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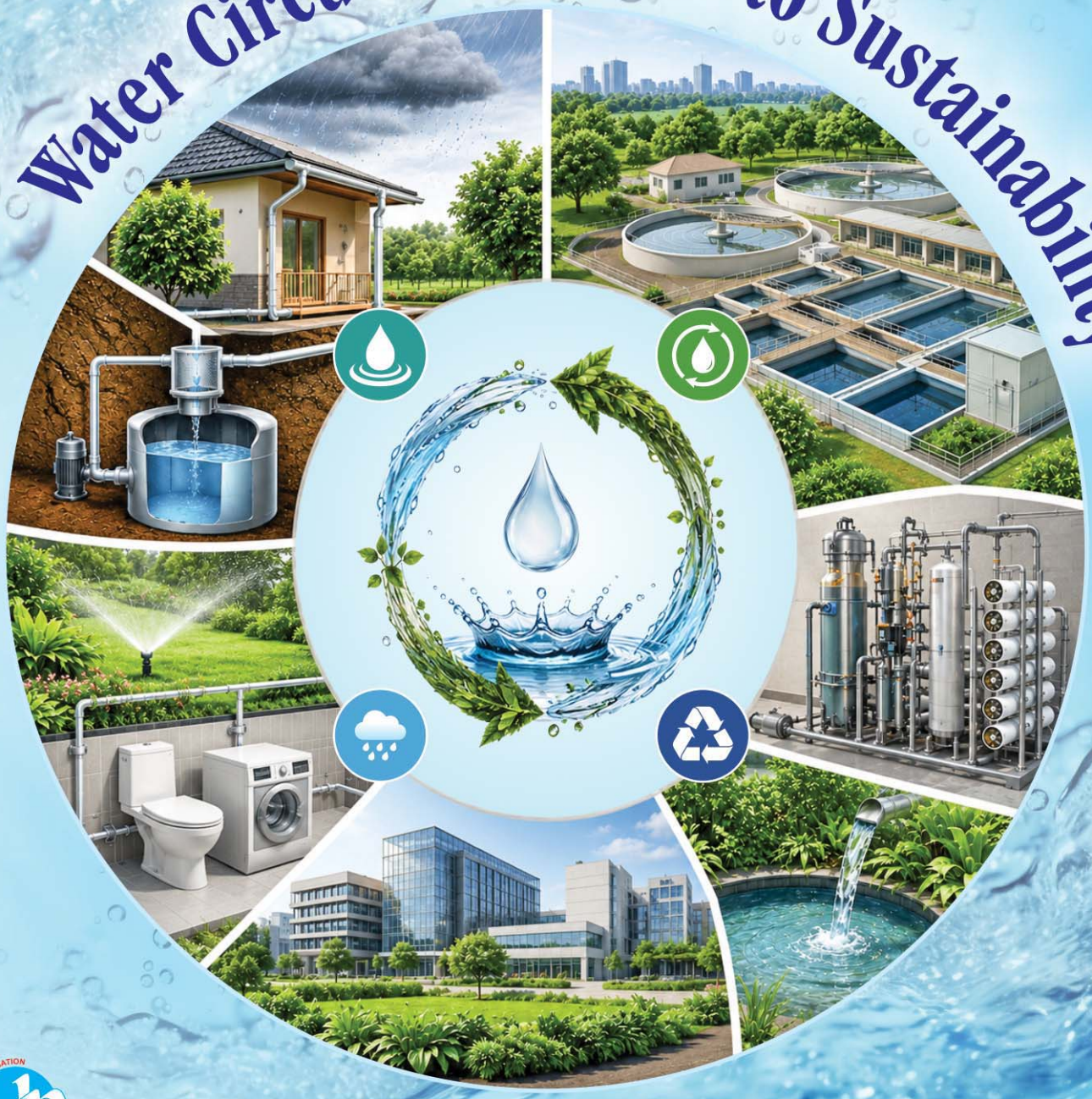
Water Circularity : Road to Sustainability



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MY PAGE

El Nino is a climate phenomenon characterised by unusually warm sea surface temperatures in the central and eastern Pacific Ocean. It significantly influences the Indian monsoon by altering global atmospheric circulation patterns. This results in reduced rainfall over large parts of India.

For the 2026 monsoon predictions, meteorological agencies have indicated that monsoon activity will be below normal this year, thus exposing our vulnerability to climate hazards. This also has a detrimental effect on our agricultural produce output, which in turn affects the economy. Using water sparingly, saving water by all means, recycling, and harvesting is the only solution in front of us. A great amount of work is being done on the water-saving aspect, but these efforts are also falling woefully short.

In this context, water circularity offers a sustainable pathway to address growing water stress. By treating, reusing, and recycling water at every possible stage, we can reduce dependence on freshwater sources and maximise resource efficiency. Adopting circular water management practices in homes, industries, and communities is essential to building long-term water security and resilience against climate-related challenges. This edition of Indian Plumbing Today will explore about water circularity in detail, from experts across the water, sanitation, plumbing and construction industry.

We are also delighted to announce that the Indian Plumbing Association (IPA) has successfully won the bid to host the **15th World Plumbing Council Conference** in **India** in **2029**.

This achievement marks a significant milestone for the Indian plumbing fraternity and reflects the growing global recognition of India's leadership, expertise, and commitment to advancing the plumbing profession. Hosting this prestigious international event will provide a unique platform to showcase India's innovations, best practices, and contributions to sustainable water management and public health.

The 10th Edition of Indian Plumbing Professional League is now entering in a new era and is offering a co-branded certificate by NSDC and IPA on "Professional Certificate in Plumbing Practices". IPA chapters across India have already registered and the grand finale is all set to take place in the 32nd Indian Plumbing Conference, scheduled from 17-19th December, 2026 in Chennai.

Looking forward to witness great participation in all IPA's upcoming events by all our IPT readers!

Sharat V. Rao
Managing Editor, Indian Plumbing Today
National Joint Secretary, Indian Plumbing Association

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Indian Plumbing Association Wins the Bid to Host 15th World Plumbing Conference in 2029 in India

In a defining moment for the Indian plumbing fraternity, the **Indian Plumbing Association (IPA)** has been entrusted with the honour of hosting the **15th World Plumbing Conference (WPC) in 2029** by winning the bid. The announcement was made during the World Plumbing Council General Meeting held alongside the **14th World Plumbing Conference in Birmingham, United Kingdom**, where IPA presented it's bid to host the 15th WPC, marking a historic achievement for India on the global plumbing stage.

Hosting the World Plumbing Conference in 2029 will bring together global policymakers, industry leaders, consultants, developers, manufacturers, researchers, educators, and young professionals to exchange knowledge, discuss emerging challenges, and develop solutions for the future of water, sanitation & plumbing.

The conference is expected to become a significant platform for:

- Showcasing India's advancements in plumbing technologies and water management.
- Promoting innovation and sustainable infrastructure.
- Encouraging international collaboration and technical exchange.
- Strengthening professional education and skill development.
- Positioning India as a global hub for plumbing excellence.

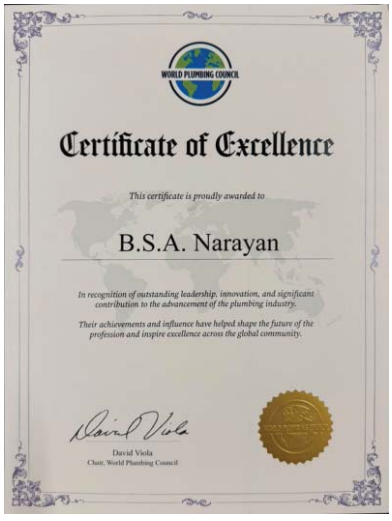
For the Indian Plumbing Association, this achievement represents the culmination of over three decades of dedication towards advancing plumbing as an essential pillar of public health, environmental sustainability, and resilient infrastructure.

As preparations begin for 2029, IPA looks forward to welcoming the global plumbing community to India for an event that promises to inspire innovation, foster collaboration, and shape the future of the profession.

World Plumbing Council - Executive Board (2026-2029)

B. O. Prasanna Kumar, National Executive Committee Member, Technical Committee Member, Chair - Centre of Excellence & Former Bengaluru Chapter Chairman, was elected to the **World Plumbing Council Executive Board** as Director. His winning is a testament to the growing recognition of India's expertise, leadership, and commitment to advancing the plumbing profession at the global level. As a member of the WPC Executive Board, B. O. Prasanna Kumar will play a key role in shaping the Council's strategic direction, fostering international collaboration, promoting knowledge exchange, and supporting initiatives that advance sustainable plumbing practices worldwide.

World Plumbing Council Excellence Award 2026



B. S. A. Narayan—Founder Member, Former National Vice President, and Past Technical Committee Convenor of the Indian Plumbing Association, was honoured with the prestigious World Plumbing Council Excellence Award, during the 14th World Plumbing Conference 2026. The award celebrates his exceptional contributions to plumbing excellence, public health, professional education, and sustainable water management, reflecting decades of leadership and commitment to the industry's growth in India and beyond.

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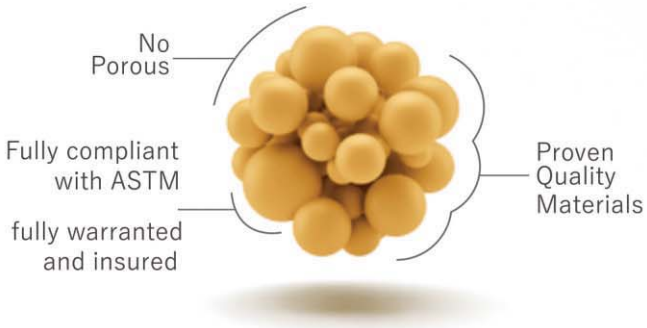

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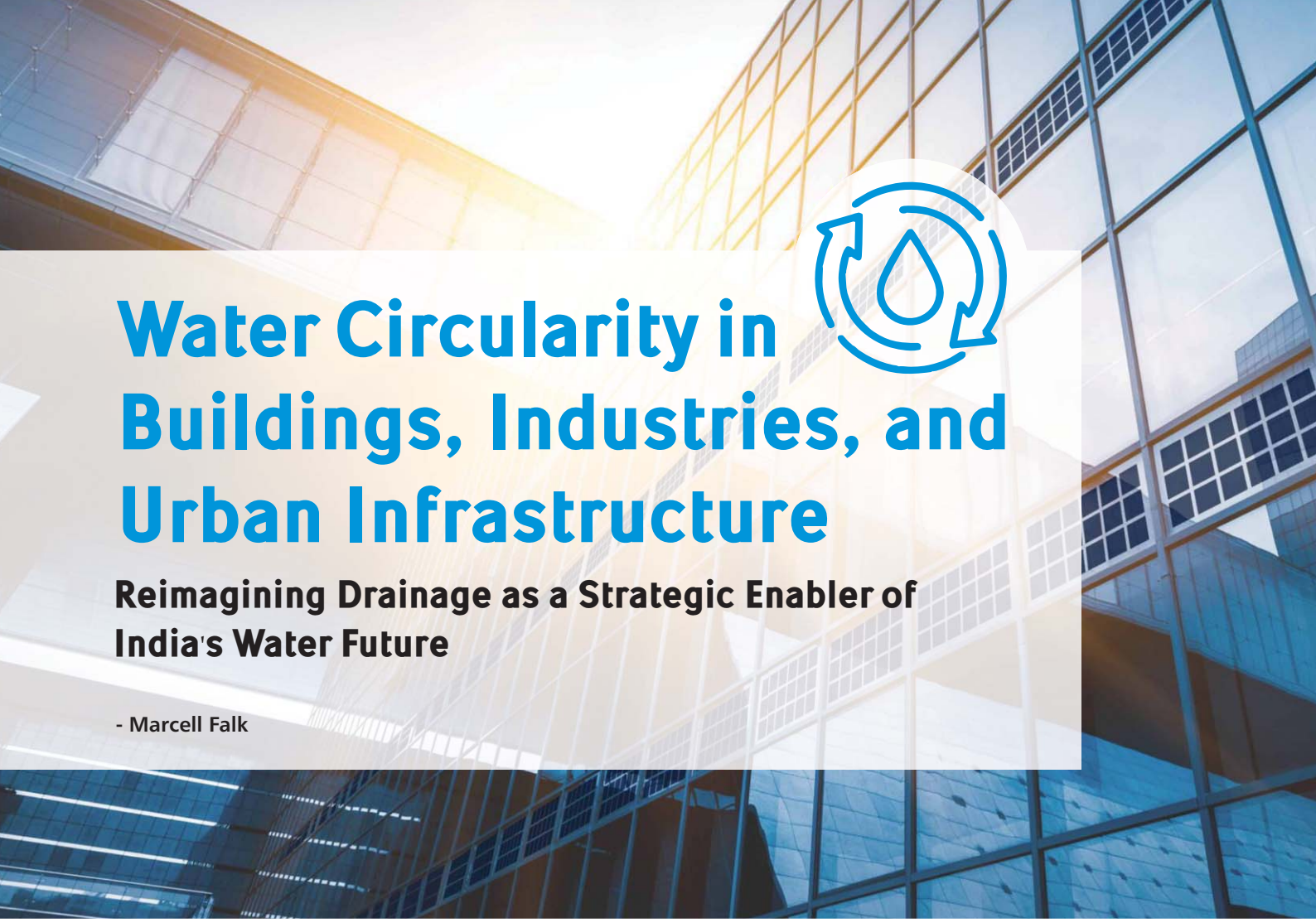


Water Circularity in Buildings, Industries, and Urban Infrastructure

Reimagining Drainage as a Strategic Enabler of India's Water Future

- Marcell Falk

1. Introduction: India's Water Reality and the Need for Circularity

India today is confronting a dual water challenge—**scarcity and excess**. On one hand, cities face acute shortages driven by rapid urbanisation, groundwater depletion, and rising demand. On the other, intense and erratic rainfall events lead to **urban flooding, infrastructure damage, and water wastage**.

The traditional **linear water paradigm—"extract, use, discharge"—is no longer viable** in this context. A paradigm shift is urgently required toward **water circularity**, where water is:

- Collected intelligently
- Used efficiently
- Recycled and reused
- Reintroduced into the ecosystem

The journey toward water circularity in the built environment begins at the building envelope—specifically, the roof.

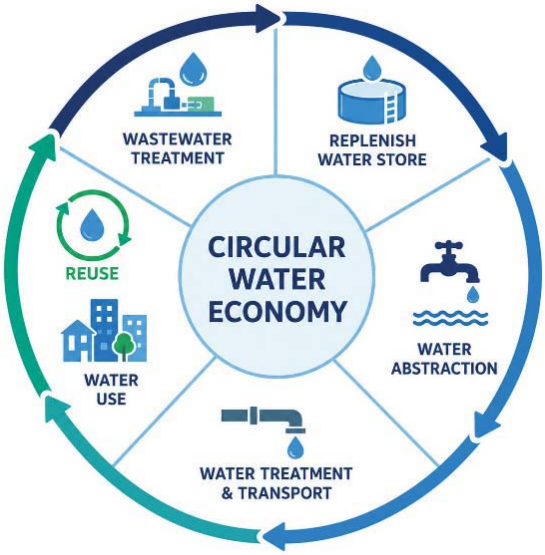
2. Understanding Water Circularity in the Built Environment

Water circularity is not merely about recycling wastewater—it is about **designing integrated systems that optimise every stage of the water cycle.**

Core Pillars of Water Circularity

1. **Capture** – Rainwater harvesting at source
2. **Conveyance** – Efficient transport through optimised drainage and piping
3. **Treatment** – Filtration and purification
4. **Storage** – Short- and long-term retention
5. **Reuse** – Non-potable and indirect potable applications
6. **Recharge** – Restoring groundwater aquifers

While substantial focus is often placed on treatment and reuse systems, **capture and conveyance—especially roof drainage—remain under-leveraged opportunities.**



3. Roof Drainage: The Underestimated First Link

Every roof is a **high-quality catchment surface.** Unlike surface runoff, roof water is typically less contaminated, making it ideal for reuse applications with minimal treatment.

Quantifying the Opportunity

A simple example:

- 1,000 m^2 roof area
- 800 mm annual rainfall
- Potential collection: ~800,000 liters/year

Multiply this across India's residential complexes, industrial sheds, malls, and airports, and the scale becomes transformative.

4. Engineering Efficient Roof Drainage Systems

4.1 Traditional Gravity Systems

Conventional systems rely on gravity and slope:

- Multiple downpipes
- Larger pipe diameters
- Limited efficiency during peak rainfall
- Space constraints in dense developments

While still widely used, these systems often **do not optimise water capture or conveyance efficiency.**

4.2 Siphonic Drainage Systems: A Game-Changer

Globally, siphonic systems have revolutionised roof drainage:

How It Works

- Pipes run full-bore under pressure
- Negative pressure induces high flow velocities
- Minimal need for slope

Key Advantages

- **Up to 80% reduction in pipe diameters**
- **Fewer downpipes and vertical shafts**
- **Higher discharge capacity during cloudbursts**
- **Improved architectural flexibility**
- **Better integration with rainwater harvesting systems**

In India, where cities increasingly face s**hort-duration, high-intensity rainfall**, siphonic systems ensure:

- Efficient drainage without ponding
- Rapid capture for reuse
- Reduced risk of structural load failures

5. Water Circularity in Buildings

5.1 Residential and Commercial Developments

Modern buildings can operate as **micro water ecosystems.**

Integrated System Design

Roof drainage connects to:

- First-flush systems
- Filtration units
- Underground or overhead storage
- Reuse applications such as:
  - Flushing
  - Landscaping
  - HVAC cooling

Design Considerations

- Leaf guards and debris separators
- Roof material compatibility
- Proper slope and inlet placement
- Overflow routing for recharge systems

5.2 Role in Green Building Certifications

Globally recognised frameworks—LEED, IGBC, GRIHA—emphasise:

- Rainwater capture efficiency
- Reduction in potable water consumption
- Stormwater management

A well-designed roof drainage system directly contributes to:

- Achieving water credits

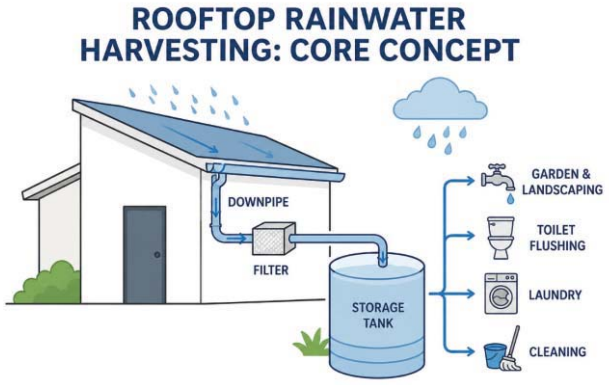
- Lowering operational costs
- Enhancing sustainability ratings

6. Industrial Water Circularity: Scale and Strategy

Industrial facilities offer unparalleled opportunity for water circularity due to their large roof footprints.

6.1 Industrial Applications of Roof-Harvested Water

- Process water
- Cooling tower makeup
- Boiler feed (after treatment)
- Fire water reserves
- Site irrigation



6.2 Key Engineering Challenges

- Dust and particulate contamination
- Chemical exposure (in some sectors)
- Large-span roofing systems
- High flow volumes

6.3 Importance of Robust Drainage Systems

From global industrial projects, we have observed:

- Properly engineered systems can **capture millions of liters annually per facility**
- Reduce dependence on external water sources
- Provide resilience during water shortages

Material selection is critical:

- HDPE and engineered polymers for corrosion resistance
- Long-life systems reducing maintenance cycles
- Thermal expansion handling for large roofs

7. Urban Infrastructure and the Role of Decentralisation

Indian cities are increasingly vulnerable to **urban flooding**, driven by:

- Loss of permeable surfaces
- Encroached waterways
- Outdated drainage infrastructure

7.1 Buildings as Decentralised Water Assets

Instead of burdening municipal systems, buildings can:

- Capture rooftop runoff
- Store and reuse water
- Reduce peak discharge into public drains

7.2 Integration with Urban Water Management

Effective strategies include:

- Stormwater detention tanks
- Recharge wells
- Smart drainage networks

A well-designed roof drainage system contributes to:

- **Peak flow reduction**
- **Urban flood mitigation**
- **Groundwater replenishment**

8. Climate Change and the New Design Paradigm

Climate change is redefining rainfall patterns:

- Higher intensity storms
- Unpredictable distribution
- Increased variability

Implications for Drainage Design

- Systems must handle future peak loads, not historical averages
- Hydraulic modelling becomes essential
- Safety factors must be re-evaluated

Advanced Tools and Approaches

- Digital simulation of rainfall scenarios
- BIM-integrated system design
- Performance validation under extreme events

From global practice, the shift is clear:

Drainage systems are no longer static utilities—they are dynamic, engineered safety systems.

9. Operation, Maintenance, and Lifecycle Thinking

A circular water system is only as strong as its maintenance strategy.

Common Issues

- Blocked drains due to debris
- Poorly maintained filters
- Misaligned system design
- Lack of monitoring

Best Practices

- Scheduled inspection of roof outlets

- Cleaning of strainers and gutters
- Integration of access points
- Use of durable, low-maintenance materials

Lifecycle thinking ensures:

- Long-term functionality
- Reduced operational costs
- Sustained water recovery performance

10. Policy Landscape and Opportunities in India

India's regulatory ecosystem is evolving:

- Mandatory rainwater harvesting in many states
- Smart Cities Mission
- Jal Jeevan Mission
- AMRUT initiatives

However, key gaps remain:

- Inconsistent enforcement
- Limited awareness of advanced drainage technologies
- Fragmentation in design responsibility

There is significant opportunity to:

- Update plumbing codes
- Incorporate global drainage standards
- Encourage performance-based design

11. The Manufacturer's Role: Beyond Products

Role of manufacturer's should not be limited to product supply but they should be solution partners.

Responsibilities Include:

- Providing engineering design support
- Sharing global best practices adapted to Indian conditions
- Enabling system integration across disciplines
- Training stakeholders—consultants, plumbers, contractors
- Ensuring compliance with international standards

The success of water circularity depends as much on system design and execution as on the technologies themselves.

12. The Way Forward: A Collaborative Ecosystem

Achieving water circularity at scale requires **multi-stakeholder collaboration.**

Key Stakeholders and Actions

- **Architects & Consultants:** Integrate water systems early in design
- **Developers:** Invest in lifecycle efficiency
- **Urban Authorities:** Encourage decentralised systems
- **Plumbing Professionals:** Adopt advanced installation practices
- **Manufacturers:** Innovate and educate

13. Conclusion: Every Roof is an Opportunity

Water circularity is not an abstract sustainability goal—it is a practical, achievable reality.

And it begins with a simple realisation:

Every drop of rain falling on a roof is an opportunity waiting to be harnessed.

By reimagining roof drainage systems as **critical infrastructure for water capture and management,** India can:

- Reduce freshwater stress
- Enhance urban resilience
- Improve sustainability outcomes
- Build climate-ready cities

"From drainage to resource management—every roof must become part of the solution."

Marcell Falk
Head Technical Services & BD PPS
Geberit

Marcell Falk is the Head of Technical Service and Business Development at Geberit India. With 18 years of experience in the plumbing industry, he brings extensive expertise in technical solutions, customer support, and business growth. Since joining Geberit in 2020, Marcell has played a key role in strengthening the company's presence and service excellence in India.

His focus is on delivering innovative, reliable, and customer-centric solutions that contribute to the successful execution of modern plumbing and sanitary projects.

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Water Circularity: Where Every Drop Saves Energy, Money and Risk

- Dr. Saandeepani Vajje

Water circularity is often discussed as an environmental idea. Most conversations stop at familiar words like reduce, reuse, recycle and recharge. But the stronger and more practical story is this: water circularity is also an energy strategy, a financial strategy and a business-continuity strategy.

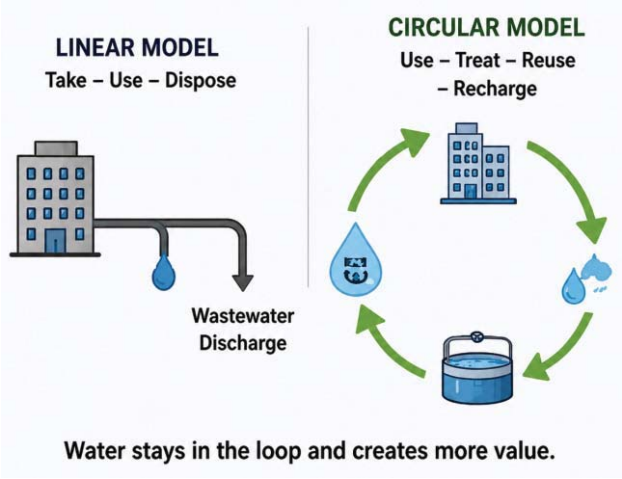
Every litre of water has a cost before it reaches the user and after it leaves the user. It has to be extracted, pumped, treated, stored, distributed, used, collected, treated again and either reused or discharged. At every stage, energy is consumed and money is spent. Therefore, when a building or campus uses water only once and throws it away, it is not only wasting water. It is wasting energy, operating cost, infrastructure capacity and future resilience.

The most powerful question in water circularity is not "How much water do we need?" The better question is, "How many times can the same drop be used before it leaves the site?"

• From Linear Use to Circular Value

Most buildings still follow a linear water model: take water, use it once, treat or discharge it, and then depend again on fresh supply. This model creates constant pressure on municipal supply, borewells, tankers, STPs, drains and stormwater systems.

Water circularity changes this approach. It looks at water as a resource with multiple possible uses. Freshwater is reserved for drinking, cooking, bathing and other high-quality uses. Treated wastewater can be reused for flushing, landscaping, cooling tower makeup, road washing, construction use and cleaning. Rainwater can be harvested, stored or recharged. Process water can be recovered and reused.



Water stays in the loop and creates more value.

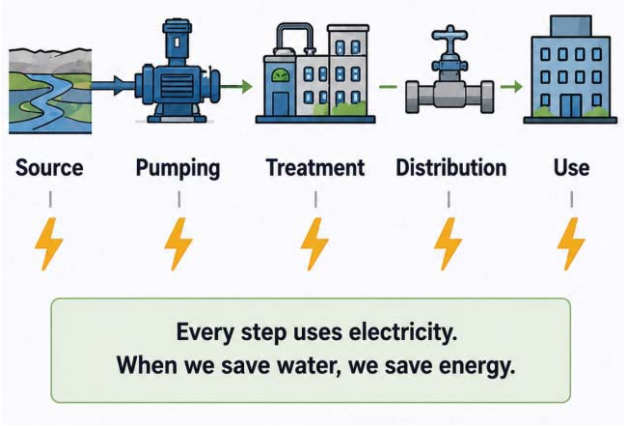
In a circular system, wastewater is not the end of the cycle. It becomes the beginning of another useful application.

• The Hidden Energy Inside Every Drop

Water is rarely seen as an energy-consuming resource, but it quietly carries a major energy footprint. Water needs energy for extraction, pumping, filtration, pressure boosting, treatment, distribution and disposal.

In a high-rise building, water may be pumped multiple times: from source to sump, from sump to overhead

tank, from overhead tank to fixtures, and later from wastewater collection to treatment and reuse tanks. In campuses and townships, this pumping network becomes even more energy-intensive.



This is the water-energy nexus. Saving water also means saving the energy required to move and manage that water. A building that reduces freshwater intake also reduces pumping load. A campus that reuses water locally reduces dependence on distant supply systems. A city that reduces leakage and non-revenue water also reduces energy wasted in unnecessary pumping.

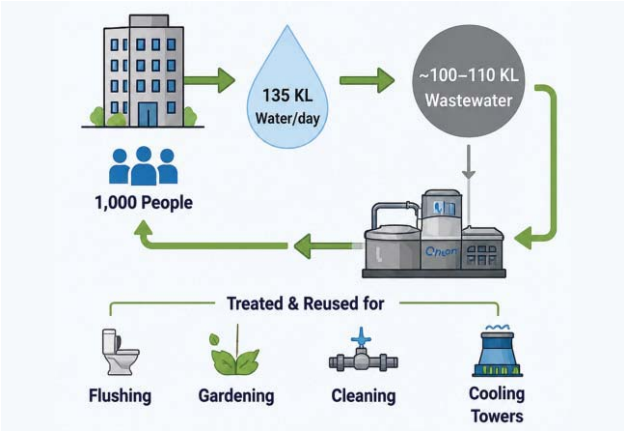
Water efficiency should therefore not be treated only as a plumbing or sustainability issue. It should also be part of energy efficiency and operating cost strategy.

• A Simple Water Circularity Example

Consider a residential apartment or institutional campus with 1,000 occupants.

If water demand is assumed at 135 litres per person per day, the total daily water requirement is around 1,35,000 litres, or 135 KL per day.

Around 80% of this may return as wastewater. That means nearly 100–110 KL per day can be available for treatment.

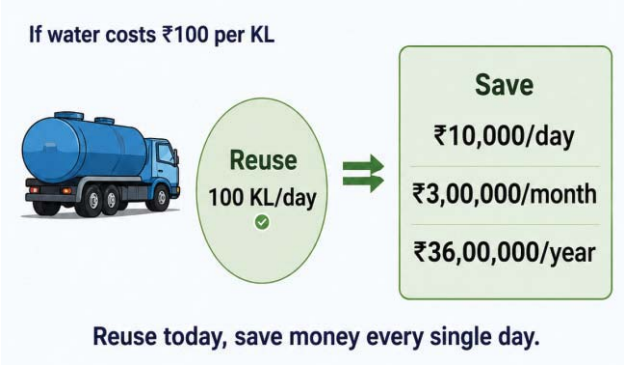


If this treated water is reused for flushing, gardening, car washing, road cleaning and cooling tower makeup, the project can reduce a major portion of its freshwater demand.

This is where circularity becomes visible. The same water that would have gone out as wastewater can now support multiple non-potable uses within the site.

• The Financial Logic of Reuse

Water circularity has a direct financial impact. If tanker water or purchased water costs even ₹100 per KL, then reusing 100 KL per day can save about ₹10,000 per day.



In many cities, especially during summer, tanker water may cost much more. When water prices rise, a circular water system protects the project from sudden operating cost escalation.

So the return on water circularity is not measured only in litres saved. It is measured in rupees protected, energy reduced, tankers avoided, discharge minimized and risk controlled.

The cheapest water is the water you do not have to buy again.

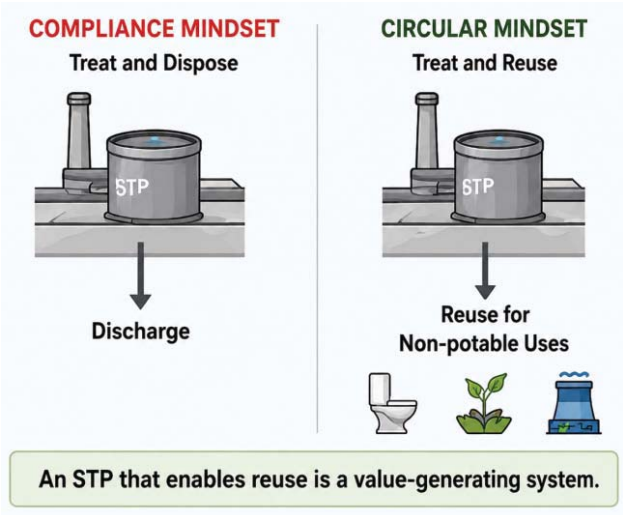
• STP: From Compliance Burden to Financial Asset

One of the most misunderstood assets in a building is the STP. **Many projects treat STPs as a compliance requirement.** They install them because authorities demand them, but they do not design a proper reuse system.

The result is common - the STP works, but treated water is not reused effectively because of smell, poor quality, lack of dual plumbing, insufficient storage, maintenance gaps or user hesitation.

In a circular water system, the STP is not only a sewage treatment plant. It becomes a water recovery plant. Its success is not measured only by BOD, COD and TSS values. Its real success is measured by how much treated water replaces freshwater.

If a 100 KLD STP treats water but only 20 KLD is reused, the circularity performance is poor. If 80–90 KLD is reused safely for non-potable applications, the STP becomes a financial asset.



An STP that only treats water is a compliance system. An STP that enables reuse is a value-generating system.

• Tanker Water: The Cost of Delayed Planning

Tanker dependency is one of the clearest signs that water planning has failed. A tanker is not only a water source. **It is a cost, a delay, a traffic load, a diesel footprint and a risk.**

In many Indian cities, apartments, hotels, hospitals and commercial buildings depend on tankers during summer. But tanker water is often the most expensive and least reliable form of water supply.

Every tanker bill is a reminder that rainwater harvesting, recharge, STP reuse, leak monitoring and demand reduction were either ignored, under-designed or poorly maintained.

Circular water planning reduces this dependency. It may not eliminate the need for external water completely, but it can significantly reduce the quantity purchased and the urgency during peak summer months.

• The HVAC Connection: Where Water Meets Energy

Cooling towers provide one of the strongest examples of the link between water, energy and finance.

Commercial buildings, malls, hospitals, hotels, airports, IT parks and data centers use large quantities of water for cooling tower makeup. In such projects, HVAC is already one of the largest energy consumers. If cooling tower water management is poor, both water and energy costs increase.

Better cycles of concentration, side-stream filtration, automated blowdown control and suitable treated-water reuse can reduce freshwater demand and improve operational efficiency.

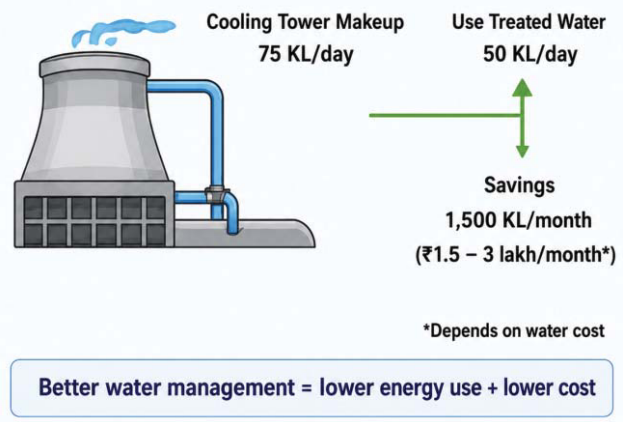
Consider a commercial building using 75 KL per day for cooling tower makeup. If treated wastewater can safely replace even 50 KL per day of this demand, the building can save 1,500 KL per month of freshwater.

At ₹100 per KL, this is ₹1.5 lakh per month.

At ₹200 per KL, this becomes ₹3 lakh per month.

Over a year, the savings can range from ₹18 lakh to ₹36 lakh.

This is apart from reduced tanker movement, reduced



borewell stress and reduced wastewater discharge.

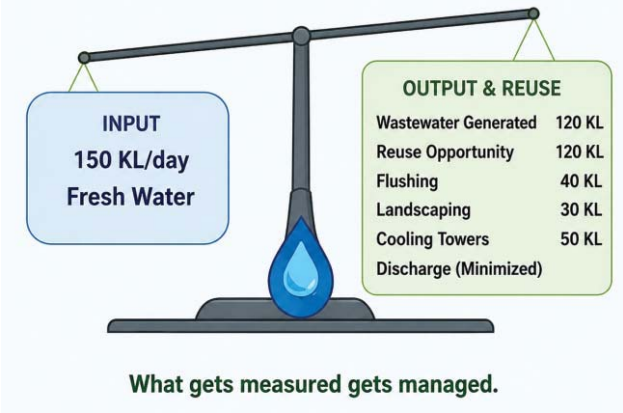
In large buildings, water efficiency and energy efficiency often meet at the cooling tower.

• The Need for a Water Balance Sheet

Water circularity cannot be managed without measurement. A project needs a water balance sheet, just as a business needs a financial balance sheet.

A water balance sheet tracks:

Freshwater input, wastewater generation, treated water recovery, flushing demand, landscape demand, cooling tower demand, rainwater harvesting, groundwater recharge, losses and final discharge.



This means the campus has a reuse opportunity of 120 KL per day.

If the STP, storage, plumbing and quality monitoring are properly designed, freshwater demand can reduce drastically. If not, the same 120 KL becomes a disposal problem.

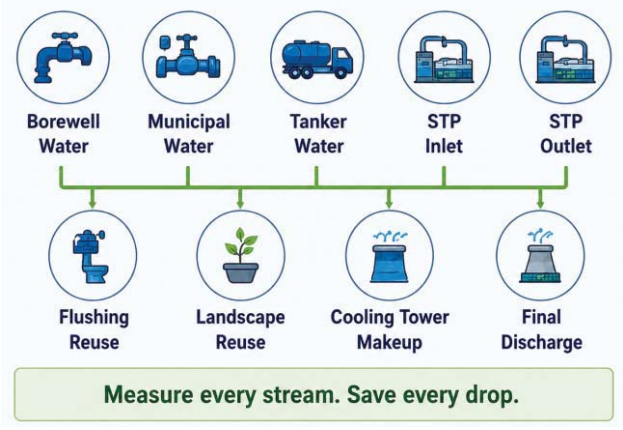
What gets measured gets reused. What is not measured becomes waste.

• Smart Metering: Making Wastage Visible

Smart meters can make water circularity more effective. Metering should not stop at the main water inlet.

Separate meters are needed for borewell water, municipal water, tanker water, STP inlet, STP outlet, flushing reuse, landscape reuse, cooling tower makeup and final discharge.

Once these numbers are visible, wastage becomes visible. **Once wastage becomes visible, savings become possible.**



A sudden increase in flushing water, continuous landscape consumption, abnormal tanker dependency or mismatch between STP inlet and outlet can reveal leaks, misuse, treatment inefficiency or operational gaps.

Digital monitoring also helps facility teams take decisions based on data instead of assumptions.

• Business Continuity and Water Risk

Hotels cannot function without water. Hospitals cannot compromise hygiene. Industries cannot stop process water. Data centers need reliable cooling. Campuses need sanitation, laboratories, hostels, kitchens and landscape maintenance.

When external water supply fails, circular water systems provide resilience. They may not replace all freshwater needs, especially drinking and kitchen water, but they can protect a large portion of non-potable demand.

For businesses, water circularity is not only sustainability. It is operational insurance.

A project that can reuse 50–70% of its water internally is better prepared for summer stress, tanker price hikes, borewell restrictions, municipal shortages and climate uncertainty.

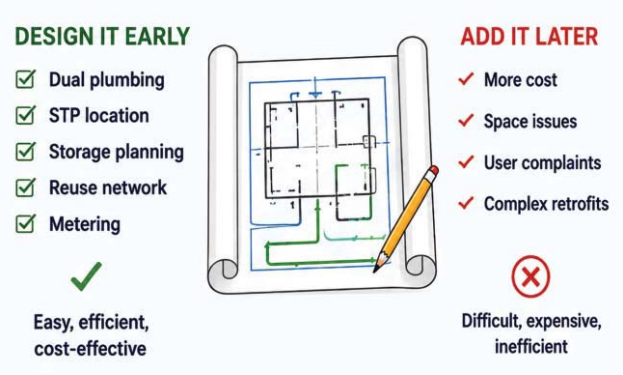
• Designing Circularity Early

Water circularity is not expensive when planned early. It becomes expensive when added later.

If dual plumbing, STP location, tank capacity, treated-water storage, landscape demand, cooling tower requirement and metering are planned at the design stage, circularity becomes part of the building's operating system.

But if these are ignored during design, the project may later struggle with space limitations, pipe routing issues, user complaints, odour problems, reuse mismatch and costly retrofits.

Circularity should begin before the first pipe is laid.



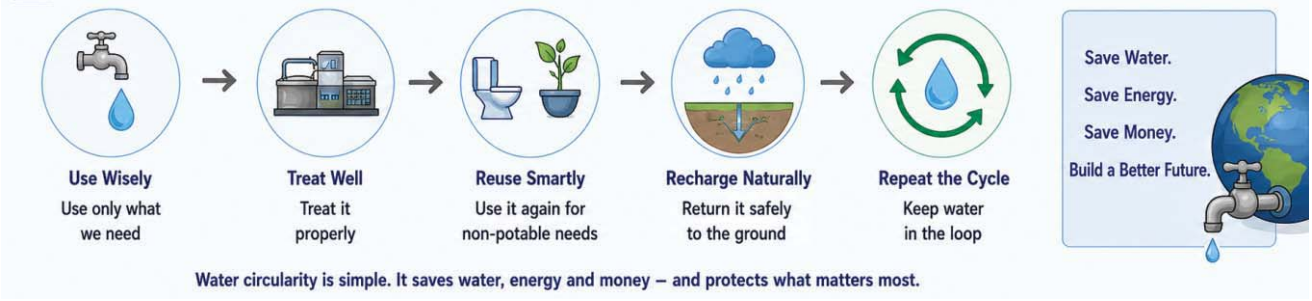
- **From Green Feature to Performance Strategy**

The next generation of sustainable buildings will not be judged only by energy performance. They will also be judged by water intelligence.

Water circularity is not about doing something fashionable. It is about making water work harder, longer and smarter.

Conclusion: Every Drop Must Have a Second Life

The future of water management is not only about finding new water sources. It is about designing projects where every drop has a planned second life.



Freshwater should be reserved for high-quality uses. Treated wastewater should serve non-potable demand. Rainwater should be captured, stored or recharged. Stormwater should be managed as a resource. Leaks should be monitored. Discharge should be minimised.

The cheapest water is the water we do not have to buy again.

The cleanest energy is the energy we do not spend on unnecessary pumping.

The strongest sustainability strategy is the one that protects both the planet and the project's balance sheet.

Water circularity is no longer just an environmental responsibility. It is a financial and operational necessity.

Dr. Saandeepani Vajje
Chairperson, IPA Amaravati Chapter
Founder & CEO, Chinoy Design

Dr. Saandeepani Vajje is the Founder & CEO of Chinoy Design, with 11+ years of expertise in green buildings and sustainability. She has led 200+ projects spanning 50+ million sq. ft. across South India, delivering IGBC, LEED, GRIHA, EDGE, and ECBC certifications across diverse sectors. She serves as an ECBC TPA for Andhra Pradesh & Telangana, Master Trainer for GGGI, and Sustainability Advisor to APCRDA. An ISHRAE Distinguished Lecturer and she also holds key roles across NAREDCO, IGBC, ASHRAE, IPA, IIID, and CREDAI. Her work has earned multiple accolades, including the Decarbonization Hero Award – Youth (ISHRAE Cool Conclave 2025), NAREDCO Women Achievers Award 2025, Pankaj Dharkar Award 2025, and The Real Woman Award 2022 and many more.

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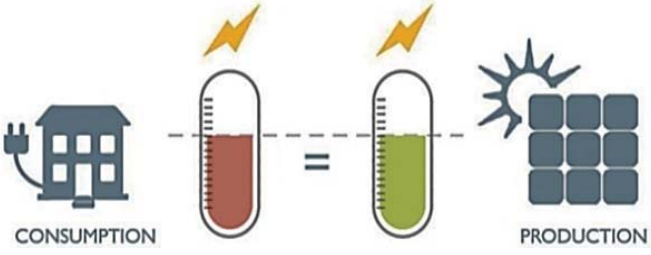
Watershed Management: A Net Zero Water Approach Towards Water Positivity

- Bhadresh Shivashankar

Water scarcity is increasingly becoming a management challenge rather than a resource limitation. As climate variability intensifies and urbanization accelerates, adopting a watershed-based net zero water approach offers a practical pathway towards water positivity. By integrating demand reduction, rainwater harvesting, groundwater recharge, and community stewardship, organizations and communities can transition from being water consumers to water custodians.

What is Net Zero?



NET ZERO – Total amount of energy(water) used by the building on an annual basis = Total amount of energy in this case "water created on the site" with water harvested, recycled, reused or replenished on site.

A Net Zero watershed approach balances the water we consume with the water we return to the environment. To become **water positive**, a catchment or facility must safely return more high-quality water to the ecosystem and local community than it extracts, actively reversing water stress

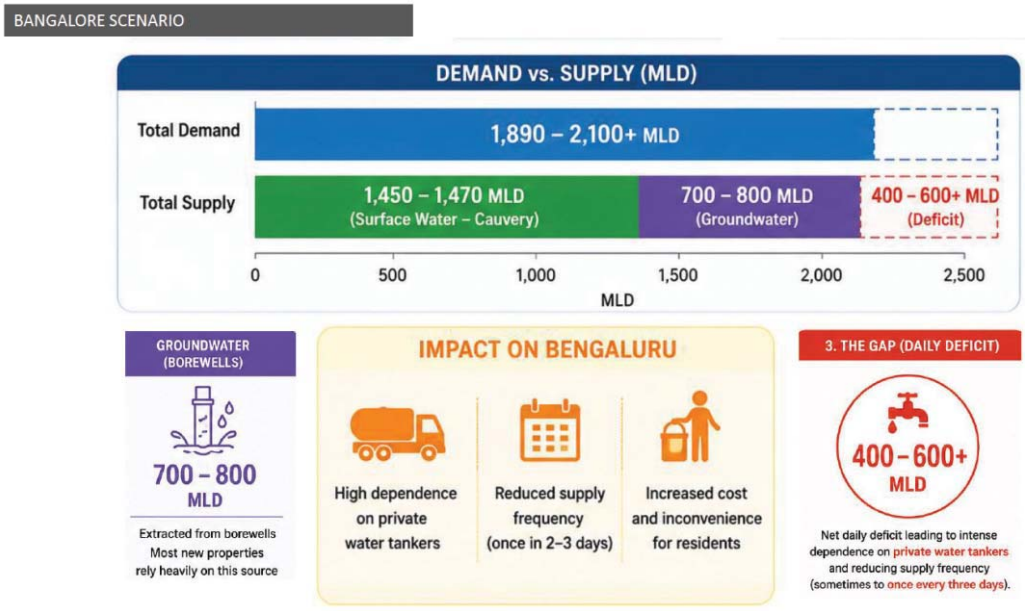
Achieving water positivity requires holistic, integrated management. The strategy is executed through four sequential phases:

1. **Measure and Audit (Water Accounting)**
   - ➢ Baseline Your Footprint: Calculate your total internal water usage (Water debit), accounting for evaporation, incorporation into products, and non-recoverable losses.
   - ➢ Assess the Catchment: Evaluate local hydrology, groundwater depletion rates, and downstream

impacts. Tools like the World Resources Institute Aqueduct Water Risk Atlas can help pinpoint severe risk zones.

2. **Internal Demand Reduction (Net Zero Water)**
   - ➢ Reduce at Source: Optimize processes to use less fresh water. Implement closed-loop systems, Zero Liquid Discharge (ZLD) technologies, and dry-cooling methods.
   - ➢ Recycle & Reuse: Maximize the reuse of treated wastewater for non-potable needs like landscaping, cooling towers, and agricultural irrigation.
3. **External Replenishment & Offsetting**
   - ➢ Nature-Based Solutions: To become water positive (Water Credit > Water debit), invest in external community projects. Build check dams, percolation tanks, and recharge pits to slow down runoff and encourage groundwater infiltration.
   - ➢ Soil & Vegetation Management: Implement afforestation, contour bunding, and mulching to enhance soil moisture retention and prevent erosion.
4. **Community Stewardship**
   - ➢ Empower Locals: Engage local communities—especially near operations—to maintain rainwater harvesting and micro-irrigation systems.
   - ➢ Policy Integration: Align local micro-watershed projects with broader macro-level (top-down) river basin or municipal plans to secure long-term water resilience.

Major corporations and sustainability leaders in water-stressed regions like India actively use this framework to replenish local aquifers, significantly improving downstream water tables



The Core Problem

Bangalore gets moderate rainfall but still faces water scarcity. Again rainfall is seasonal and unevenly distributed.

Mismatch: Monsoon surplus vs summer deficit

Southwest Monsoon (June–Sept): The primary season, Western Ghats, often resulting in moderate rainfall.

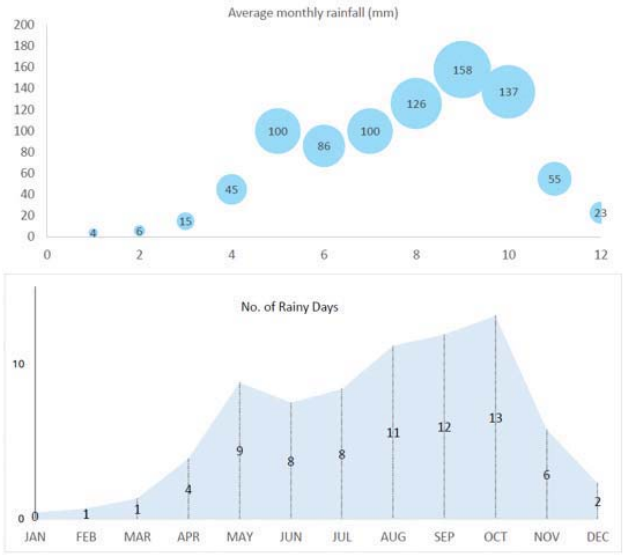
Northeast Monsoon (Oct–Nov/Dec): The secondary rainy season, often bringing heavy rainfall.

Projects fail due to poor water management — not lack of water

Rainfall Analysis

High Inflow Period – June – October offers the best opportunity for capturing & storing rainwater

Low Inflow Period – January – March requires stored reserves for drinking water, irrigation & other needs



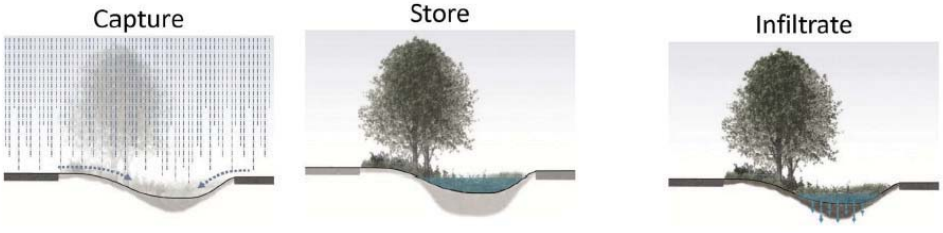
Decadal Trend & Analysis

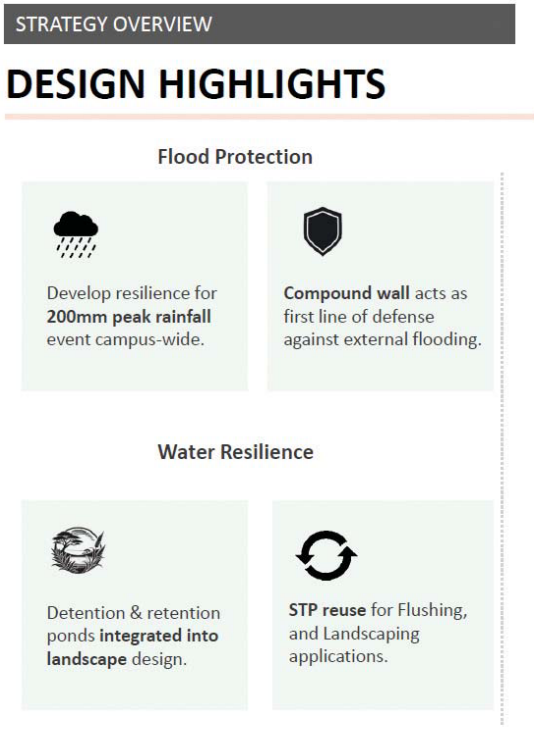
Climate Pattern – Suggests increased rainfall extremes – wetter wet years & drier dry years – consistent with climate change – driven variability

This variability necessitates infrastructure that is designed not just for average rainfall, but for peak intensity & extreme return periods

Sponge Site Strategies - Water Positive & Flood Free Campus

Designing a sponge-site ecosystem that manages extreme rainfall, protects downstream lakes, enhances groundwater recharge, and reduces freshwater dependency.





SITE CHALLENGES

External flooding risk from adjoining roads & nala

Backflow vulnerability at outfall points

150 - 200 mm/day extreme rainfall events (climate variability)

Rapid runoff due to large roof & hardscape areas

Upstream or Downstream sensitivity

Seasonal water imbalance (Monsoon surplus vs summer deficit)

High freshwater demand (Domestic + Flushing + Landscape)

Outcome – Reduced Risk

- Climate Resilience – RWH, stormwater management and green infrastructure to reduce flooding and drought risks
- Water Quality Protection – Monitor and treat wastewater to prevent contamination of local water bodies
- Regulatory Compliance – Stay ahead of evolving ester – use regulations by adopting sustainable practices early
- Biodiversity Safeguards – Protect surrounding ecosystems by minimizing extraction and runoff impacts. This also involves replanting of trees in the site or leave the trees at site without disturbing them
- During Construction – Account for Embodied Carbon during construction. Product accounts for 56%, Construction 3%, Use 32% End of Life 6%, Post EOL 3%

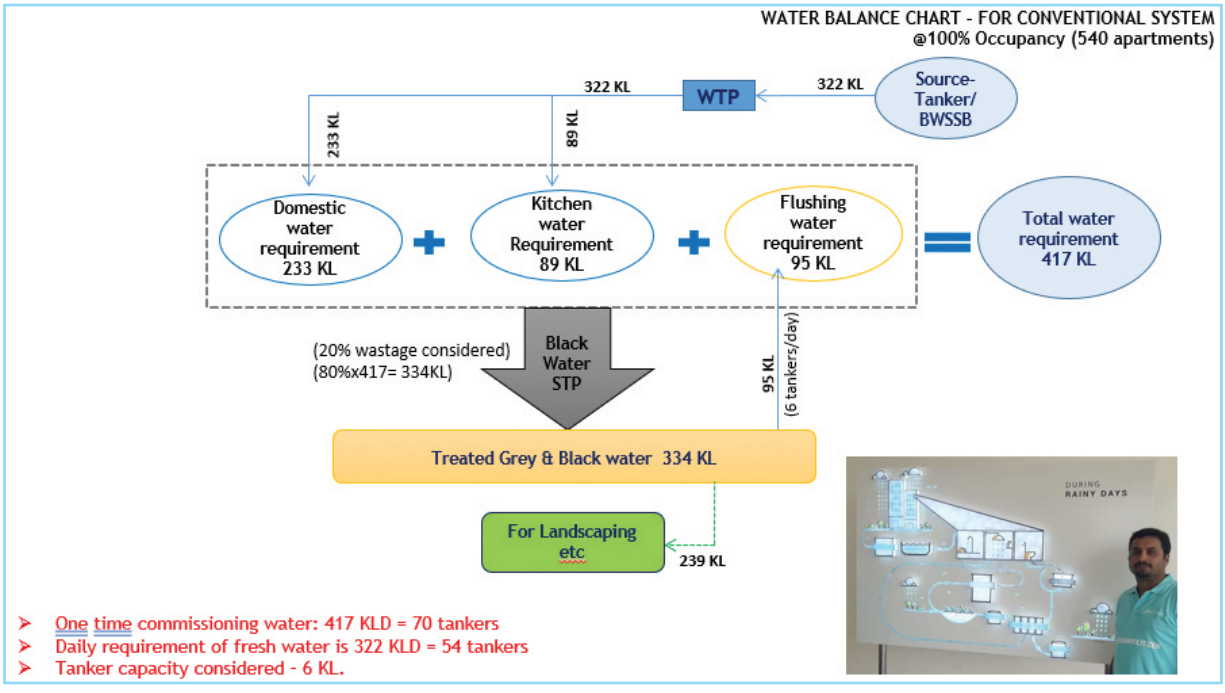
RUNOFF & FLOOD WATER MANAGEMENT PLAN

An ecological corridor within the campus is envisioned as a regenerative landscape.

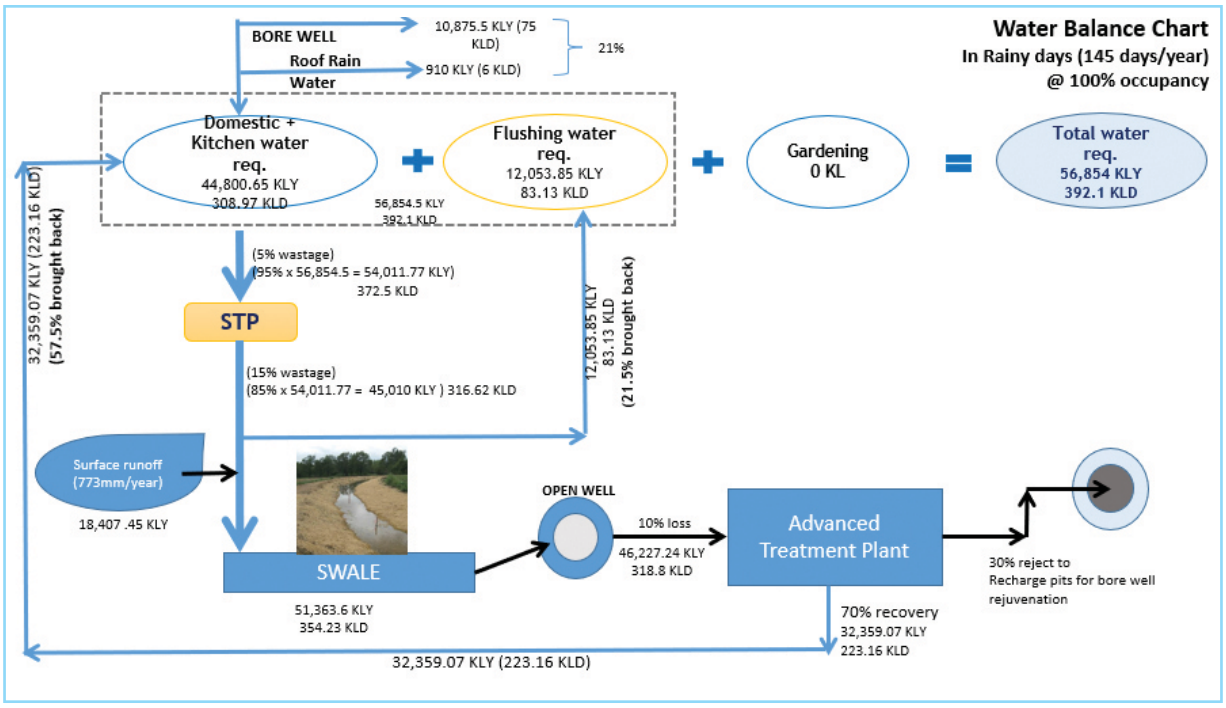
The corridor will be developed as a continuous blue–green spine, adapting from local forest structure while responding to the region's semi-arid climate, red loamy soils, and seasonal hydrological flows. Drawing from the natural vegetation typology of dry deciduous canopies (8–12 m), hardy shrubs, and drought-resilient species, the corridor will prioritize native, wind-tolerant and pollinator-supportive plants. Functioning as a living ecological infrastructure, it will regulate microclimate, sustain urban wildlife, and reconnect fragmented habitats, while also serving as an immersive experience landscape for campus users. By integrating water-sensitive design, recharge wetlands, layered planting systems, and culturally familiar native species, the ecological of site becomes a climate-resilient development.

Case Study: - Adopting an STP by Bifurcating Grey and Black Water for 540 Apartment with STP capacity of 417 KLD. Grey Water (Domestic) + Kitchen Water (Initially Passed through Grease Trap before combining with Grey Water) – This Grey Water + Kitchen water is treated in STP and is then passed through a Swale, followed by an Open well and then to an Advanced Treatment System (Consisting of Ultra Filtration/Reverse Osmosis and Ultraviolet). Reject water is sent for Rejuvenation.

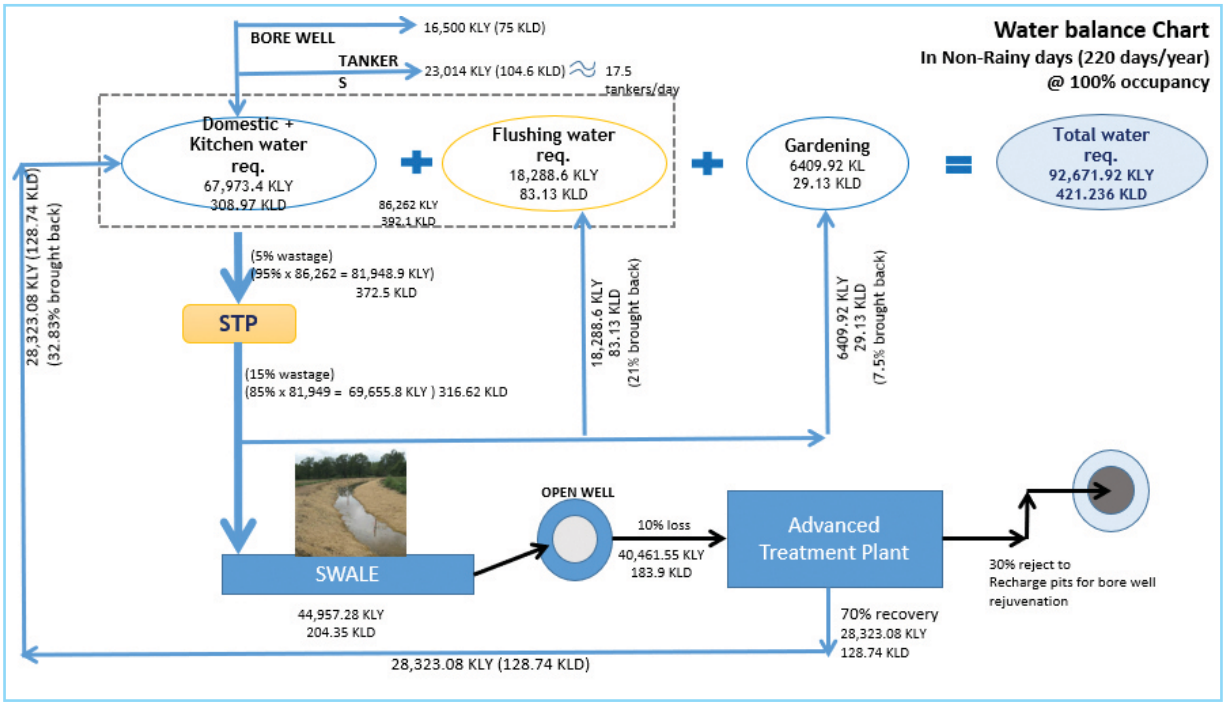
Case 1: - Conventional System – Requires 54 Tankers per day



Case 2: - During Rainy Days – Requires 0(Zero) Tankers per day



Case 3:- During Non - Rainy Days – Requires 11 Tankers per day



- The Concept involved reduction of Water Tankers – 54 nos per day to Zero Tankers per day during Rainy Days and 11 Tankers usage over 54 Tankers during Non-Rainy Days
- System Deployed was Advance Treatment System (70% Recovery) which deployed RO Ultra Filtration and Ultraviolet
- Also, Bio Swale was used
- Both Rainwater and Storm water (Surface Run Off) water was treated
- An Open Well was also deployed along with Recharge Pits with Deep Bore Holes and Rainwater
- Storage Tanks/Storm Water Storage Tanks

Open Well – a. Depth

(i) Open Well 1 – 5 metre depth – Lower Size Aggregate

(ii) Open Well 2 – 8 metre depth – Larger Size Aggregate

Infiltration – Cannot be defined

Percolation – Continuous Process. However, water will percolate depending on soil permeability and strata

Silt – No chance of coming as it is a sub soil flow.

3. Bore Hole Efficiency Improvement: -

   Water from the Swale goes to the Impervious well (Open Well) which in turn is fed into Advanced Treatment Plant (ATP) and subsequent Reject is fed into Subsoil feeding. Recharge into Ground would be done after the Advanced Treatment System as per water parameters mentioned in Table Below which would be approved as per Local Regulations.

   b. This water will go to the bore well (Arrest this water by DYKE to improve the efficiency of the bore well).

   c. One cannot directly inject water directly to borehole as it is not allowed.

4. SBR – Sequential Batch Reactor – Filtration Levels

   a. Black Water Re cycling – To Flushing/Landscaping

   b. Grey Water Recycling (In STP itself ACF – Activated Carbon Filter/PCF Pressure Sand Filter/Polishing - filtration done) – To Swale – Open Well – ATP (UF – Ultra Filtration/RO – Reverse Osmosis/UV – Ultraviolet) – Then goes back to Domestic Circuit

5. Surface Rainwater Collection
6. Swale to be designed for taking maximum rainfall
7. After Swale – Open well storage – 5 to 6 numbers (or 1 big well), then water goes to Advanced treatment plant via Big Well – 1 number.

Bhadresh Shivashankar
Associate Vice President & Head of MEP, Sattva

Bhadresh Shivashankar is a Mechanical Engineer from M.S. Ramaiah Institute of Technology, carries with him 29 years of Experience in the fields of Plumbing, HVAC, Electrical, Fire & Elevators. He is working with Sattva as Associate Vice President & Head of MEP. He is responsible for Design & Implementation of Commercial and Residential Projects

He has given 29 Technical Paper Presentations and taken classes for IPPL regularly for the past few years and given presentations in IPA forums.

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Hospitality

Leading the change for a Water Circular Economy

- Gurmit Singh Arora

In an era where environmental imperatives are reshaping the competitive landscape of luxury hospitality, water efficiency and smart plumbing systems have emerged as *critical engineering backbones* of contemporary hotel operations. No longer peripheral features, they are now *core sustainable infrastructures* that uphold guest expectations, regulatory demands, and ESG ambitions, especially across 5-star properties and global luxury brands.

Luxury hotels are increasingly integrating sustainable water infrastructure to balance guest comfort with environmental responsibility.

Across India and the world, luxury hotel chains are ramping up holistic water stewardship frameworks that blend **advanced treatment technologies, smart sensors, hydropneumatic systems, and sustainable plumbing design** to dramatically reduce freshwater dependency and operational waste.

Redefining Water Use Intensity in Luxury Properties

Hospitality's water footprint is enormous, a single hotel room can consume **hundreds to over a thousand liters** per day when aggregated across guest rooms, kitchens, landscaping, laundry and housekeeping. Traditional plumbing infrastructures with high-flow fixtures, inefficient hot water distribution, and centralized storage tanks exacerbate waste and inflate costs.

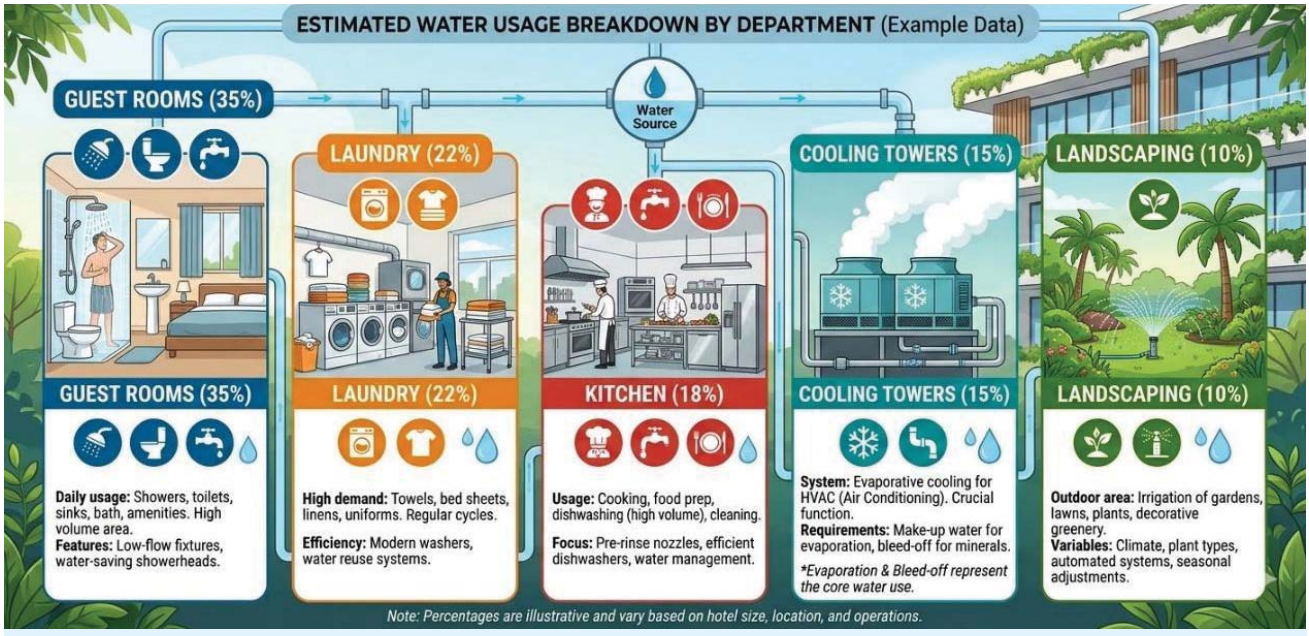
In response, leading hotel chains are deploying a suite of practices that span hardware, software, and behavioural engineering:

- **Low-flow fittings, dual-flush toilets and waterless urinals** reduce baseline consumption without compromising guest comfort. These fixtures cut water use almost in half while maintaining perceived pressure through aeration technologies.

- **Smart metering and IoT-enabled plumbing networks** continuously monitor flow, pressure changes, leaks, and usage patterns. Advanced management platforms help engineers detect anomalies and facilitate predictive maintenance to prevent waste before it becomes costly.

These measures mirror broader industry research that emphasizes *data-driven water management for sustainability and operational excellence* in hotel and restaurant sectors.

UNDERSTANDING WATER CONSUMPTION IN A HOTEL



Water consumption in hospitality operations spans multiple functions including guest rooms, kitchens, landscaping, and laundry.

Smart Plumbing: The Technical Heart of Water Efficiency

Central to modern green hospitality is a shift from passive infrastructure to **programmable, adaptive plumbing systems** that offer real-time control over water distribution and energy consumption. Two technical pillars stand out:

1. **Hydropneumatic Systems & Pressurized Water Networks**

Hydropneumatic pumping systems replace traditional rooftop tanks in mid- to high-rise hotel structures. These systems maintain consistent pressurization, eliminate the need for large gravity tanks, and reduce circulation losses, ensuring *constant 24/7* hot water availability even during peak load conditions.

A well-engineered hydropneumatic setup integrates variable frequency drives (VFDs) and smart pressure sensors to optimize pump speed and energy usage, delivering *just-in-time pressure response* to demand spikes. This reduces water hammer effects, minimizes energy use, and increases the service life of mechanical equipment, all without sacrificing guest comfort.

Hydropneumatic systems maintain constant water pressure in high-rise hotels while reducing the need for large rooftop storage tanks.

2. **High-Efficiency Hot Water Systems**

Hot water is one of the most energy-intensive utilities in a hotel, often used in kitchens, laundry, bathing, and housekeeping operations. Innovative solutions feature:

- **Heat pump-integrated thermal storage systems,** which outperform conventional combustion boilers by drastically cutting CO_2 **emissions and operating costs. Research shows such systems can reduce fossil energy use by up to 90% while delivering consistent temperature control.**
- **Solar-hybrid or direct solar thermal collectors** integrated with centralized hot water tanks, reducing grid dependency and peak electrical loads. Field installations in Indian hotel projects demonstrate significant gains in energy efficiency.
- **Condensate heat recovery loops** reclaim low-grade heat from HVAC or laundry steam to pre-heat domestic hot water, multiplying efficiency gains such that less primary energy is needed for wash-ready temperatures.

Together, these systems underpin *continuous hot water availability*, a non-negotiable aspect of luxury hotel operations — while improving sustainability metrics.

Hybrid hot water systems combining solar thermal and heat pump technologies drastically reduce energy consumption in hospitality operations.

Circular Water Ecosystems: Recycling, Rainwater, and Greywater Integration

True green hospitality extends beyond fixtures and pumps to create *circular water ecosystems* that reuse and repurpose water across functions:

- **Effluent and sewage treatment plants (ETPs/STPs)** treat grey and black water to tertiary standards for reuse in landscaping, toilet flushing, and cooling towers. At **Taj Mahal Hotel New Delhi**, advanced chemical-free ETPs recycle up to 60,000 L of laundry wastewater daily — saving freshwater equivalent to the needs of thousands of people.
- ITC Hotels provide in-house purified drinking water called **ŚūnyaAqua (Zero-Mile Water)** in reusable glass bottles in guest rooms. The water is purified

and bottled within the hotel itself, eliminating plastic bottles and transportation emissions.

- Rainwater harvesting systems capture monsoon runoff for non-potable reuse, reducing municipal draw. These systems are now standard in new luxury hotel projects across India.
- Greywater systems harvest shower and sink discharge for irrigation and flushing, integrated into smart piping networks that prioritize safe handling and storage.

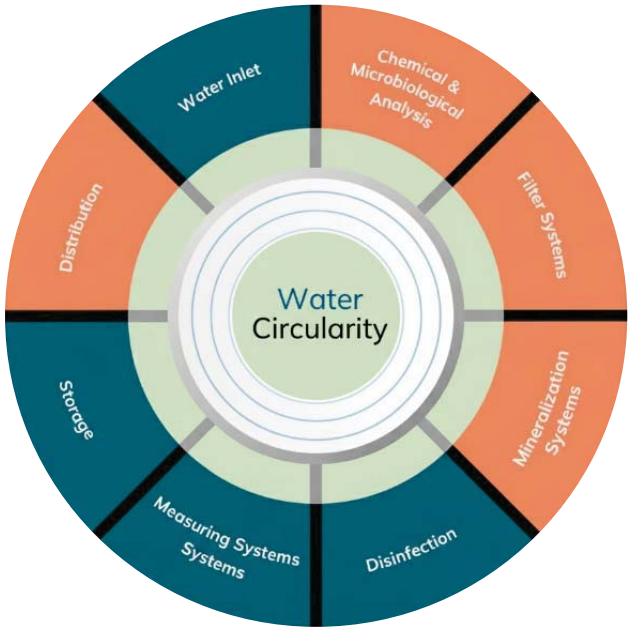
Industry Leaders Championing Water Efficiency

Hospitality giants are transforming theoretical frameworks into operational wins:

- **Indian Hotels Company Limited (IHCL)** has reduced water intensity by over 20% and recycles nearly half of generated wastewater through targeted strategies under its Paathya ESG framework.
- **ITC Hotels** leads with multiple **Zero Water certifications**, showcasing world-class water conservation that balances demand with onsite reuse.
- **Oberoi Hotels & Resorts** aims for **100% wastewater recycling** and a 20% reduction in freshwater usage per occupied room by 2030 as part of its "Elements by Oberoi" sustainability initiative.

Laundry and kitchen operations are among the most water-intensive indoor activities in buildings. Water consumption can be reduced through demand-side management measures such as using high-efficiency appliances, operating equipment at full load capacity, and optimizing linen and towel replacement frequencies based on occupancy, usage patterns, and hygiene requirements. These operational interventions can significantly improve water-use efficiency while maintaining required service and sanitation standards.

The **energy–water nexus** highlights the deep interdependence between water and energy systems. Every stage of the water cycle, from extraction and treatment to pumping, distribution, heating, and wastewater management, requires significant energy. For instance, groundwater must be pumped from aquifers, municipal water must be treated and transported through extensive pipeline networks, and hot water used in homes, hotels, and industries requires additional energy for heating. When water is wasted, the energy used to move, treat, and heat that water is also wasted. Conversely, reducing water consumption through efficient fixtures, recycling systems, and responsible usage directly lowers the energy demand associated with water infrastructure. This relationship makes water conservation not only a resource management strategy but also an important pathway to reduce energy consumption, operational costs, and carbon emissions, reinforcing the critical link between sustainable water management and energy efficiency.



Achieving water circularity is essential for reaching carbon neutrality. Water systems are energy-intensive, involving extraction, treatment, pumping, and heating, all of which contribute to carbon emissions. By adopting circular water practices such as wastewater recycling, rainwater harvesting, and efficient plumbing systems, the hospitality industry can significantly reduce both water demand and energy use, thereby moving closer to its sustainability and net-zero goals.

Conclusion: Engineering Green Hospitality

In the next decade, water efficiency and smart plumbing will evolve from sustainability markers to *business imperatives* for luxury properties. Integrating hydropneumatic designs, advanced hot water systems, IoT-driven controls, and recycled water loops not only reduces environmental impact but enhances guest comfort, lowers operating costs, and strengthens brand equity. As the hospitality industry competes for eco-minded travelers and regulatory compliance, *intelligent water infrastructure will* be its backbone, enabling hotels to deliver both luxury and sustainability at scale.

Regular water quality monitoring and filtration systems ensure safe drinking water for hotel guests.

Access to safe and clean water is a fundamental requirement in the hospitality industry, as poor water quality can pose serious health risks to guests. In many cities facing water shortages, hotels often depend on tanker water, which, if not properly tested and treated, can become a source of contamination. Waterborne diseases such as cholera, dysentery, typhoid, ambiosis, leptospirosis and diarrhoea, among others, are commonly associated with unsafe water and can lead to severe guest discomfort, health complications, and reputational damage for the property. Therefore, maintaining strict water quality standards through proper filtration, treatment, and regular monitoring is essential. Clean and safe water is not merely an operational necessity for hotels but a critical component of guest safety and well-being, as contaminated water can have serious and sometimes life-threatening consequences.

As the hospitality sector advances towards net-zero ambitions, water circularity will become a defining characteristic of resilient and responsible hotel operations. Hotels that integrate smart plumbing, reuse systems, and data-driven water management today will be better positioned to meet evolving regulatory expectations while delivering exceptional guest experiences tomorrow.

Gurmit Singh Arora
National President
Indian Plumbing Association

Gurmit Singh Arora, National President, Indian Plumbing Association and Chairman, IGBC - Marketing Outreach and Strategic Alliances, is a renowned expert in water conservation and sustainable development, actively contributing to national initiatives on water efficiency, green buildings, and sustainable infrastructure across India through various government and industry bodies.

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- Shobha N. V.

Water: The Defining Resource of Future Cities

Water has always been the lifeline of civilization. Today, however, it is emerging as one of the greatest challenges facing urban development worldwide. Rapid urbanization, climate change, population growth, groundwater depletion, and aging infrastructure are placing unprecedented stress on urban water systems.

India is expected to witness continued urban growth over the coming decades, with cities becoming the engines of economic development. Yet many urban centers already struggle with intermittent water supply, high distribution losses, flooding during monsoons, and increasing dependence on diminishing groundwater reserves.

The question before planners, developers, engineers, and policymakers is no longer whether we have enough water—but whether we can manage available water intelligently.

This is where Smart Water Management (SWM) becomes a transformative solution.

Smart water management represents the convergence of plumbing engineering, digital technologies, automation, artificial intelligence, and sustainable design principles to create resilient and water-secure cities.

The future city will not simply consume water. It will measure it, monitor it, recycle it, conserve it, and continuously optimize its use.

The Urban Water Challenge

Across India, municipalities face a common set of challenges:

- Increasing water demand
- Non-Revenue Water (NRW) losses
- Groundwater depletion
- Aging distribution networks
- Rising energy costs
- Inadequate wastewater reuse
- Climate-induced droughts and floods

In many cities, significant volumes of treated water are lost before reaching consumers due to leakages, unauthorized connections, and inefficient infrastructure.

Simultaneously, wastewater is often treated as a disposal problem rather than a reusable resource.

The traditional approach of continually sourcing more water is no longer sustainable.

The future lies in maximizing the efficiency of every drop.

The Evolution of Water Infrastructure

Urban water management has evolved through three distinct phases:

Generation	Characteristics
Traditional Water Systems	Manual monitoring, reactive maintenance
Automated Water Systems	SCADA controls and centralized operations
Smart Water Systems	IoT, AI, predictive analytics, real-time optimization

The third generation introduces intelligence into the entire water ecosystem.

Every asset—from a household meter to a treatment plant—becomes a data-generating node capable of contributing to informed decision-making.

Smart Metering: The Foundation of Water Intelligence

One cannot manage what cannot be measured.

Smart water meters are often the first step toward building intelligent water infrastructure.

Unlike conventional meters, smart meters provide:

- Real-time consumption data
- Automated billing
- Leak alerts
- Demand forecasting
- Consumer awareness

For utilities, this means better operational control.

For consumers, it promotes responsible water usage and transparency.

For cities, it creates a digital foundation for future water planning.

IoT: Creating Connected Water Networks

The Internet of Things (IoT) is revolutionizing how cities manage water.

Thousands of sensors can now be deployed across:

- Pipelines
- Reservoirs
- Pumping stations

- Treatment plants
- Building systems

These sensors continuously monitor:

- Flow rates
- Pressure
- Water quality
- Tank levels
- Energy consumption

Information is transmitted instantly to centralized control platforms, enabling operators to identify abnormalities before they become crises.

Imagine a city where a pipeline leak is detected and repaired before residents even notice a supply disruption.

That future is already becoming reality.

Artificial Intelligence and Predictive Water Management

Perhaps the most exciting advancement in water technology is the integration of Artificial Intelligence.

AI allows cities to move beyond reactive maintenance toward predictive management.

Applications include:

Predictive Maintenance

Algorithms identify equipment likely to fail before breakdowns occur.

Demand Forecasting

Utilities can anticipate seasonal and hourly consumption patterns.

Leak Prediction

Machine learning models analyze pressure and flow patterns to identify hidden leak risks.

Water Quality Monitoring

AI systems can detect contamination trends and trigger preventive actions.

The result is greater efficiency, lower operational costs, and improved reliability.

Smart Plumbing Systems in Modern Buildings

Buildings account for a substantial share of urban water consumption.

Modern plumbing systems are becoming increasingly intelligent through:

- Sensor-based fixtures
- Touchless technology
- Smart pressure management
- Automated leak detection
- Water consumption analytics

Commercial developments, hospitals, hotels, airports, and residential communities are increasingly integrating smart plumbing solutions into their sustainability strategies.

The plumbing profession itself is evolving from installation-focused services toward integrated water management expertise.

Rainwater Harvesting: Combining Tradition with Technology

India has a long history of rainwater harvesting.

What is changing today is the application of technology to improve efficiency and monitoring.

Modern systems incorporate:

- Automated filtration
- Smart storage monitoring
- Water quality sensors
- Overflow management systems

Rainwater harvesting is no longer simply a compliance requirement.

It has become a strategic resource for enhancing urban water resilience.

Every building should be viewed as a potential water collection and storage asset.

Wastewater Recycling and Circular Water Economy

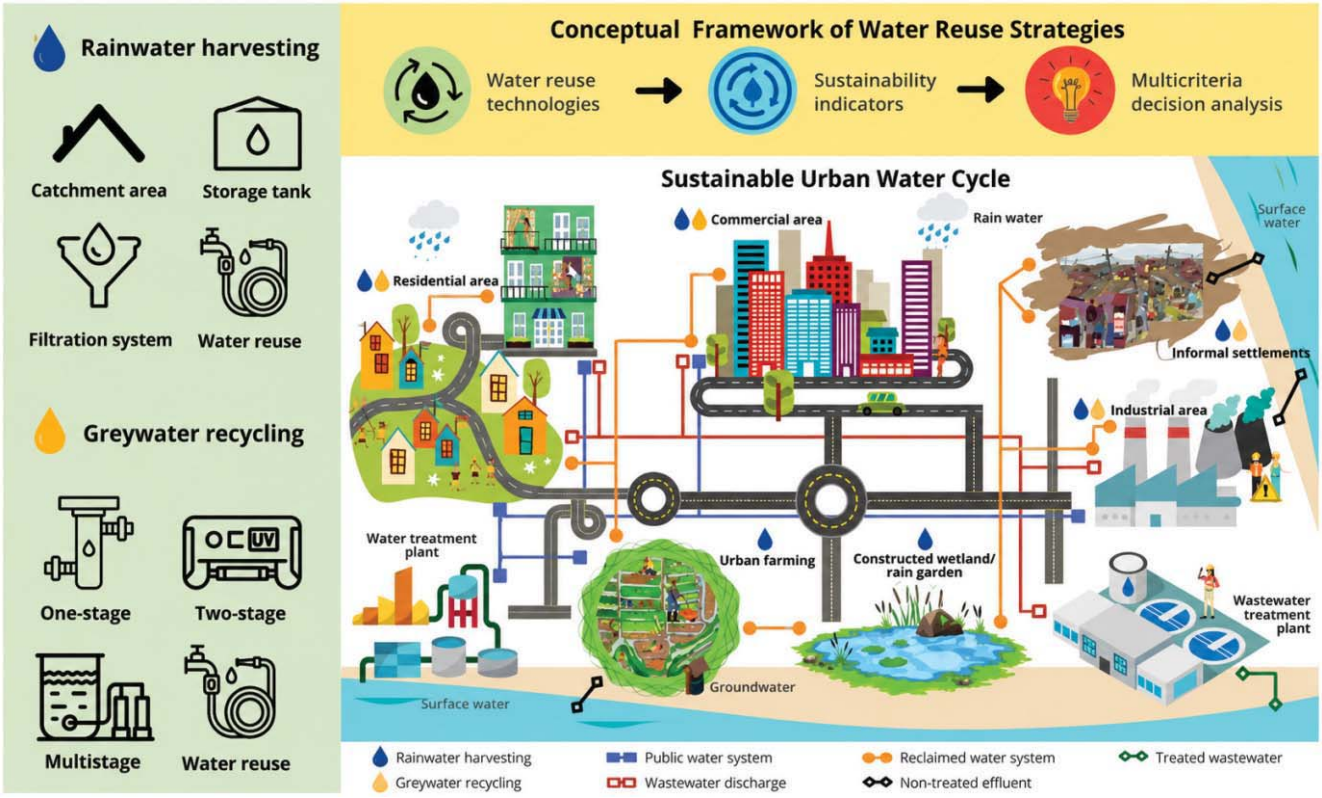
One of the most significant shifts in urban water management is the transition toward a circular water economy.

Instead of viewing wastewater as waste, future cities will treat it as a valuable resource.

Recycled water can be used for:

- Landscape irrigation
- Toilet flushing
- Cooling towers
- Industrial processes
- Construction activities

Large developments increasingly incorporate decentralized treatment systems that enable substantial reductions in freshwater consumption.



The concept is simple:

"Use water once, and it becomes a cost. Use it multiple times, and it becomes an asset."

Digital Twins: The Next Frontier

A digital twin is a virtual replica of a physical water network.

Using real-time sensor data, cities can simulate system behavior before implementing decisions.

Benefits include:

- Scenario analysis
- Infrastructure planning
- Emergency response preparation
- Asset optimization
- Climate resilience assessment

Digital twins are expected to become a standard planning tool for future smart cities.

The Role of Developers and Urban Planners

Sustainable water management cannot be achieved solely through municipal intervention.

Developers and urban planners must integrate water sustainability from the earliest design stages.

Future-ready developments should include:

✓ Smart metering

✓ Rainwater harvesting

✓ Greywater recycling

✓ Water-efficient plumbing fixtures

✓ Leak detection systems

✓ Smart irrigation

✓ Water monitoring dashboards

Water infrastructure must be treated as a strategic investment rather than a statutory requirement.

Case for Sustainable Cities

A sustainable city is not defined solely by green buildings or renewable energy.

It is defined by its ability to manage resources responsibly.

Smart water technologies contribute directly to:

- Environmental sustainability
- Economic efficiency
- Public health
- Climate resilience

- Urban livability

As India continues its urban transformation, water security will become one of the most critical indicators of city competitiveness and quality of life.

Cities that invest in intelligent water infrastructure today will be better positioned to thrive tomorrow.

Key Learnings

1. Water management is becoming data-driven.
2. Smart technologies significantly reduce wastage.
3. IoT and AI enable predictive decision-making.
4. Rainwater harvesting remains a critical urban resource.
5. Wastewater recycling is essential for future water security.
6. Plumbing professionals play a strategic role in sustainability.
7. Smart water infrastructure improves resilience and operational efficiency.

Conclusion

The future of urban development depends not only on how we build our cities but also on how we manage the resources that sustain them.

Water is arguably the most critical of these resources.

Smart water management technologies provide a pathway toward sustainable, resilient, and future-ready cities by combining engineering excellence with digital innovation.

For India, where urbanization and climate pressures are simultaneously accelerating, the adoption of intelligent water infrastructure is no longer a choice—it is an imperative.

As professionals in the plumbing, infrastructure, and built-environment sectors, we have an opportunity and a responsibility to lead this transformation.

The cities of tomorrow will not be measured merely by their skylines.

They will be measured by how intelligently they manage every drop of water.

Executive Takeaways

For Policymakers

- Invest in digital water infrastructure.
- Mandate smart metering and water reuse.

For Developers

- Integrate smart water systems at design stage.
- Adopt circular water management practices.

For Plumbing Professionals

- Expand expertise into digital water technologies.
- Champion water efficiency and sustainability.

For Cities

- Build intelligent, resilient, and water-secure ecosystems.

Shobha N. V.
Founder & CEO
Infinite Building Technologies

Shobha N. V. is a seasoned real estate and infrastructure leader with over 28+ years of experience delivering large-scale urban development projects across India. She has led the execution of over 40 million sq. ft. of residential, commercial, IT/SEZ, retail, and hospitality developments, with a cumulative project value exceeding ₹7,600 crore. She is a Certified Independent Director (MCA-India) and International Corporate Director, Shobha is also a certified ESG and BRSR expert, enabling organizations to strengthen compliance frameworks, enhance sustainability performance, and align with evolving regulatory expectations. She can be reached at shobha@infinitebuildingtechnologies.com

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Rethinking Kitchen Infrastructure: Why Grease Management Is Becoming Critical in India's Hospitality Sector

SFA India Launches Sanigrease Grease Separator at Plumbex India 2026

SFA INDIA
Shaking up water

India's hospitality sector is expanding rapidly, with new restaurants, hotels, and cloud kitchens opening across cities at an unprecedented pace. From premium dining spaces in metro cities to fast-growing QSR chains and delivery-focused kitchens, the industry is scaling to meet evolving consumer demand. However, behind the seamless customer experience lies a growing infrastructure challenge, one that often goes unnoticed until it disrupts operations: the management of fats, oils, and grease (FOG) in commercial kitchens.

Every commercial kitchen generates wastewater loaded with FOG. Left unmanaged, these substances accumulate within drainage systems, gradually restricting flow and eventually leading to blockages. The result is not just a maintenance issue, but a combination of operational downtime, hygiene risks, foul odours, and increased costs. For businesses that depend on consistency and cleanliness, such disruptions can directly impact both efficiency and reputation.

Traditionally, grease management has been treated as a reactive problem, addressed only when blockages occur. However, with the scale and intensity of today's hospitality operations, this approach is no longer sufficient. Preventive infrastructure is becoming essential.

Adding to this shift is the growing role of regulatory oversight. Municipal and local authorities are increasingly enforcing grease management practices to prevent FOG from entering public sewer systems and damaging infrastructure, particularly in dense urban environments where drainage networks are under constant strain. For hospitality businesses, this means grease management is no longer just an operational concern, but a critical part of compliance and sustainable infrastructure planning.

Globally, this challenge has already been addressed through the adoption of dedicated grease separation systems. These solutions are designed to intercept FOG at the source, separating it from wastewater before it enters the drainage network. The result is a cleaner, more efficient system that reduces the likelihood of blockages and extends the life of plumbing infrastructure.

As India's hospitality sector matures, it is increasingly looking toward such proven solutions. This is where global expertise becomes particularly relevant. SFA India, the Indian subsidiary of SFA Group, a global leader in wastewater and pumping solutions, is bringing its grease separation technology to the Indian market through Sanigrease Grease Separator range, a solution developed for efficient grease separation in commercial kitchens.

The Sanigrease Grease Separator was launched by SFA India at Plumbex India 2026, held in Bengaluru in April, where the company showcased its innovative plumbing, wastewater, and grease separation solutions to industry professionals. The launch highlighted SFA India's focus on addressing practical infrastructure challenges faced by modern commercial kitchens, especially in sectors where hygiene, reliability, and operational continuity are critical.

Sanigrease Grease Separator – Advanced Grease Separation Solution for Commercial Kitchens

SFA India Booth at Plumbex India 2026: Showcasing Innovative Plumbing and Grease Separation Solutions (Bengaluru, India)

Speaking about the launch, Udit Khattry, Country Manager, SFA Pumps India Pvt. Ltd., said, "Today, the MEP fraternity in India is increasingly adopting solutions that align with environmental and sustainability goals. Among these, grease separators have emerged as a critical solution, widely used across hotels, commercial establishments, and large infrastructure projects. At SFA India, we have earned the trust of the MEP community through our high-quality products and dependable service support. With the introduction of the Sanigrease range, we are strengthening our commitment to delivering reliable, high-performance solutions that address the evolving requirements of the hospitality and infrastructure sectors. Backed by a strong pan-India distribution network, we are well positioned to support projects across the country."

Designed for restaurants, hotels, cafeterias, cloud kitchens, food courts, institutional kitchens, and other commercial food preparation spaces, Sanigrease helps separate grease from wastewater before it reaches the drainage system. By addressing grease at the source, it helps reduce maintenance needs, minimize the risk of blockages, improve hygiene conditions, and ensure smoother day-to-day operations.

Beyond immediate operational benefits, the adoption of such systems also aligns with broader industry trends. Sustainability, resource efficiency, and regulatory compliance are becoming central to how hospitality businesses design and manage their spaces. Kitchen infrastructure, once considered purely functional, is now being re-evaluated as a critical component of overall performance.

Another important factor is the changing nature of kitchen formats. The rise of cloud kitchens and compact urban setups often comes with space constraints and complex plumbing layouts. In such environments, solutions need to be not only effective but also adaptable and easy to install without extensive structural modifications. This further emphasizes the need for modern, engineered systems over conventional approaches.

As awareness grows, stakeholders across the ecosystem, architects, consultants, facility managers, and business owners, are beginning to factor grease management into their planning processes from the outset. This marks a significant shift from reactive fixes to proactive design thinking. At Plumbex India 2026, SFA India's booth served as a platform to present this evolving approach to plumbing and wastewater management. By showcasing Sanigrease alongside its broader range of solutions, SFA India reinforced the importance of preventive infrastructure for modern buildings and commercial kitchens.

As India's hospitality sector continues its growth trajectory, the focus is steadily expanding beyond front-end design and customer experience to the strength and reliability of backend infrastructure. Grease management, once overlooked, is now becoming integral to sustainable and compliant kitchen operations. With the launch of Sanigrease Grease Separator at Plumbex India 2026, SFA India is bringing global expertise to the market, helping the industry move toward smarter, preventive solutions that not only solve today's challenges but also prepare commercial kitchens for the demands of tomorrow.

COMPANY PROFILE

SFA INDIA
Shaking up water

SFA India is a subsidiary of the SFA Group, a global leader in innovative wastewater and drainage solutions with a presence in over 30 countries. The company offers wastewater evacuation and drainage systems, including macerators, grey water pumps, lifting stations, condensate pumps, and grease separators, enabling the installation of bathrooms, kitchens, and drainage infrastructure where conventional gravity-based plumbing is not feasible. Through its range of reliable and efficient solutions, SFA India helps residential, commercial, hospitality, healthcare, and institutional projects overcome complex drainage challenges, delivering greater flexibility in building design and wastewater evacuation.

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Indian Architectural Plumbing League 2026

1–5 June 2026

India Habitat Centre, New Delhi

The Indian Architectural Plumbing League (IAPL) 2026, jointly organized by the **Council of Architecture (CoA)** and the **Indian Plumbing Association (IPA)**, was successfully conducted from 1st to 5th June 2026 at Jacaranda Hall, India Habitat Centre, New Delhi. The program comprises **20 hours** of immersive offline learning, including four days of expert discussions and deliberations, culminating in a site visit on Day 5 conducted under expert guidance. The five-day Professional Development Programme was designed to bridge the gap between architectural design and plumbing engineering by equipping architects with practical knowledge of water management, plumbing systems, sustainability, and building services integration.

The programme was designed to enhance architects' understanding of plumbing fundamentals, relevant

codes, and sustainable water management practices. It focused on strengthening knowledge of water supply, drainage, and stormwater systems while introducing innovative plumbing solutions and emerging industry trends. The programme also encouraged better integration and coordination between architectural design and plumbing disciplines, complemented by practical learning through real-world case studies and site exposure.

Distinguished Speakers

The programme brought together eminent professionals from the architecture, plumbing, and building services sectors. Notable speakers included:

Sandeep Goel

Ar. Anupam Bansal

Er. Subhash Deshpande

Mukesh Asija

Prof. (Dr.) Amit Hajela

Manjula Thavarekere

Sharat V. Rao

Ar. Raman Vig

Distinguished Speakers

B.O. Prasanna Kumar

Dr. S. Virapan

Minesh Shah

Assessment and Certification

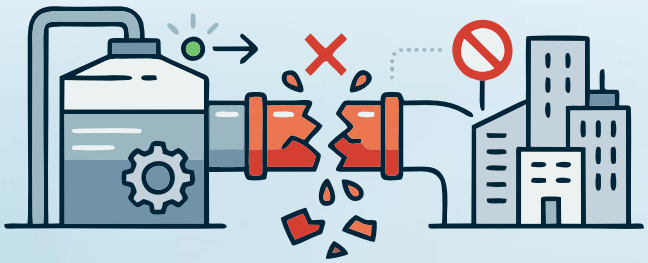
Following the completion of all technical sessions, participants appeared for an offline classroom assessment to evaluate their understanding of the key concepts covered during the programme. Participants who successfully qualified were awarded a Certificate of Completion jointly issued by the Council of Architecture (COA) and the Indian Plumbing Association (IPA).

Site Visit at 'The Amaryllis' by Unity Group

The programme also included a structured assessment process and concluded with a site visit to a distinguished building, allowing participants to observe practical implementation of concepts discussed during the sessions.

The Indian Architectural Plumbing League (IAPL) 2026 marked a significant step toward strengthening the integration of architecture and plumbing disciplines. Through expert-led technical sessions, knowledge sharing, practical exposure, and collaborative learning, the programme successfully enhanced participants' understanding of sustainable water management and modern plumbing systems. IAPL has established itself as a valuable platform for professional development and is expected to play an increasingly important role in shaping sustainable built environments across India.

From STP to System: Why Water Reuse Fails Even When Treatment Works



Part 2: Designing Reuse Systems That Work – Beyond Plant-Centric Thinking

- Madhava Narasimha Murthy Nedunuri

INTRODUCTION

In Part 1, we examined why water reuse fails despite technically sound STPs. The issue was not treatment performance, but the absence of system integration across distribution, storage, operations, and user experience. If reuse depends on the system rather than the plant, then the next question becomes unavoidable:

How should these systems be designed differently? Addressing reuse failure requires a fundamental shift in approach. The focus must move from designing a treatment plant to designing an integrated system. A system-level approach recognises that reuse performance is not determined by any single component, but by the interaction between storage, hydraulics, circulation, operational response, and end-use behaviour over time. This part explores the design and execution principles that determine whether treated water is consistently delivered, maintained, and ultimately used.

From Plant Design to System Design

One of the most common mistakes in township water infrastructure is treating the STP as the reuse system itself.

In practice, the STP is only one component within a much larger chain. Reuse performance depends not only on treatment quality, but on how water behaves after leaving the plant. Storage conditions, distribution hydraulics, circulation behaviour, pressure stability, and end-use delivery collectively determine whether reuse functions reliably.

However, most projects continue to approach reuse from a plant-centric perspective. Significant effort is invested in selecting treatment technology, achieving discharge standards, and optimising the STP process. Meanwhile, the downstream system is often treated as secondary infrastructure.

This creates a structural imbalance in design thinking.

A reuse system must be approached as a continuous hydraulic and operational network rather than a treatment asset connected to pipes. The transition from "STP design" to "system design" is therefore not a technological shift, but a conceptual one.

Hydraulic Stability: The Most Ignored Layer

In many developments, reuse distribution systems are designed with compromises that would never be accepted in potable networks.

Dead-end branches are introduced to simplify routing. Pressure balancing is overlooked under the assumption that flushing systems are non-critical. Network circulation is rarely evaluated beyond basic flow movement.

Over time, these decisions become operational problems.

Zones with low circulation begin to experience stagnation. Towers located farther from pumping points experience inconsistent pressure. Localised flow imbalance creates unequal performance across the development. The system may technically function, but not uniformly.

Hydraulic stability is not optional in reuse systems. In fact, it becomes more critical because reused water is more sensitive to retention and stagnation effects than potable supply.

Distribution networks must therefore be designed with the same engineering discipline applied to primary water infrastructure.

Looped networks improve circulation stability and reduce stagnation zones. Pressure zoning becomes essential in high-rise developments where demand patterns vary significantly across towers and occupancy conditions.

A hydraulically unstable reuse network eventually becomes operationally unstable.

Storage Design: Capacity Alone Is Not Performance

Storage tanks are often oversized in reuse systems to provide operational flexibility and backup. While this appears safe during design, it frequently creates long-term performance problems.

Unlike potable water demand, reuse demand fluctuates significantly depending on occupancy, usage behaviour, and seasonal variation. When storage capacity is excessive relative to actual demand, turnover reduces and retention time increases.

From an engineering perspective, retention time directly influences water stability.

Low-turnover storage creates conditions where odour formation, biological activity, and sensory degradation become more likely. Even when treated water leaves the STP within acceptable quality parameters, its condition changes during prolonged storage.

This distinction is critical. Water quality at the STP outlet is not the same as water quality at the point of use.

Storage systems must therefore be designed based not only on static capacity calculations, but on turnover behaviour under realistic occupancy conditions. Ventilation, circulation, accessibility for maintenance, and operational flushing arrangements must also be integrated into the design itself.

A well-designed storage system is not one that stores more water.

It is one that prevents stored water from degrading.

Integration Between STP Output and Network Demand

Equally important is how the system responds to variation.

Demand in residential developments is not constant. It changes with occupancy, time of day, and user

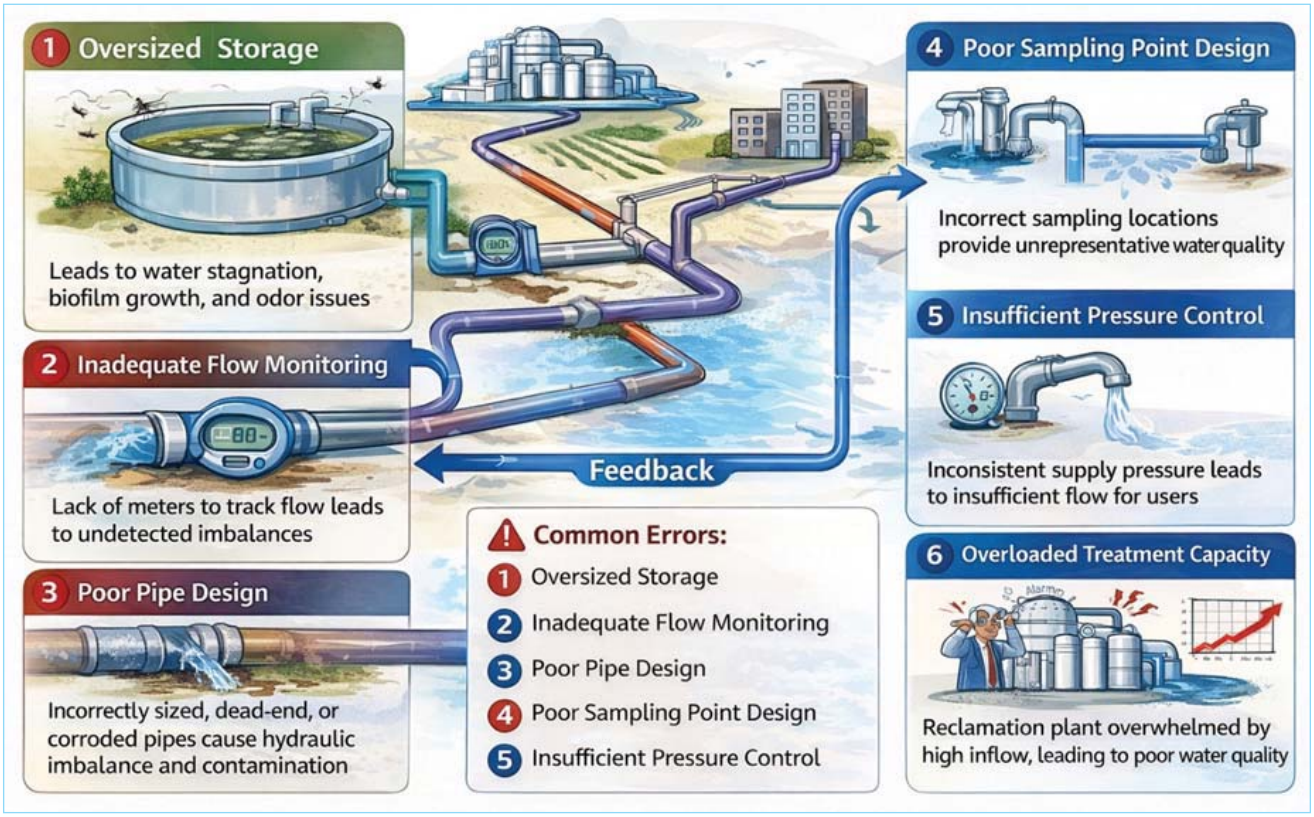


Fig. 6: Typical Design and Execution Errors in Reuse Systems

behaviour. A well-designed system must accommodate these variations without compromising performance.

This requires careful integration between STP output, storage levels, and distribution control.

Monitoring also plays a crucial role in this integration. Flow and pressure data must not only be captured, but interpreted. Systems that are visible but not understood still fail.

Reuse, therefore, is not achieved at the outlet of the STP.

It is achieved at the point where water is delivered consistently, under stable conditions, and without degradation.

Common Design and Execution Mistakes in Reuse Systems

Across multiple projects, reuse systems rarely fail because of a single major design flaw. Instead, failure emerges from a series of small decisions—often made with practical constraints in mind—that collectively compromise system performance over time.

One of the most common issues begins at the design stage, where reuse networks are treated as secondary to potable systems. This leads to compromises in routing, sizing, and hydraulic planning. Dead-end branches are introduced to simplify layouts, without fully considering their long-term impact on stagnation and water quality. In many cases, the absence of looped networks results in uneven distribution, where certain zones receive consistent supply while others remain under-served.

Another recurring issue is improper pressure planning. Reuse systems are often designed to operate at lower pressures, under the assumption that they serve non-critical applications such as flushing. However, insufficient or inconsistent pressure at end-use points directly affects performance and user experience. Over time, this leads to dissatisfaction and eventual rejection of reuse.

Segregation between potable and reuse systems is another area where execution challenges are frequently observed. While designs may clearly differentiate the two networks, implementation on site may not always maintain the same level of discipline. Poor identification, lack of colour coding, or incorrect connections can introduce risks that compromise both safety and confidence in the system.

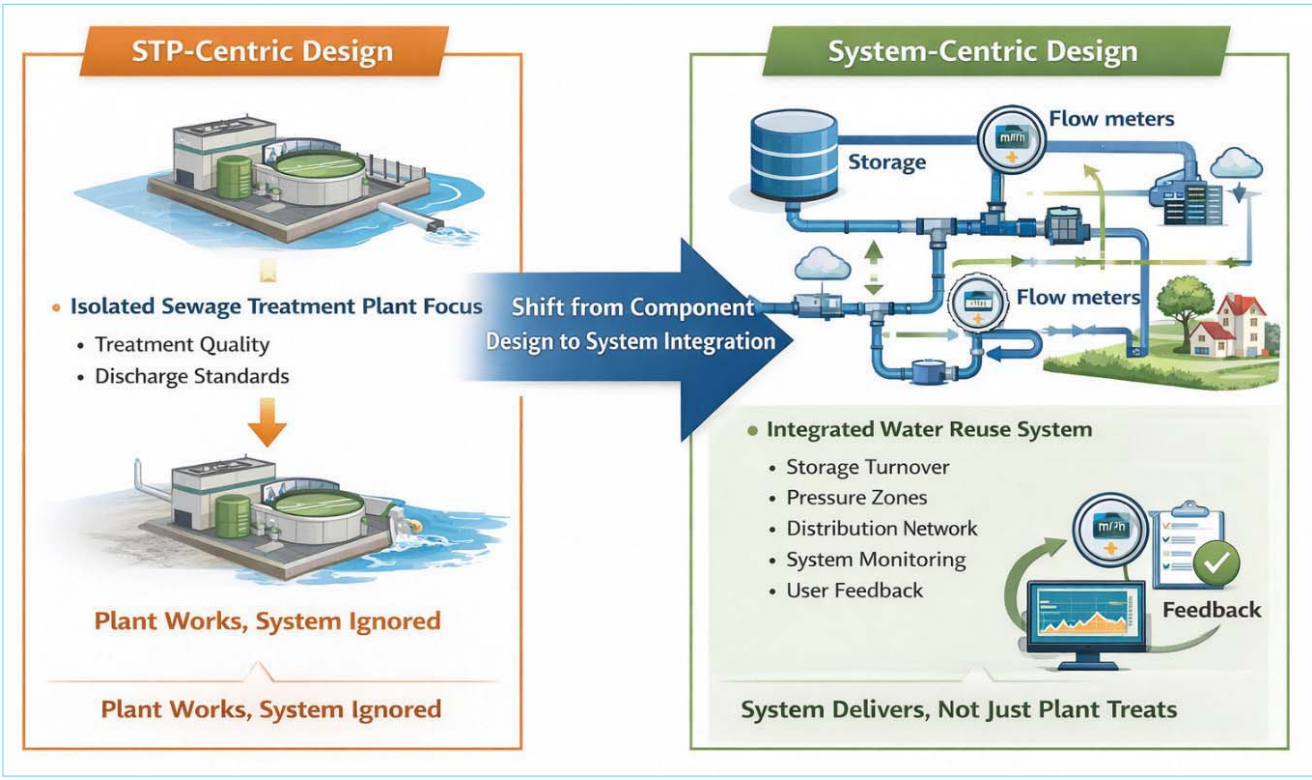


Fig. 7: Transition from STP-Centric to System-Centric Design

Storage-related mistakes also contribute significantly to reuse failure. Tanks are often oversized to provide operational flexibility, but without adequate consideration of turnover. This results in prolonged retention times, increasing the likelihood of odour formation and quality degradation. Additionally, tank access for inspection and cleaning is often restricted, making maintenance difficult.

During execution, deviations from design intent further compound these issues. Pipe slopes may not be maintained accurately, leading to air pockets or partial stagnation. Valves and balancing elements may be omitted or installed in inaccessible locations, limiting operational control.

Individually, these issues may appear minor.

Collectively, they create systems that are technically complete but operationally fragile.

From STP to System Thinking

Addressing reuse failure requires a fundamental shift in approach. The focus must move from designing a treatment plant to designing an integrated system.

A system-level approach recognises that the performance of reuse is not determined by any single component, but by the interaction between all components over time. Hydraulic design must ensure continuous circulation and balanced pressure across the network so that treated water does not remain stagnant or degrade before reaching the point of use. Storage systems must be optimised not only for capacity, but for turnover characteristics that reflect actual consumption patterns. Oversized tanks with low utilisation can be as detrimental as undersized systems.

Equally important is how the system responds to variation. Demand in residential developments is not constant. It changes with occupancy, time of day, and user behaviour. A well-designed system must accommodate these variations without compromising performance. This requires careful integration between STP output, storage levels, and distribution control.

Monitoring plays a crucial role in this integration. Flow and pressure data must not only be captured, but interpreted. Systems that are visible but not understood still fail.

Reuse, therefore, is not achieved at the outlet of the STP. It is achieved at the point where water is delivered consistently, under stable conditions, and without degradation.

Designing for Trust, Not Just Treatment

Technical performance alone does not guarantee acceptance. For reuse to succeed, systems must be designed to build and sustain trust.

In most projects, user perception is treated as a secondary consideration, addressed only when complaints arise. However, perception is not an after-effect of system performance; it is a parallel parameter that must be considered during design itself.

Trust is built through consistency. When users experience reliable flushing performance, absence of odour, and stable water quality over time, confidence develops naturally. Conversely, even a technically compliant system can fail if performance is inconsistent. Occasional lapses—such as discolouration or odour—have a disproportionate impact on perception and can lead to long-term rejection of reuse.Visibility plays an important role in reinforcing trust. Systems that provide basic, understandable indicators of performance—whether through displays, communication, or clear identification of reuse networks—reduce uncertainty. Users are more likely to accept what they can see and understand.

It is also important to recognise that trust, once lost, is difficult to rebuild. Therefore, designing for trust is not about managing complaints, but about preventing situations that trigger them. This requires aligning technical reliability with user experience from the outset.

Conclusion

Most reuse systems do not fail because treatment technology is inadequate. They fail because the system surrounding treatment is fragmented, hydraulically unstable, or disconnected from real-world usage conditions.

The industry therefore needs a fundamental shift—from designing treatment plants to designing integrated reuse systems.

However, even well-designed systems can drift over time if they are not actively monitored, understood, and operated with discipline.

That is where the next challenge begins.

Part 3 will examine how operations, monitoring, circulation management, and user trust determine the long-term sustainability of reuse systems.

It will also explore why some projects maintain stable reuse performance while others gradually revert to freshwater dependence.

Madhava Narasimha Murthy Nedunuri
IPA Professional Member
FIE, Senior MEP Leader

Madhava Narasimha Murthy Nedunuri, FIE, is a senior MEP leader, IPA Professional Member who has spent two decades shaping complex building environments across India. His career spans leadership roles at Urbanac Infra Projects, IL&FS Engineering, Shapoorji Pallonji, and HCC, where he led delivery of high-rise residential towers, hospitals, malls, data centers, townships, and large commercial developments. A Fellow of The Institution of Engineers (India), Chartered Engineer, PMP®, PMI-RMP, and IGBC Accredited Professional, he is known for uniting technical clarity with execution reality. His approach emphasizes design-to-site alignment, lifecycle-focused decision-making, and building strong second-line leadership rather than dependence on individuals.

He can be reached at madhu091@gmail.com

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Mumbai

IPA Mumbai Chapter organised a tree plantation drive under **"Ek Ped Maa Ke Naam"** at Hiranandani Communities, Panvel. Celebrating World Environment Day, the Chapter committee members planted 150 diverse saplings, promoting sustainability and environmental stewardship.

Ahmedabad

IPA Ahmedabad Chapter successfully organised a Tech Talk on 13th June 2026 on "Sewage Treatment Plants and the Use of Reclaimed Water." The event witnessed a great participation, fostering knowledge sharing and sustainable water management practices.

Trivandrum

IPA Trivandrum Chapter successfully conducted a training program on "Measures for Proper Installation of Fixtures." The session was well attended by over 60 plumbers, including plumbing contractors, enhancing skills and promoting best installation practices.

Amaravati

IPA Amaravati Chapter organised a successful half-day seminar on "District Cooling Systems" with APCRDA, attracting 150+ stakeholders. The event strengthened IPA's engagement with the State Government and future technical collaborations.

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