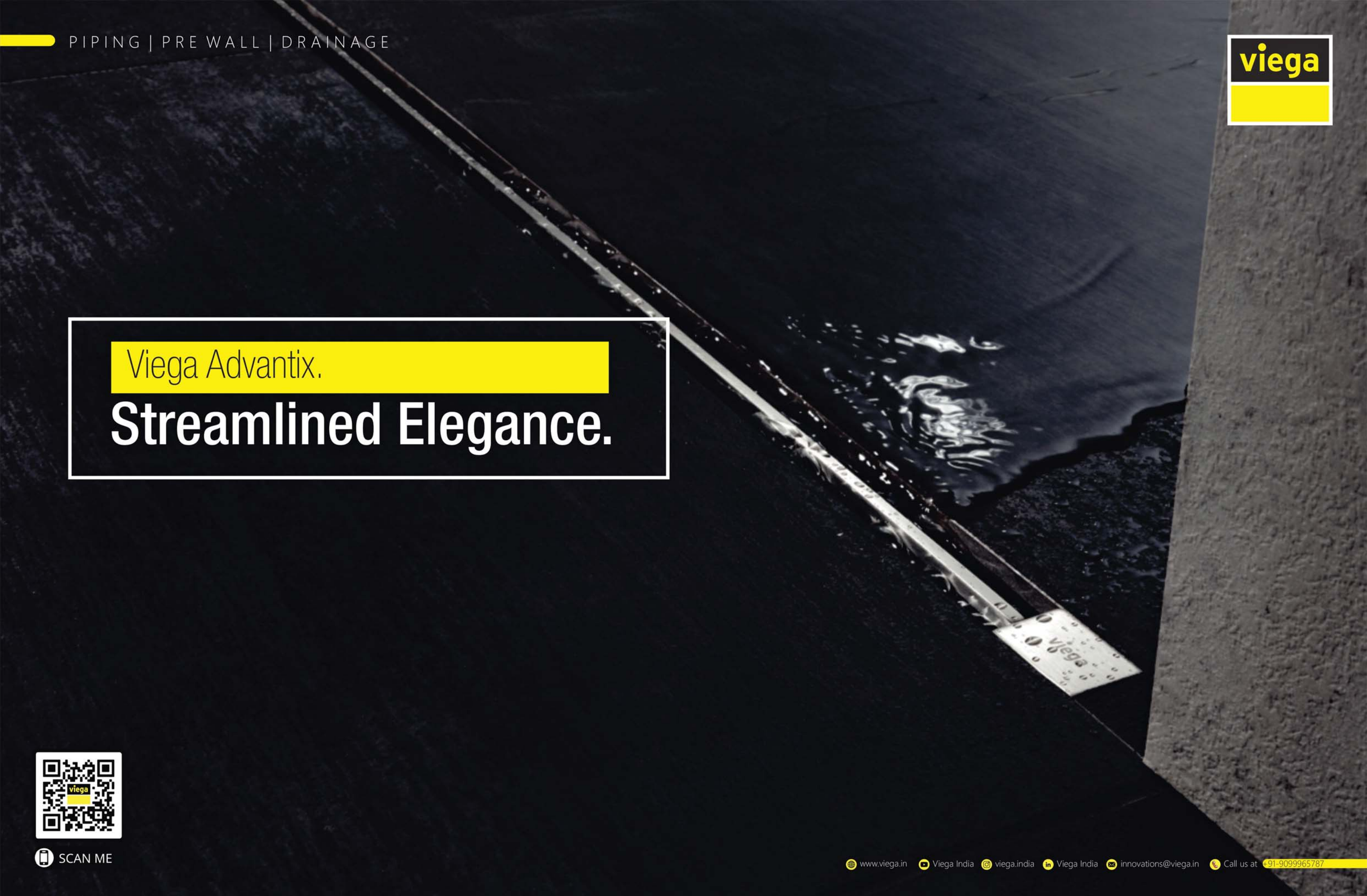

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IPA Lifetime Achievement AWARD 2023

Sh. BO Prasanna Kumar (4th from left) receiving the IPA Lifetime Achievement Award from honourable Chief Minister of Gujarat, Sh. Bhupendrabai Patel and MoS, Sh. Jagdishbhai

IPA Lifetime Achievement Award 2023 was conferred upon BO Prasanna Kumar by honourable Chief Minister of Gujarat, Sh. Bhupendrabhai Patel.

IPA's highest honour, IPA Lifetime Achievement Award is presented to individuals recognizing their exemplary services and contributions made towards the betterment of plumbing practices in the country. Lifetime Achievement Awards have been conferred upon eminent personalities who have helped IPA make a difference in the Indian plumbing industry since 2003.

BO Prasanna Kumar is Past Chair, IPA Bengaluru Chapter for 3 consecutive terms (2012-2015, 2015-2018, 2018-2024) and NEC member from 2021-2024. He is also Co-Convener, IPA Technical Committee & Convener, Centre of Excellence.

Mr. Prasanna is Co-Founder and Joint Managing Director, Design Tree Consultants. He contributed immensely to the growth of the Bengaluru Chapter and 26th Indian Plumbing Conference was held in Bengaluru under his Chairmanship in 2019. Plumbex 2023 held at Bengaluru in April 2023 with his leadership was big success.

He conceptualized Plumb Talk, an IPA Video series along with Chandra Shekhar Gupta, IPA National Vice President. Plumb Talk is based on A Guide to Good Plumbing Practices (AGGPP), under which 12 videos have been released till date with 5100+ views.

He is Co-Founder and Joint Managing Director of Design Tree Service Consultants Pvt. Ltd, a leading name in the domain of MEP services. DesignTree, a multi-disciplinary engineering consultancy company founded in March 2008 currently has 5 offices across the country with 500+ employees.

Mr. Kumar possesses over three decades of rich experience of carrying out design services like water supply system, sewerage network, sewage treatment plants, water treatment plants, solid waste management, and so on. He is a seasoned consulting engineer who has designed over thousand projects includes residential, IT commercial, and a lot more.

He is one among the few enterprising men with whose hard work not only IPA but also his organization DesignTree has reached where it is today.

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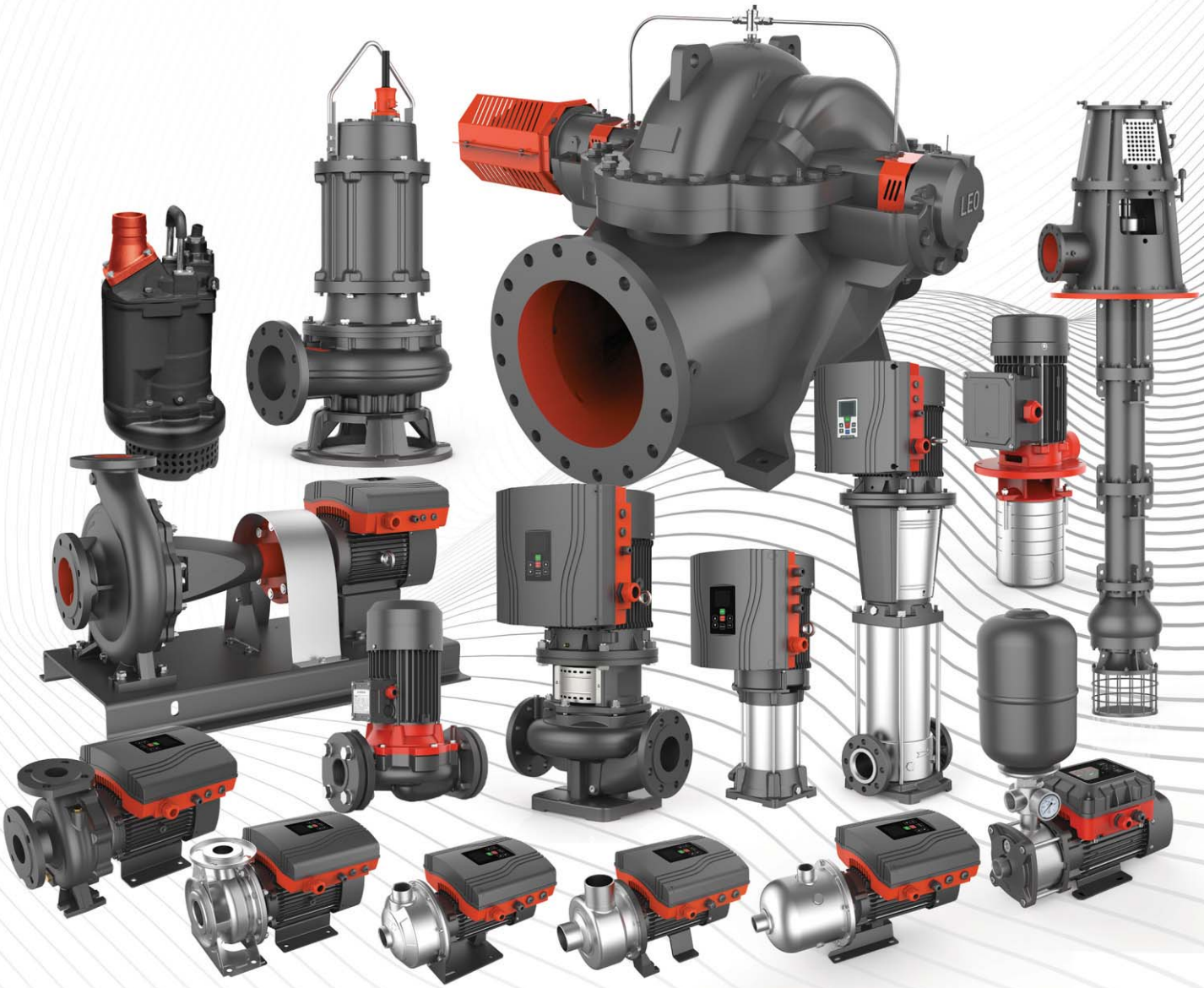

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IPA Distinguished Partner Award was conferred to Astral Pipes and Prince Pipes for their relentless contribution to promoting good plumbing practices by participating in all IPA events and activities with great enthusiasm.

Kairav Engineer, Executive Director, Astral Limited receiving the Distinguished Partner Award

IPA Felicitations

During every Indian Plumbing Conference, IPA confers IPA Felicitation, an IPA award category given to recognize a leading Architect, Academician, Plumbing Contractor, Plumbing Consultant and Manufacturer in that region who have contributed to the growth of the plumbing industry in that geographical region. Giving below an account of the felicitations rewarded in 29th IPC at Ahmedabad.

ARCHITECT

Dr. Bimal Patel

Director, HCP Design Planning and Management

Dr. Bimal Patel is an architect, urbanist and academician who has crisscrossed disciplinary, professional and institutional boundaries to explore how architecture, urban design and urban planning can enrich the lives of people in India's cities. He received his PhD and Masters in City Planning, and Masters in Architecture from University of California, Berkeley in 1995 and his Diploma in Architecture from the School of Architecture, CEPT, Ahmedabad in 1984.

Dr. Bimal Patel receiving the IPA Felicitation as an architect from Honourable CM of Gujarat, Sh. Bhupendrabhai Patel

He is Chairman and Managing Director, HCP Design, Planning and management Pvt. Ltd., Ahmedabad and President, CEPT University, Ahmedabad. Dr. Patel's work has won numerous awards. In 2019 he was awarded the Padma Shri.

PLUMBING CONTRACTOR

Shyamlal Lakhara receiving the IPA Felicitation as a Contractor from Dr. Bimal Patel and Sh. Gurmit Singh Arora

Shyamlal Lakhara has 25 years of experience into all type of plumbing work of Hotel, resedential, Commercial & Industrial, School & College, Apartment, Luxury Bungalows. He has worked for Goyal & Co, Shree Siddhi Group, Pacifica Companies, N.R. Construction & HK & Solutions.

ACADEMICIAN

Dr. Dipsha Shah
Associate professor, Faculty of Technology, CEPT University

Dr. Dipsha Shah receiving the IPA Felicitation in Academician category from Dr. Bimal Patel and Sh. Gurmit Singh Arora

Dr. Dipsha Shah is an Environmental Engineer and Manager and did her Ph.D. in Air Quality Index. She has more than 15 years of experience in the field of teaching and consultancy. Under her leadership, Indian Plumbing Association - Ahmedabad Chapter have started CEPT University student chapter since January 2021. As a part of IPA Student Chapter, various activities has been done such as blood donation camp, tree plantation drive, organization of number of technical visits and expert lectures. Her areas of interest are water and wastewater treatment process & design, Plumbing design, air pollution monitoring and controlling, and infrastructure planning and design such as solid waste management, water distribution, and sewerage network.

PLUMBING CONSULTANT

Arvind I Patel
Chairman, Aashir Engineering Pvt. Ltd

Arvind I. Patel receiving the IPA Felicitation in Plumbing Consultant category from Dr. Bimal Patel and Sh. Gurmit Singh Arora

The Chairman of AASHIR Engineering Pvt. Ltd., Mr. Arvind I. Patel completed his engineering in Civil from Birla Vishwakarma an engineer. During his above tenure his assignments were Mahavidyala, Sardar Patel University, Vallabh Vidyanagar in 1963. Immediately on passing B.E. (C) he joined Gammon Shah Construction as a site engineer in their barrage project at Dakpathar near Dehradun and thereafter he worked as site engineer in Oza Brothers for their project in Koyali Refinery, Ranoli, Gujarat. In April '64 he joined the renowned firm of M/s Hasmukh C. Patel, architects, Ahmedabad and in 1989 he started his consultancy.

He did consultancy for more than 200 school and hotels. Overall, he accomplished 2000 project in his career.

MANUFACTURER

Jaymal Amin, Lubi
Senior Managing Partner, Lubi Industries LLP

Lubi has been in the business of manufacturing Pumps, Motors and Valves for last 58 years. Jaymal Amin received the IPA felicitation for Lubi in Manufacturer category.

Jaymal Amin graduated with a Master of Science degree in Electrical Engineering from Illinois Institute of Technology, Chicago, USA in 1986. After graduation he joined the Lubi Group and received practical training in various group companies. Over the last 37 years at Lubi, he has managed various activities in the group starting with Production, Quality Assurance, Design and Engineering as well as Marketing of its products in India and North America. He has contributed significantly in a leadership role to the phenomenal growth of Lubi Group over the past 37 years.

Jaymal Amin receiving the IPA Felicitation in Manufacturer category from Dr. Bimal Patel and Sh. Gurmit Singh Arora

IPA AHMEDABAD CHAPTER DISTINGUISHED AWARD

Harshal Parikh is a Post graduate civil engineer (gold medalist) with rich professional experience of more than 20 years in the field of large scale infrastructure, municipal sector infrastructure and area development projects.

Mr. Parikh has worked in renowned companies like L&T Construction, Howe India, VMS Consultants and WAPCOS etc.During his tenaure in L&T Construction he has worked as a Design Director for the Dholera Green field Smart City Project. Rajkot Smart City Project, Bidkin Smart City Project and WDFC. He served in VMS Consultancy for more than 8 years in different capacities and at the time of separation he was Associate Vice President - Infrastructure services. He was involved in renowned projects like Sardar Sarovar Project-Irrigation canal network, Eden Garden Stadium, Suzlon SEZ.

Mr. Harshal Parikh, Vice Chair, IPA Ahmedabad Chapter being felicitated by Dr. Bimal Patel and Sh. Gurmit Singh Arora

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IPA NAVRATNA AWARDS

IPA Navratna Awardees with IPA National Executive Board Members (Gurmit Singh Arora, Chandra Shekhar Gupta and Rahul Dhadphale) and Dr. Bimal Patel, Keynote Speaker at 29th IPC

IPA Navratna Awards were conferred to the following IPA leaders for their exemplary contribution in their respective areas.

Ashok Joshi, Chair, IPA Goa Chapter – Contribution to COIPP (Centre of International Plumbing Practices) at Goa

B.K. Prasad, Chair, IPA Bengaluru Chapter – leading the Bengaluru team for organizing a successful Summit 2023, first IPA Neerathon in April 2023 and Plumbex India 2023 in April 2023.

Dipen Mehta, EB Member and Co-Convener, IPC – relentless efforts for making 29th IPC successful.

Guruprasad Mantravadi, Vice Chair, IPA Goa Chapter – working together with Sh. Ashok Joshi for COIPP at Goa.

K. Bhaskar, NEC, Hyderabad Chapter & Convener, Membership Growth Committee – efforts in increasing members across Chapters.

Minesh Shah, Chair, IPA Ahmedabad Chapter – leading the Ahmedabad team and organizing an illustrious 29th IPC at Ahmedabad in Dec 2023

Dr. S. Virapan, NEC, IPA Chennai Chapter – contribution to making IPA Neerathon at Chennai in September 2023, a great success.

Sujal Shah, Convener, IPA Neerathon–for her leadership and expertise to spearheaded 3 IPA Neerathons in Bengaluru, Chennai and Ahmedabad in 2023.

Ahmedabad Executive Committee and IPAHQ Felicitations

National Executive Board felicitated IPA Ahmedabad Chapter Executives and HQ members

IPA Editorial Board Felicitations

IPA Editorial Board Committee Members being felicitated by IPA National President

IPPL Chapter Felicitations

IPA Ahmedabad Chapter

IPA Bengaluru Chapter

IPA Chennai Chapter

IPA Delhi Chapter

IPPL Chapter Felicitations

IPA Jaipur Chapter

IPA Hyderabad Chapter

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INDIAN PLUMBING PROFESSIONALS LEAGUE 2023

Learning ▸ Knowledge ▸ Quiz

GRAND FINALE

23rd December 2023

6 Winners of Study Tour abroad

30 Chapter Finalists

11 Industry Partners

IPPL 2023 Winners

Indian Plumbing Professional League (IPPL) is a flagship event organized by IPA to foster a spirit of learning, competition, and fun. The league takes the form of an engaging quiz, where participants have the opportunity to showcase their expertise in various aspects of plumbing. Through IPPL, participants can broaden their understanding of the latest innovations in plumbing products and installations, and gain valuable insights into the importance of correct plumbing practices for a healthier living environment.

IPPL is an inclusive platform that caters to diverse professionals within the building industry, such as architects, interior designers, engineers, real estate developers, MEP consultants, contractors, academicians, and manufacturers.

The 7th Edition of IPPL was an annual event and it took place at 15 IPA Chapters (Ahmedabad, Bengaluru, Chennai, Delhi, Hyderabad, Jaipur, Kochi, Kolkata, Mumbai, Nagpur, Nashik, Navi Mumbai, Pune, Puducherry & Raipur) with a total of 574 Participants.

Each team, consisting of 2 professionals, is eligible to join from any of the Building Industry Segments. The event comprises three distinct phases. In the initial phase, all chapters conduct comprehensive learning sessions on 5 Saturdays, inviting subject matter experts for training.

The second phase entails MCQ based tests for all participating teams, with the top six from each chapter proceeding to compete for the top three slots at the Chapter level.

Finally, the No.1 winning teams from all chapters cameto Ahmedabad to compete at the National level Grand Finale during the 29th Indian Plumbing Conference. Please find below an account of Chapter Finalists.

IPPL Chapter Finalists

S.No.	Chapter	Winning Team
1	Ahmedabad	Ravi Bhatt & Mohmed Sajid Saiyad
2	Bengaluru	Girish V N& Jagadeesh M
3	Chennai	K. S. Thayumanavan & S. Viswanathan
4	Delhi	Ashish Kumar& Ashwini
5	Hyderabad	Abhi Asokan & Mohamed Faraas Ahamed Shabeer
6	Jaipur	Ritika Gupta & Jai Sankhla
7	Kolkata	Rochishnu Ganguly & Moumita Das
8	Kochi	Sachin Ajith & Athul P V
9	Mumbai	Denish Koli & Durga Satapathy
10	Nagpur	Riya Nitnaware & Maheshwari Landge
11	Nashik	Jhanvi Chauhan & Ajinkya Dalvi
12	Navi Mumbai	Rakesh Kumar Maurya & Chandrakant Gaikwad
13	Pune	Sanket Khilare & Saurabh Khilare
14	Puduchery	S Jayanthi & B Prathab
15	Raipur	Versus Gupta & Aakanksha Gautam

Out of 15 teams, 6 teams qualified for the Grand Finale on 23rd December 2023.

1. Team Chennai (Ganga): - K. S. Thayumanavan & S. Viswanathan, L & T Construction
2. Team Mumbai (Yamuna): - Denish Koli & Durga Satapathy, Kalpataru Limited
3. Team Nagpur (Saraswati): - Maheshwari Landge & Riya Nitnaware, Airtechnics Consultancy
4. Team Puducherry (Kaveri): - S Jayanthi & B Prathab, Design Collaborative
5. Team Kochi (Godawari): - Sachin Ajith & Athul P V, ULCCS Ltd
6. Team Bengaluru (Narmada): - Girish V N & Jagadeesh M, Prestige Group

Grand finale took place at YMCA International Center, Ahmedabad. Minesh Shah, Chairman, IPA Ahmedabad Chapter was the quiz master and conducted all Quiz rounds in a very interesting and exciting manner. Much awaited was the buzzer round which carried negative marking for a wrong answer so the finalists had to be extra careful. Most of the questions were pictorial

GRAND FINALE

23rd December 2023

Win a study Tour to Europe

K. S. Thayumanavan &
S. Viswanathan, L & T Construction
Chennai (Ganga)

Win a study Tour to East Asia

Denish Koli & Durga Satapathy,
Kalpataru Limited
Mumbai (Yamuna)

Win a study Tour to Middle East

S Jayanthi & B Prathab,
Design Collaborative
Puducherry (Kaveri)

A glimpse of IPPL 2023 Grand finale

Minesh Shah, Chairman, IPA Ahmedabad Chapter conducting the Grand Finale

Some glimpses during IPPL 2023 Quiz

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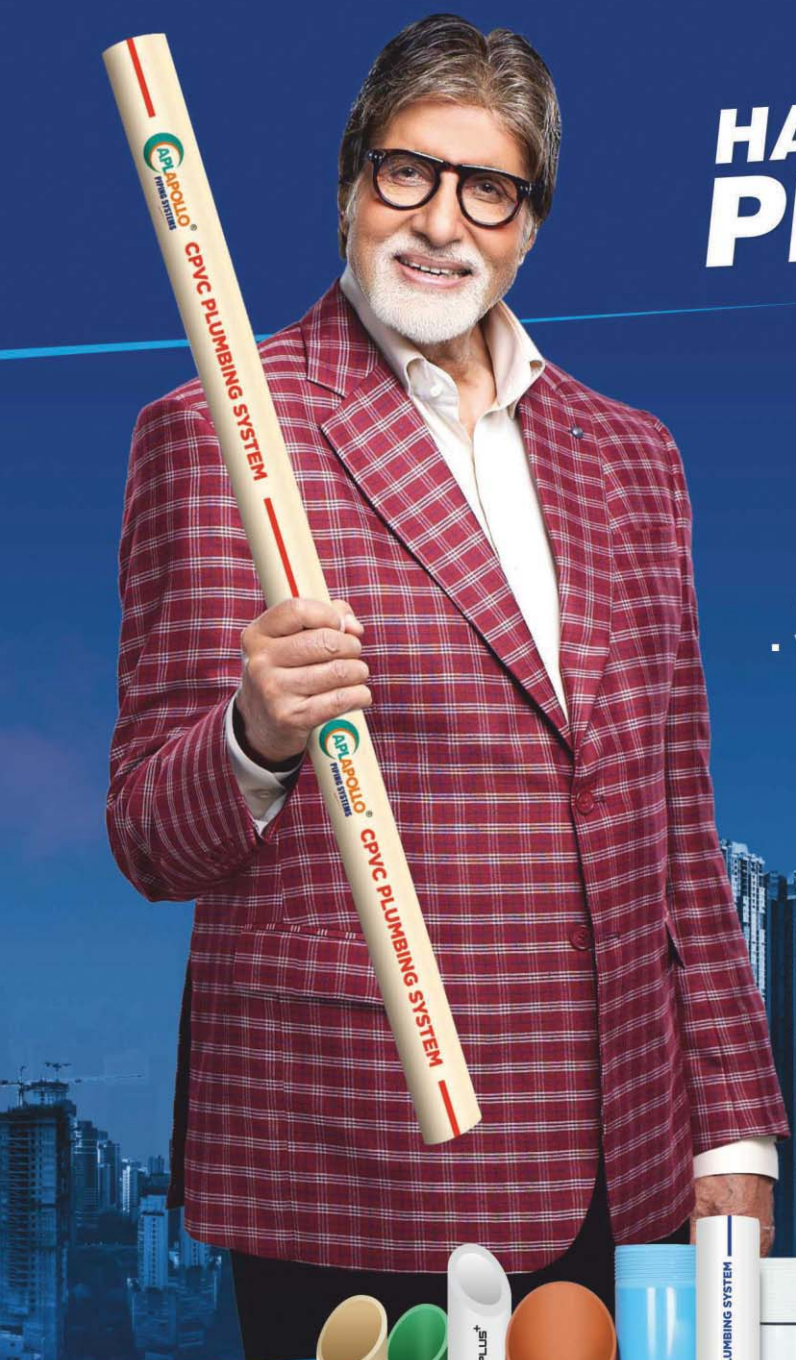

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