

# **Total Water Management and Water Use Efficiency in Buildings & Cities**

**Presented by**

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## WATER AVAILABILITY & DEMAND SCENARIO



Lost in evaporation etc  
**2131 BCM**

Available water  
**1869 BCM**

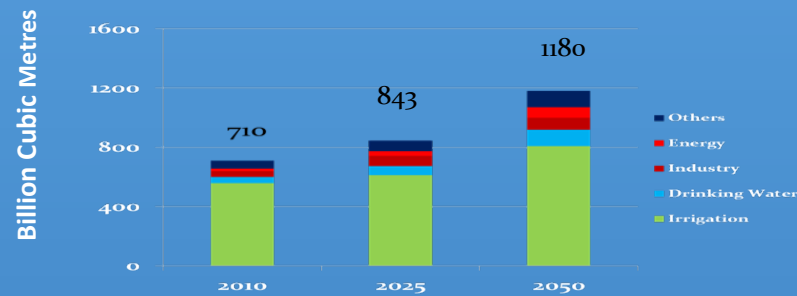
Usable Water  
**1123 BCM**

Non-Usable Water  
**746 BCM**

Surface Water  
**690 BCM**

Ground Water  
**433 BCM**

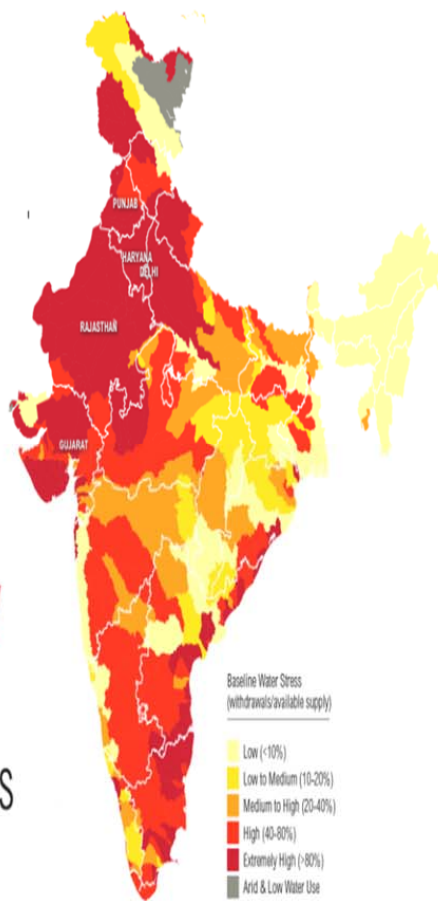
| Total Anticipated Demand |       |                   |
|--------------------------|-------|-------------------|
| S.No                     | Years | Water Demand(BCM) |
| 1                        | 2010  | 710               |
| 2                        | 2025  | 843               |
| 3                        | 2050  | 1180              |



- Water Use Efficiency in India is only 35 - 45% against 60% - 70% in developed countries.
- Agriculture consume 70-80 % of Usable water. Can we reduce it to 40-50%?

## WATER CRISIS IN CITIES

**54%**  
of India  
Faces  
**High to  
Extremely  
High**  
Water Stress



**844 Million**

Have no access to  
safe water

**1 Million**

Die due to water, sanitation and  
hygiene related diseases each year

**21 Cities**

Will run out of  
groundwater by 2020

**6% Loss**

By 2030, water woes could  
cause 6% loss of GDP

**GROWING  
CITIES  
STRUGGLING  
TO MEET THE  
WATER  
DEMAND**

**Water  
Bodies**

**Rain  
Water**

**Ground  
Water**

**Recycle  
Water**

**Depleting and contaminating Water resources**

**Municipal  
Water  
Supply**



**Bore  
Water**



**Tanker  
Water**



**How does one meet the daily water requirement**

# CITY WATER DEMAND

## Type of Demand

- Domestic Water Demand
- Institutional & Commercial Water Demand
- Demand for public use
- Fire protection
- Losses

## Factor affecting City Water Demand

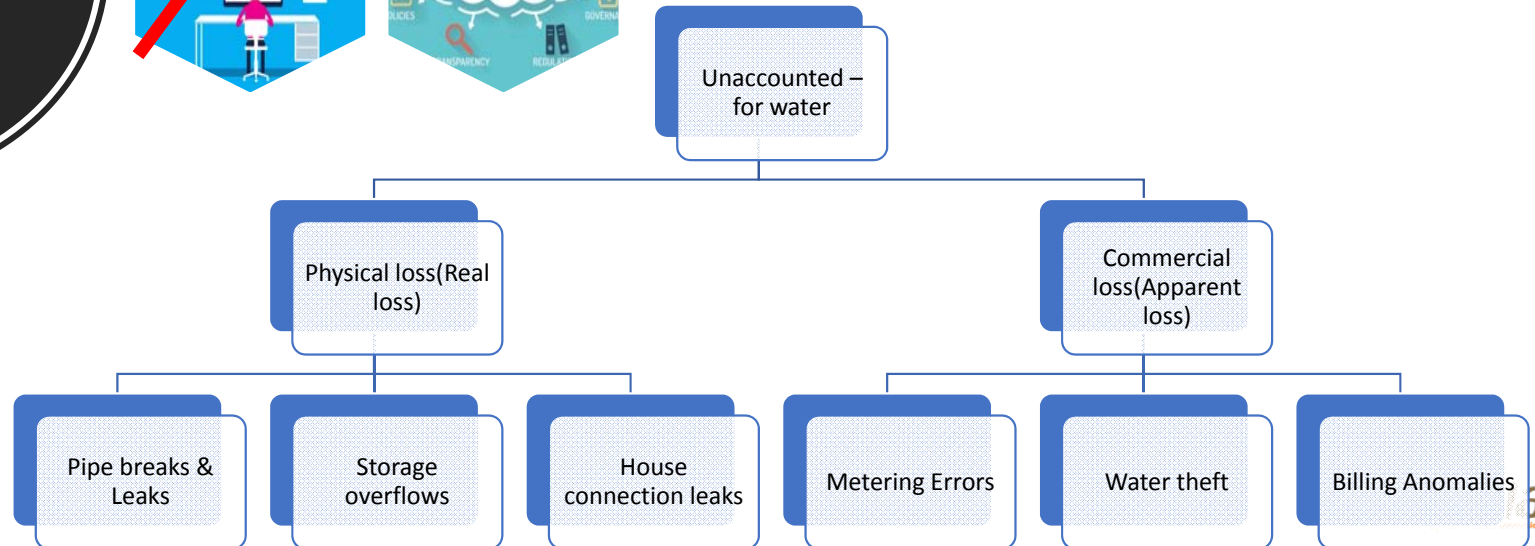
- Size of the City
- Population
- Living Standard
- Climatic conditions
- Availability (Quality & Quantity) of Water
- Commercial Activities
- Pressure in distribution system
- System of Sanitation
- System of Supply
- Metering & method of Charging
- Water Conservation measures

| S.No. | Particulars  | Water Requirement   |
|-------|--|---|
| 1.    | • Domestic Water   | 135 LPCD  |
| 3.    | Hospitals  | FOR <100 Beds= 340 LPCD<br>FOR >100 Beds=450 LPCD   |
| 4.    | Hostel/Boarding Schools  | 135 LPCD  |
| 5.    | Hotel  | 180 LPCD  |
| 6.    | Restaurants  | 70/SEATS  |
| 7.    | Offices  | 45 LPCD   |
| 8.    | Cinema & Concert hall  | 15/SEATS  |
| 9.    | Day Schools  | 45 LPCD   |
| 10    | Railways , bus station & Sea ports(MAIL EXPRESS)<br><br>Junction Railway stations with mails/ Express<br><br>Terminal stations                       | With Bathing=45 LPCD<br>Without Bathing=25 LPCD<br>With Bathing=70 LPCD<br>Without Bathing=45 LPCD<br>45 LPCD |
| 11.   | Airports   | 70 LPCD   |
| 12.   | Fire (for 2 hour duration)<br>City with population of <1,00,000<br>City with population of 1,00,000 to 3,00,000<br>City with population of >3,00,000 | 3600 L/Min/50,000 population<br>1800 L/Min/50,000 population<br>1800 L/Min/1,00,000 population                |

# WATER LOSSES IN CITIES



- Old Water Infrastructure
- Pipeline Leakage
- Irresponsible Human Behavior
- No implementation of 3Rs(Reuse, Recycle & Reclaim)
- Lack of Data driven Decision
- Improper implementation of Compliances



## NEED OF THE HOUR



Minimize Water Losses



Water Demand Reduction

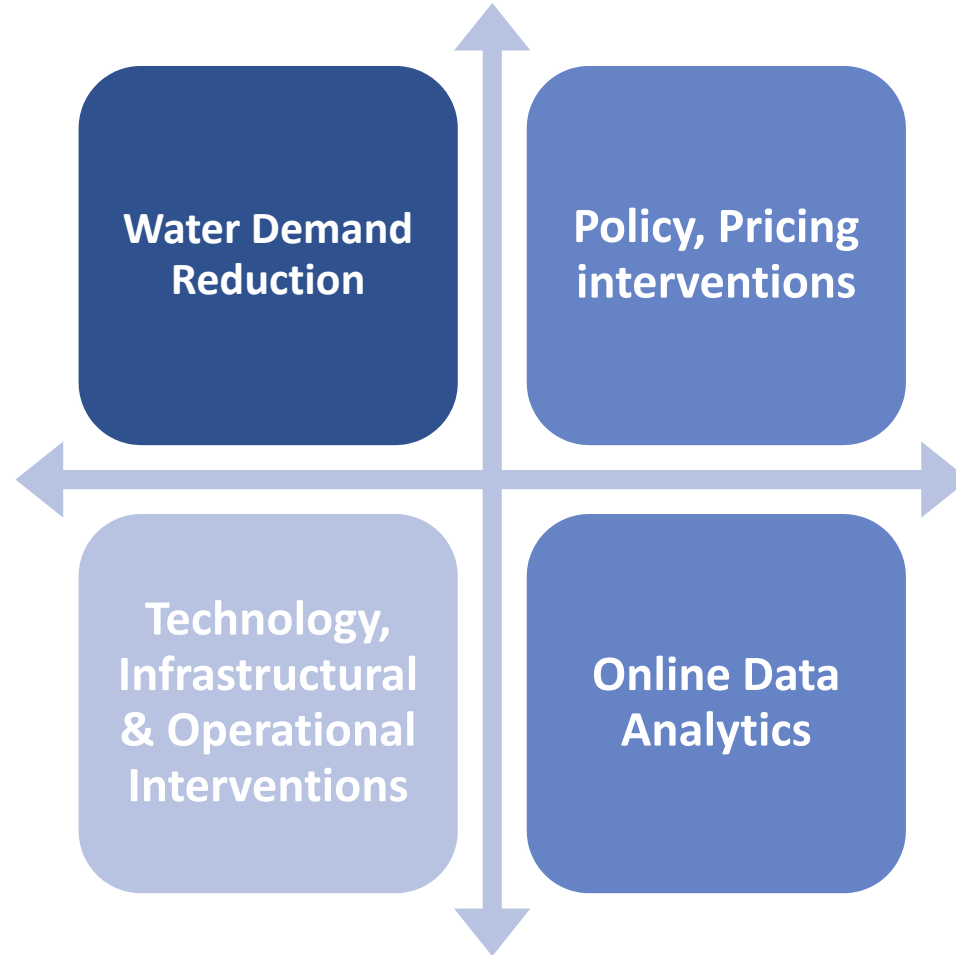


Sustainable Water Economics

24/7

24/7 Water Supply

**STRATEGIES  
TO AVERT  
FUTURE  
WATER CRISIS**



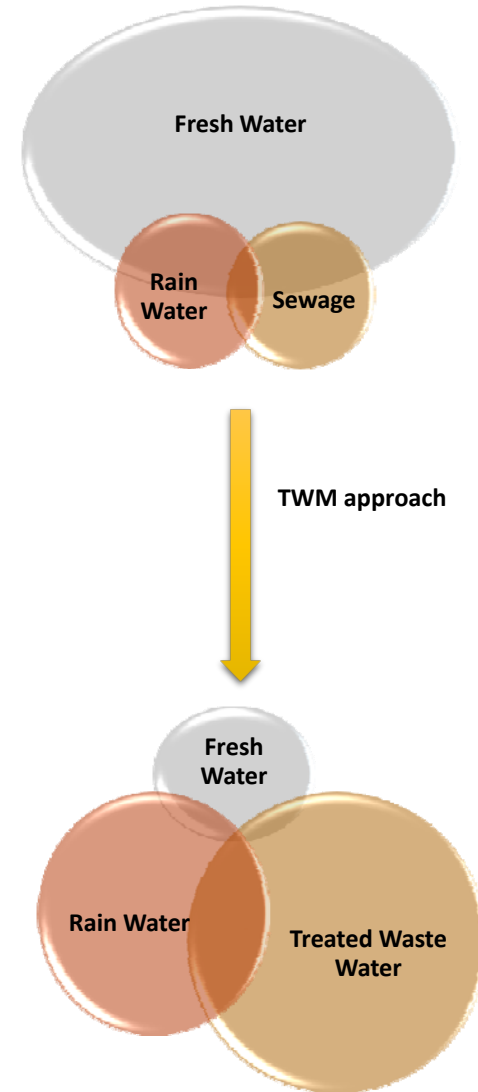


## TWM APPROACH TO MEET THE CURRENT NEEDS

It is an approach that examines city /Building water systems in a more interconnected manner. In broad term it includes Storm Water, Water Supply & Sewage management. Mainly focusing on:

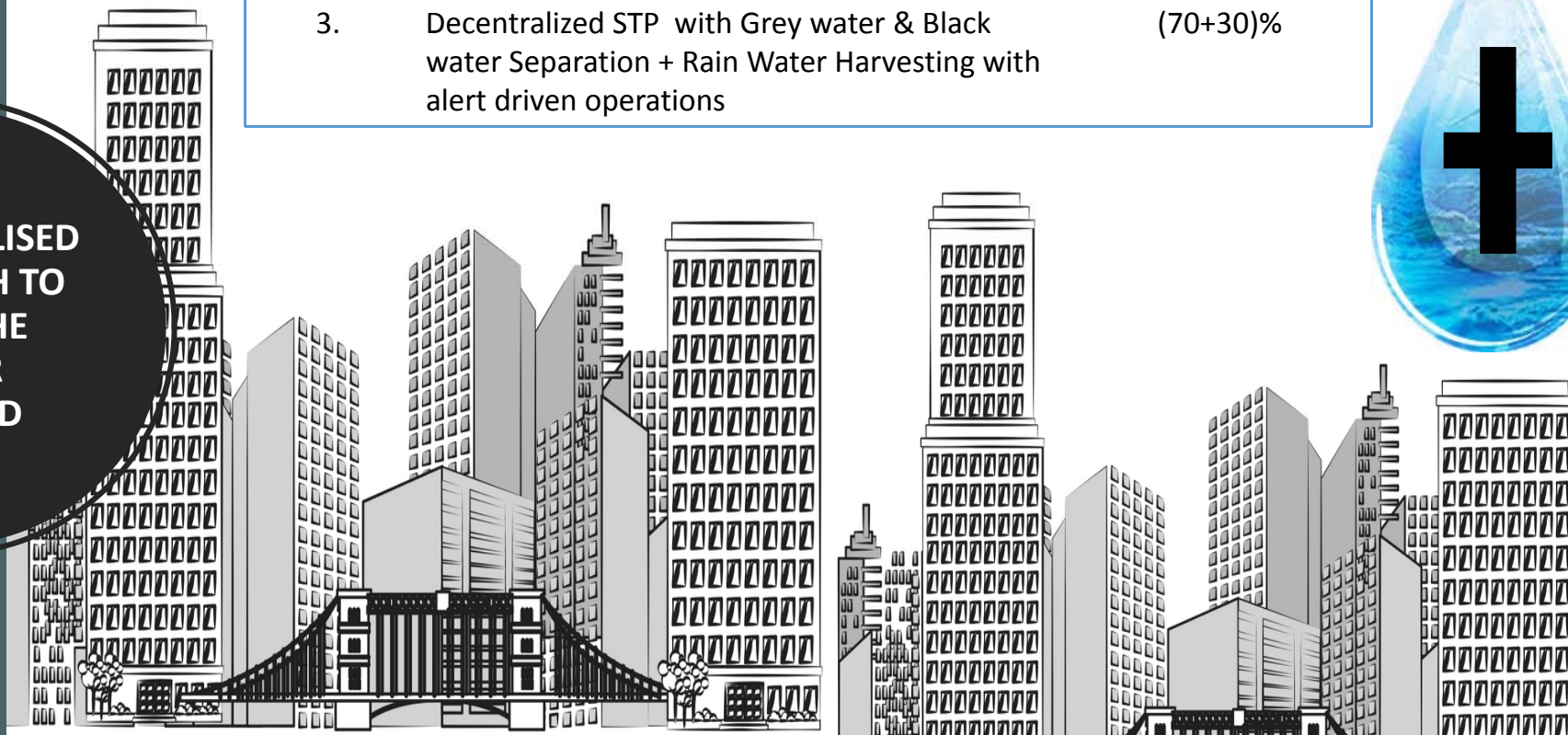
- Reducing water demands,
- Increasing water recycling and reuse,
- Creating water supply assets from stormwater management, matching water quality to end-use needs,
- Achieving environmental goals through multi-purpose, multi-benefit infrastructure.

## CAN WE BRING DOWN FRESHWATER DEMAND NEAR TO ZERO?



**DECENTRALISED  
APPROACH TO  
MEET THE  
WATER  
DEMAND**

| S.No. | Particulars   | % of Water Recycle |
|-------|---|--------------------|
| 1.    | Centralized STP   | 10-20%             |
| 2.    | Decentralized STP   | 50-60%             |
| 3.    | Decentralized STP with Grey water & Black water Separation + Rain Water Harvesting with alert driven operations | (70+30)%           |

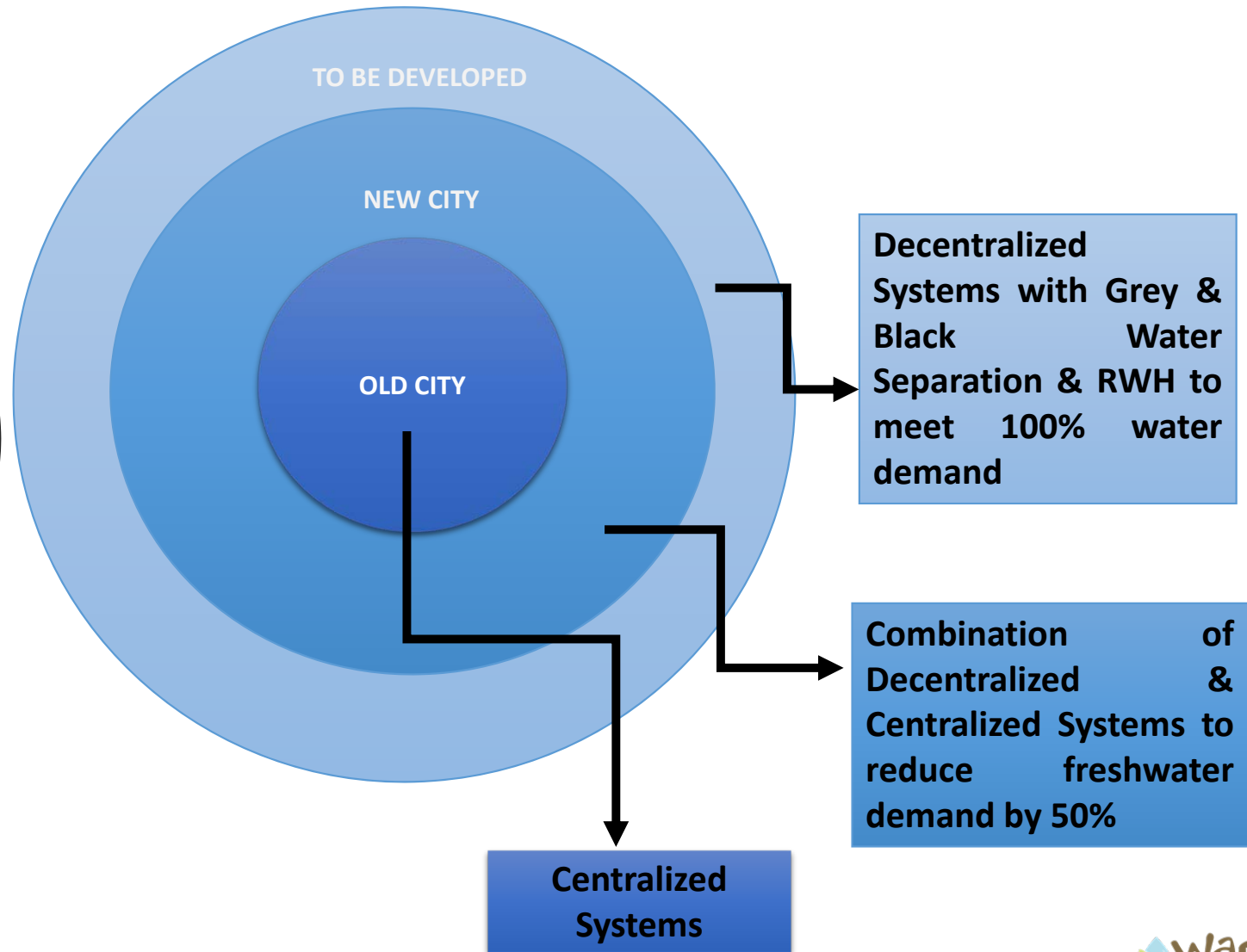


**BUILDINGS**



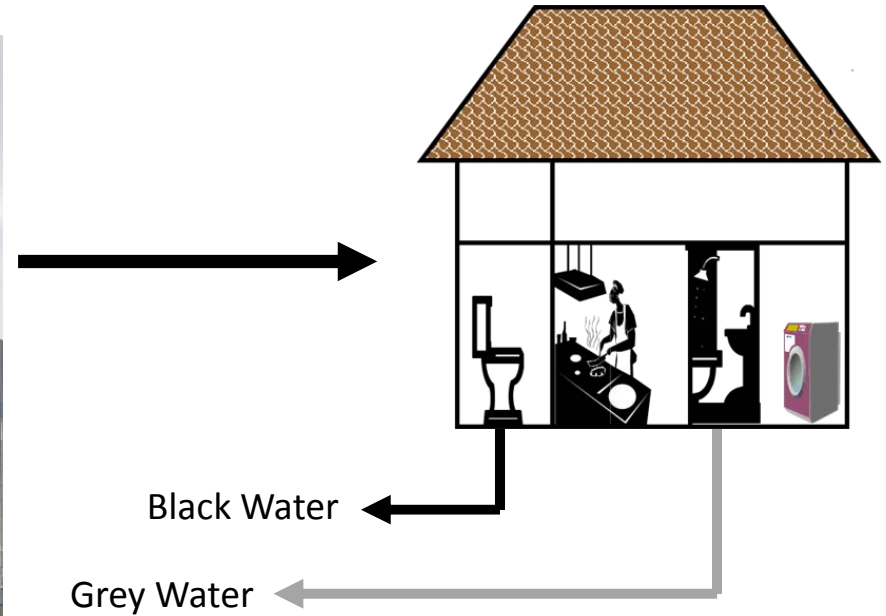
**CITIES**

**WATER DEMAND  
REDUCTION  
THROUGH RIGHT  
POLICY AND  
INFRASTRUCTURE  
INTERVENTIONS  
IN A GROWING  
CITY**



**DUAL  
DISCHARGE -  
100%  
RECLAMATION  
OF WATER**

- **Separation of Grey & Black Water**



- **Decentralized Approach**



## ELEMENTS OF A CITY



If City has to be Water efficient then each Building has to be Water Efficient

# APPROACH FOR NEW & EXISTING PROJECTS

## NEW PROJECTS APPROACH

### Concept

- Based on building/City Architecture
- Based on weather data & estimated occupancy
- Based on Benchmarking Data

### Design

- To minimize fresh water consumption
- To minimize water cost
- Right technology selection & implementation

### IoT

- Water Quality & quantity Alerts
- Better DSM
- Better operational efficiency

## OPERATING INFRA

### Design Review

- Based on building/City Architecture
- Based on weather data & estimated occupancy
- Based on Benchmarking Data

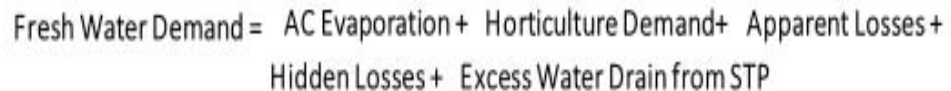
### Audit

- Minimal possible vs Actual
- To identify – Apparent Losses, Current water consumption, Hidden Losses etc.
- To minimize water cost

### IoT

- Mobilize services to reduce Apparent Losses
- Implementation of IoT strategically
- Better DSM & operational efficiency

# INTEGRATED WATER MANAGEMENT TO MINIMISE LOSSES





# This is compounded by fragmented operations

**WATER  
LOSSES DON'T  
GET DUE  
ATTENTION**



## Fragmentation

- Multiple vendors
  - Waste water treatment
  - Domestic water treatment
  - Drinking water
  - Condenser water
  - Hot water
  - Cleaning & Housekeeping
- Local optimization Vs Global



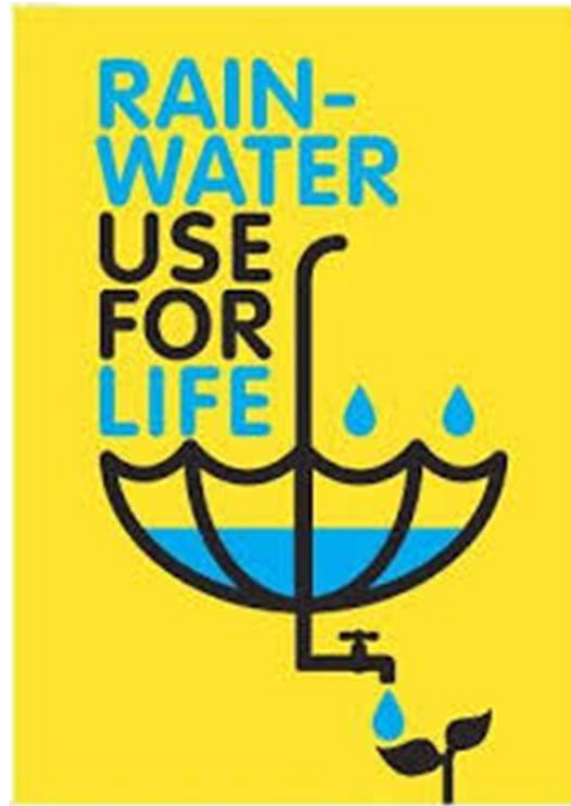


**AUDIT  
-FIRST STEP  
FOR TWM  
FOR A  
EXISTING  
BUILDING**



- Annual demand variation curves
- Quantification of Apparent losses
  - Present water consumption
  - Minimum possible water consumption
- Water Balance: Present & Proposed
- Data visibility index & alerts proposed
- Plug & Play infrastructure
- Technology selection
- Package wise & overall ROI
- Implementation plan
- Water quality standards & frequency of testing
- Manpower & other savings
- Risk quantification & management

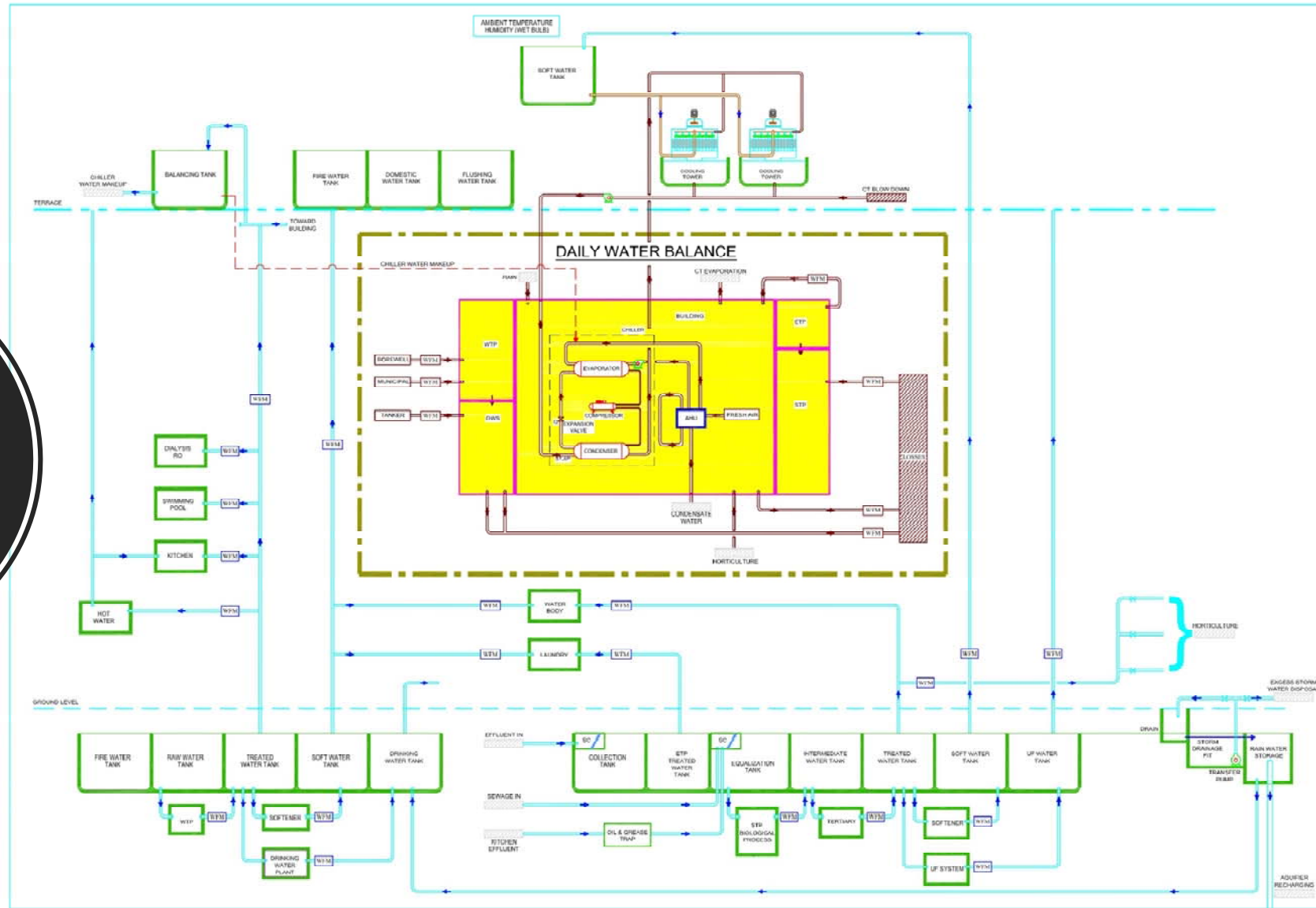
## INTEGRATED OPERATIONS



## Integrated Operations (Reduce, Reuse & Recycle)

- *Survey form for TWM, STP, WTP, RO etc.*
- *Taking over the site*
- *Schedule planning for retrofit to save more*

# WATER MANAGEMENT DASHBOARD FOR A BUILDING



# SAFE , COMPLIANT AND AGILE OPERATION



## Operational Alerts

Screen Cleaning  
Tank Cleaning  
Filter Backwash +9more

## Water Quality Alerts

BOD, COD, Ph, TSS +30more

## Safety Alerts

Poisonous Gases  
Fire  
Flood

## Preventive Maintenance Alerts

Equipment status alerts  
Warranty/replacement alerts  
Sensor calibration alerts

## Compliances Alerts

## Leak Detection



## Operational Alerts

Blowdown  
Residual Chlorine  
+10more

## Water Quality Alerts

Ph, TDS +10more

## Safety Alerts

Corrosion  
Scaling

## Preventive Maintenance Alerts

Equipment status alerts  
Warranty/replacement alerts  
Sensor calibration alerts

## Compliances Alerts

## Leak Detection



ROUTES FOR  
ACHIEVING  
TWM

**A***gile operations*

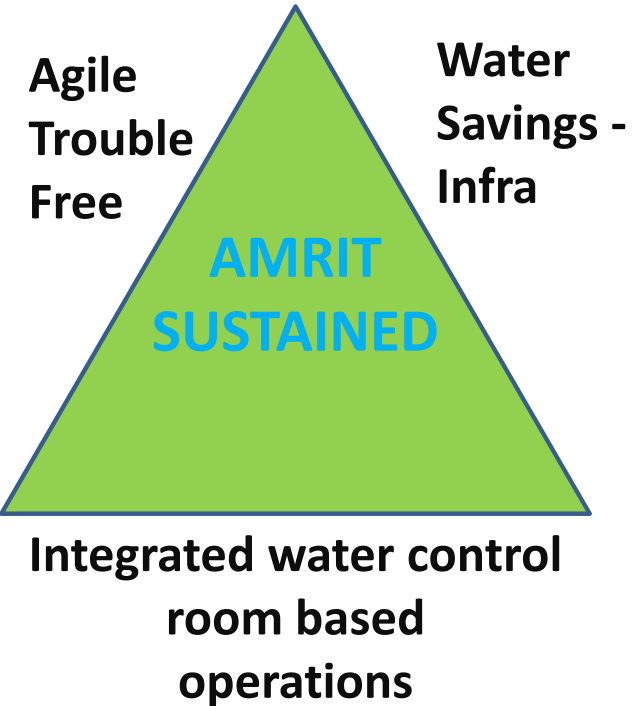
**M***inimum water losses annualized*

**R***educe, Re-use and Recycle*

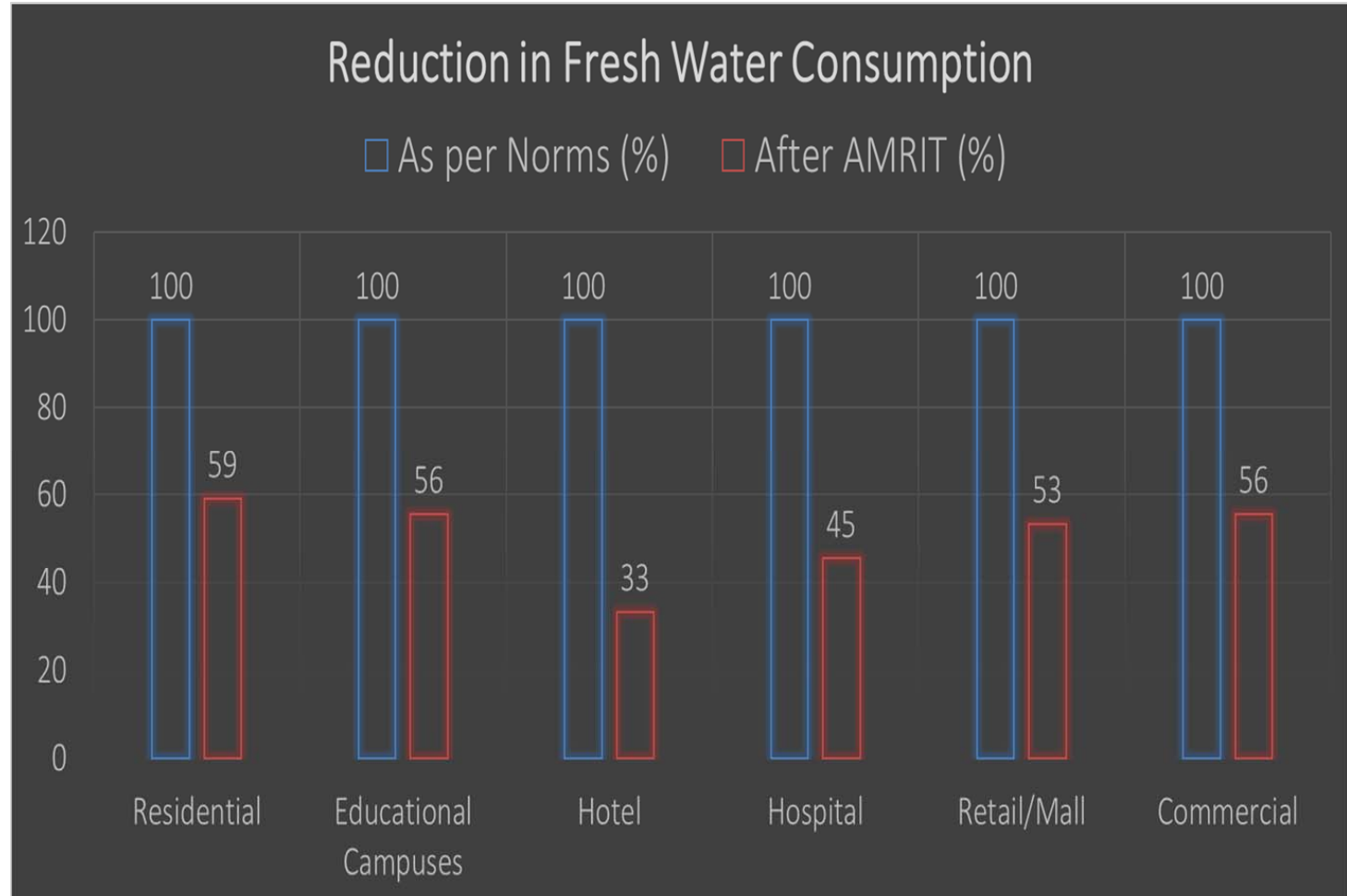
**I***nfrastructure - ROI Justified*

**T***rouble free*

*Sustained*



**NEW  
BENCHMARKS  
WITH AMRIT**



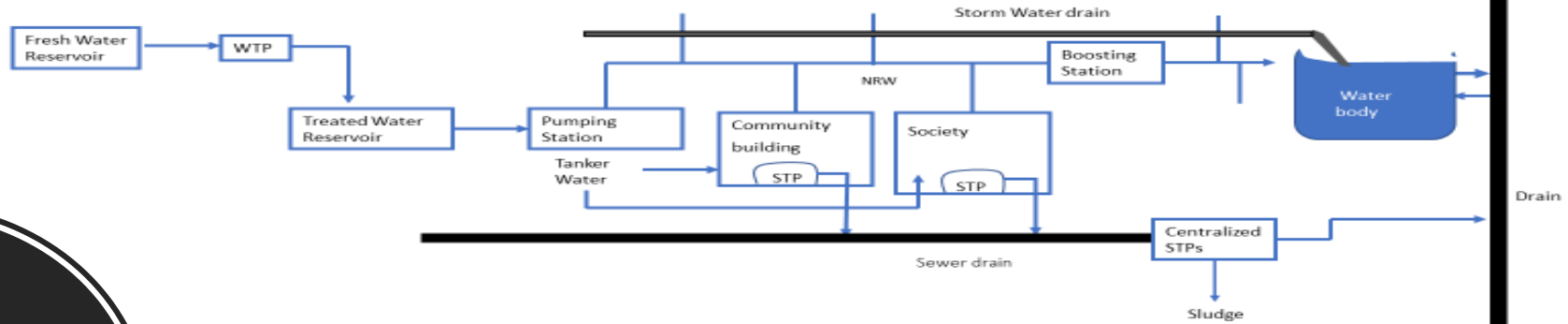
# WAPP – A TOTAL WATER MANAGEMENT CO.



| S.No. | Sector  | Case 1 - Government Norms |                           |  | Case 2 - As Actual & Field study |                           |  |
|-------|---|---------------------------|---------------------------|--|----------------------------------|---------------------------|--|
|       |   | As per Norms              | After TWM                 | After TWM with Grey & Black separation | Actual                           | After TWM IoT             | After TWM IoT with Grey & Black separation |
| 1     | Housing Society/Township/Building/Individual Home | 135 Litres/capita/day     | 50 - 60 Litres/capita/day | 25 - 30 Litres/capita/day              | 200 - 250 Litres/capita/day      | 100-110 Litres/capita/day | 50 - 60 Litres/capita/day                  |
| 2     | Educational Campus                                | 135 Litres/capita/day     | 50 - 60 Litres/capita/day | 25 - 30 Litres/capita/day              | 200 - 250 Litres/capita/day      | 100-110 Litres/capita/day | 50 - 60 Litres/capita/day                  |
|       |   | 45 Litres/capita/day      | 7 - 10 Litres/capita/day  | 2.5 - 5 Litres/capita/day              | 60 Litres/capita/day             | 15 - 20 Litres/capita/day | 12 - 15 Litres/capita/day                  |
| 3     | Hotel   | 360 litres/room           | 180 - 200 litres/room     | 100-120 litres/room                    | 900 litres/room                  | 450 - 500 litres/room     | 250 - 300 litres/room                      |
| 4     | Hospital  | 450 Litres/bed            | 320 - 350 Litres/bed      | 220-250 Litres/bed                     | 1000 - 1100 Litres/bed           | 750 - 850 Litres/bed      | 500 - 600 Litres/bed                       |
| 5     | Retail/Mall                                       | 45 Litres/capita/day      | 7 - 10 Litres/capita/day  | 2.5 - 5 Litres/capita/day              | 60 Litres/capita/day             | 15 - 20 Litres/capita/day | 12 - 15 Litres/capita/day                  |
|       |   | 15 Litres/capita/day      | 3 - 5 Litres/capita/day   | 1 - 2 Litres/capita/day                | 20 Litres/capita/day             | 8 - 12 Litres/capita/day  | 5 - 8 Litres/capita/day                    |
| 6     | Commercial/ IT Parks                              | 45 Litres/capita/day      | 7 - 10 Litres/capita/day  | 2.5 - 5 Litres/capita/day              | 60 Litres/capita/day             | 15 - 20 Litres/capita/day | 12 - 15 Litres/capita/day                  |



# TYPICAL CITY WATER DASHBOARD

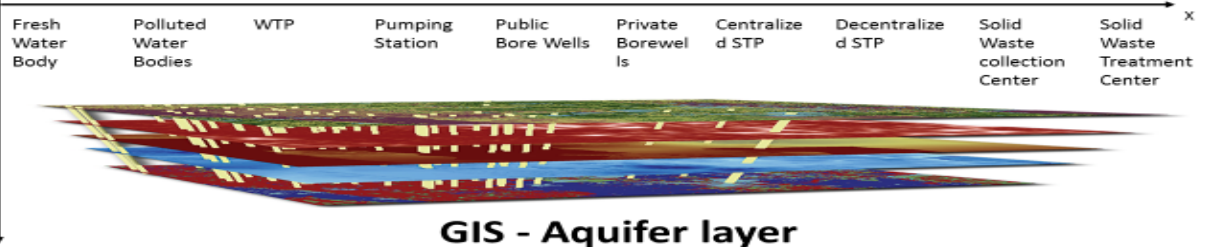


Sectors

- Housing Society
- Commercial Building
- IT Park
- Open Malls
- Hotels
- Hospital/Nursing Home
- Eateries
- Public toilets
- Green Area



**GIS - Surface layer**



**GIS - Aquifer layer**





YOUR VALUE ADDED TOTAL WATER MANAGEMENT PARTNER

# THANK YOU

## CAN WE TOGETHER CREATE WATER POSITIVE CITIES?



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