



सत्यमेव जयते

MINISTRY OF WATER RESOURCES, RD & GR



NATIONAL WATER MISSION

“WATER USE EFFICIENCY”

PRESENTED BY

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Ministry of Environment, Forest and Climate Change
Government of India



INDIA
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Objective of NWM

“Conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management”



Goals of NWM



Comprehensive water data base in public domain and assessment of impact of climate change on water resources



Promotion of citizen and State action for water conservation, augmentation and preservation



Focused attention to vulnerable areas including overexploited areas



Increasing water use efficiency by 20%



Promotion of basin level integrated water resources management



Goal 4

Increasing

Water Use Efficiency

by 20%

Overall WUEs in all sectors in India are low especially WUE in Agricultural sector is only 38%

The overall irrigation project efficiency of Agricultural Sector in developed countries is 50 – 60%

the ratio between effective water use and actual water withdrawal

Activities/Projects taken by NWM w.r.t. WUE – Irrigation, Industry, Domestic Sectors

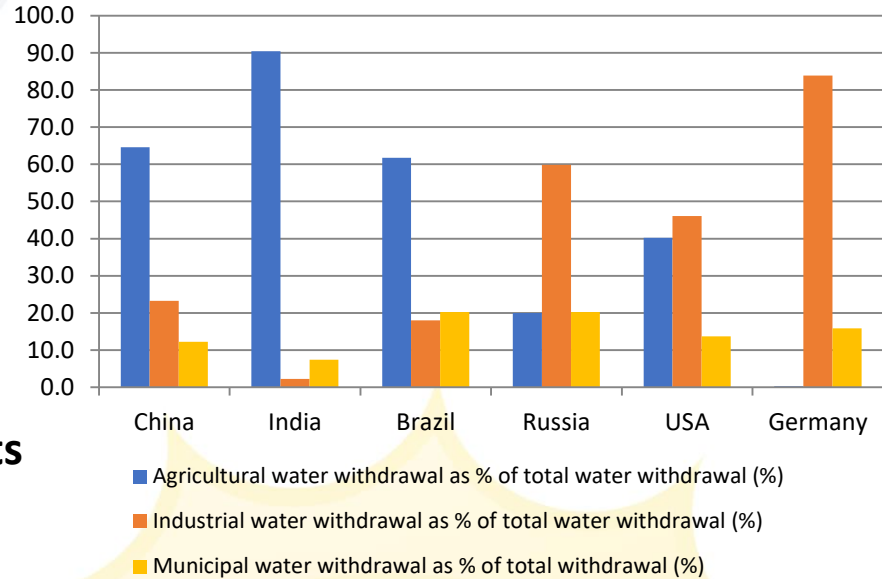
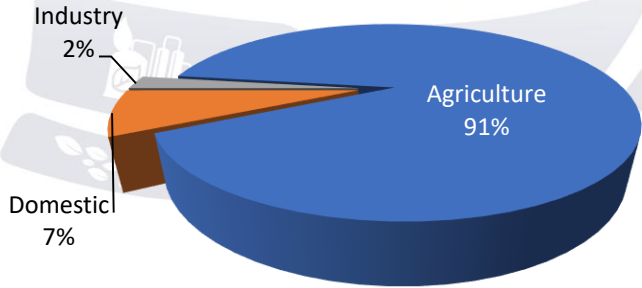


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Sectorial Water Use in India



As the Indian economy grows, so will its demand for domestic water

Parameter	China	India	Russia	Brazil	USA	Germany
Total water withdrawal (10 ⁹ m ³ /yr)	554.13	761	66.2	58.07	478.44	32.299
Agricultural water withdrawal (10 ⁹ m ³ /yr)	358	688	13.2	31.7	192.4	0.081
Industrial water withdrawal (10 ⁹ m ³ /yr)	128.6	17	39.6	10.14	220.6	27.09
Municipal water withdrawal (10 ⁹ m ³ /yr)	67.53	56	13.4	16.23	65.44	5.128
Agricultural water withdrawal as % of total water withdrawal (%)	64.61	90.41	19.94	61.77	40.22	0.2508
Industrial water withdrawal as % of total water withdrawal (%)	23.21	2.234	59.82	17.96	46.11	83.87
Municipal water withdrawal as % of total withdrawal (%)	12.19	7.359	20.24	20.27	13.68	15.88
Total water withdrawal per capita (m ³ /inhab/yr)	409.9	621.4	454.9	330.8	1583	391.4
Municipal water withdrawal per capita (total population) (m ³ /inhab/yr)	49.95	45.73	92.08	67.04	216.5	62.15
Water used per Agricultural Produce in 1000M ³ /US\$	0.49	2.27	0.17	0.22	1.06	0.00
Water used per Industrial Produce in 1000M ³ /US\$	0.04	0.04	0.06	0.02	0.66	0.03

Source: Food and Agriculture Organization of United Nations, 2012



- Agriculture sector withdraws about 80% of all withdrawal
 - India has low water use efficiency compared to the developed countries.
 - The overall irrigation project efficiency in developed countries is 50 – 60% as compared to only 38% in India.
- The industrial plants in our countries consume about 2 to 3.5 times more water per unit of production compared to similar plants operating in other countries.
- In the domestic water sector the loss of water on account of leakages in mains, communication and service pipes and valves is approximately 30 to 40% of the total flow in the distribution system.
- The present utilization of water can be estimated as about 750 BCM whereas for the year 2050 it is estimated to be 1180 BCM



- India uses about 688 M³ of water for agriculture every year
 - That's the second highest in the world!
- Rice, Wheat and Sugarcane constitute 91% of crop production in India
 - While for Sugarcane India uses less water than global average
 - For Wheat and Rice, water use is higher than global average
- Lack of use of modern irrigation techniques is resulting in loss of water in this sector

Water Footprint in M ³ /MT ¹		
Crops	India	Global
Wheat	1654	1334
Rice	2850	2291
Sugarcane	159	175

Virtual Water Use for Crops in M ³ /Tonne ²			
Crops	India	U.S.	China
Rice	4254	1903	1972
Wheat	1654	849	690
Corn	1937	489	801
Soya beans	4124	1869	2617
Sugarcane	159	103	117
Cottonseed	8264	2535	1419
Roast coffee	14500	5790	7488

Source : ¹Grail Research, ²Food & Agriculture Organization and Lennotech B.V. 2008



Inefficiency & Over Use!



Adopt modern irrigation methods



Irrigation Sector

- A scoping study for a National Water Use Efficiency Improvement Support Program for Major/Medium Irrigation Projects has been completed with technical assistance from Asian Development Bank (ADB).
 - Two pilot projects, Dharoi Irrigation Project in Gujarat and Sanjay Sarovar Irrigation Project in Madhya Pradesh, have been completed under Phase-II of the study.
- 26 Baseline studies for Improving WUE in Irrigation Sector- Major-Medium Irrigation projects
 - NEERWALM (Tezpur) - 5Nos.
 - WALMTARI - Hyderabad – 10 Nos.
 - WALMI - (Aurangabad)- 6Nos.
 - CWRDM – Kerala – 5 Nos.

The purpose of a baseline study is to provide an information base against which to monitor and assess an activity's progress and effectiveness during implementation and after the activity is completed.



A case study of Crop Ground Truth Study

For
Kharif and Rabi
In Telangana

Done by
WALMITARI









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Government of India



One World
One Sun
One Grid

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Step – 1		Opening the app >> Enter Your Profile (One Time Activity[for first time])
Step – 2 (GPS)		Click on “GPS” button, alert appears with accuracy in meters and display over GPS button in text.
Step – 3 (Camera)		Click on “Camera” button, camera feature opens >> Click on camera capture button >> Click on Save >> A blue button appears below camera >> Click on it to preview the photo and fill attribute of the photo or Click on close preview.
Step – 4 (Attribute)		Click on “Attribute” button to display attribute form fill-in the form and again click on attribute button to close the form.
Step – 5 (Send)		Click on “Send” button to send it immediately >> Once data reach “Bhuvan Server” an alert appears “Data Sent Successfully”. (**Note – Internet connectivity available on the device in the field)
Step – 6 (Save)		If Internet not available then click on “Save” button to store data in the device >> An alert appears “Data Stored for Sending Later”.
Step – 7	Upload - Send later data	Manage >> Send later >> Send
Step – 8	Edit - Send later data	Manage >> Send later >> Edit >> Do changes >> Save
Step – 9	Delete – Send later data	Manage >> Send later >> Delete >> An alert appear after delete

Crop Ground Truth Application

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Enter City or Lat, Lon(ex:chennai or 1

Show Andhra pradesh and Telangana Only

Base Details

NRSC Thematic Data

Irrigation Projects - WUE Studies

Field Data Collection

Select Project: CGTW

Select State: All

Date Mode: Day Period

Start Date: [Select Date](#)

End Date: [Select Date](#)


Accepted Points Rejected Points

[Remove](#)

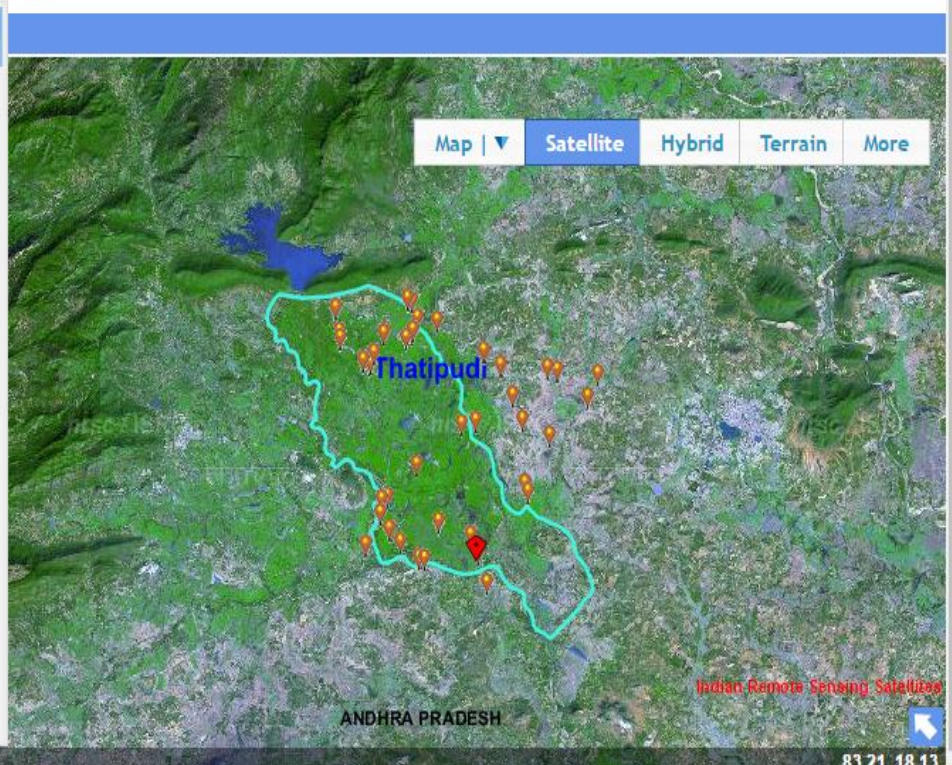
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Field Data Collection Android Apps

1. CGTW



1	
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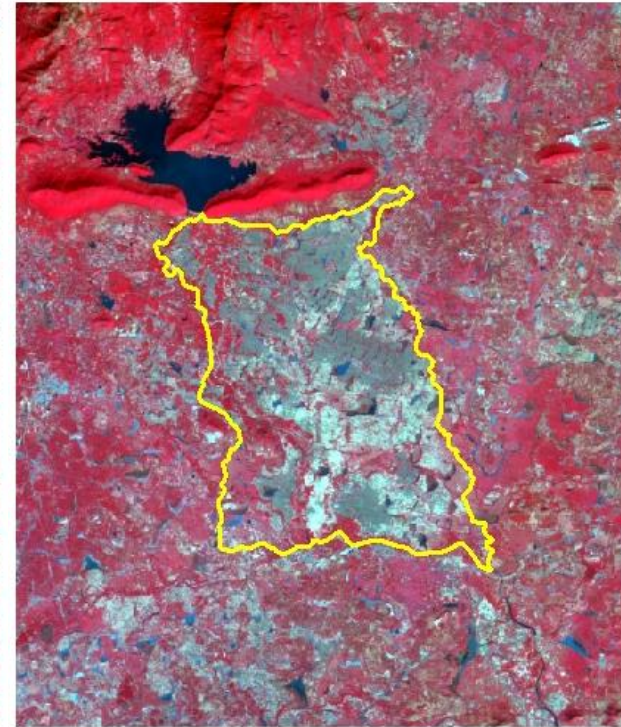
THATIPUDI MEDIUM IRRIGATION PROJECT



25 oct 2016



10 nov 2016



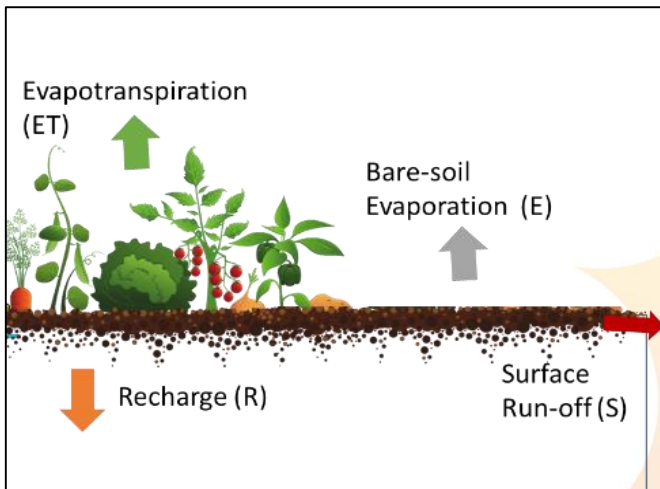
26 nov 2016

All the above images are Layer stacked (date wise)

Agricultural water use efficiency



- India's first large scale surface water drip irrigation projects have been commissioned.
- Drip companies claim 70% savings from converting from flood to drip.
- Need better estimates about net savings after crop-switching, decreases in downstream flows and recharge are accounted for.





“

- Indian industries use 15 M³ of water every year to give industrial output of US \$ 113.041 Billion
 - This is one of the lowest water industrial productivity of water in the world
- Power generation consumes 2 M³ of water every year to generate 855 Billion Units of power
- It is estimated that industrial water consumption in India will increase from 17 M³ to 68 M³ in order to keep pace with economic growth of 7% per annum
- India's water use efficiency being low in industry it is heavily dependent on water supply
- Many of the industries use their own ground water
 - The actual water consumption figures may be much higher

Country	Industrial water use (billion M ³)	Industrial productivity (million US \$)	Industrial water productivity (US \$ / cubic metre)
Argentina	2.6	77171.0	30.0
Brazil	9.9	231442.0	23.4
India	15.0	113041.0	7.5
Korea, Rep.	2.6	249268.0	95.6
Norway	1.4	47599.0	35.0
Sweden	0.8	74703.0	92.2
Thailand	1.3	64800.0	48.9
United Kingdom	0.7	330097.0	443.7

Source: World Bank, 2001

Industrial Sector	Annual consumption (million cubic meters)	Proportion of water consumed in industry
Thermal power plants	35157.4	87.87
Engineering (Mainly Automobiles)	2019.9	5.05
Pulp and paper	905.8	2.26
Textiles	829.8	2.07
Steel	516.6	1.29
Sugar	194.9	0.49
Fertiliser	73.5	0.18
Others	314.2	0.78

Note: For methodology see www.downtoearth.org.in

Source: Estimated by CSE based on the wastewater discharged data published by CPCB in "Water quality in India (Status and trends) 1990 - 2001".



Low Water Productivity in the Industrial Sector



Industries Shut Down Due to Water Shortage!

Southern Petrochemicals Industries Corporation (SPIC) has completely stopped production at its **Tuticorin** plant, in southern Tamil Nadu, as there is no water supply



Vizag Steel Plant faces the danger of shutdown due to water supply crisis





Water Audit

(Improving water use efficiency in industries)

Case Study

Thermal Power Plant

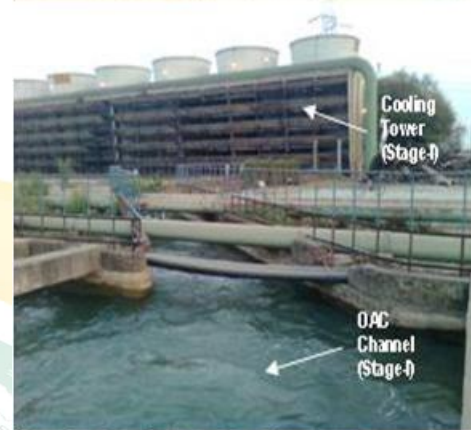


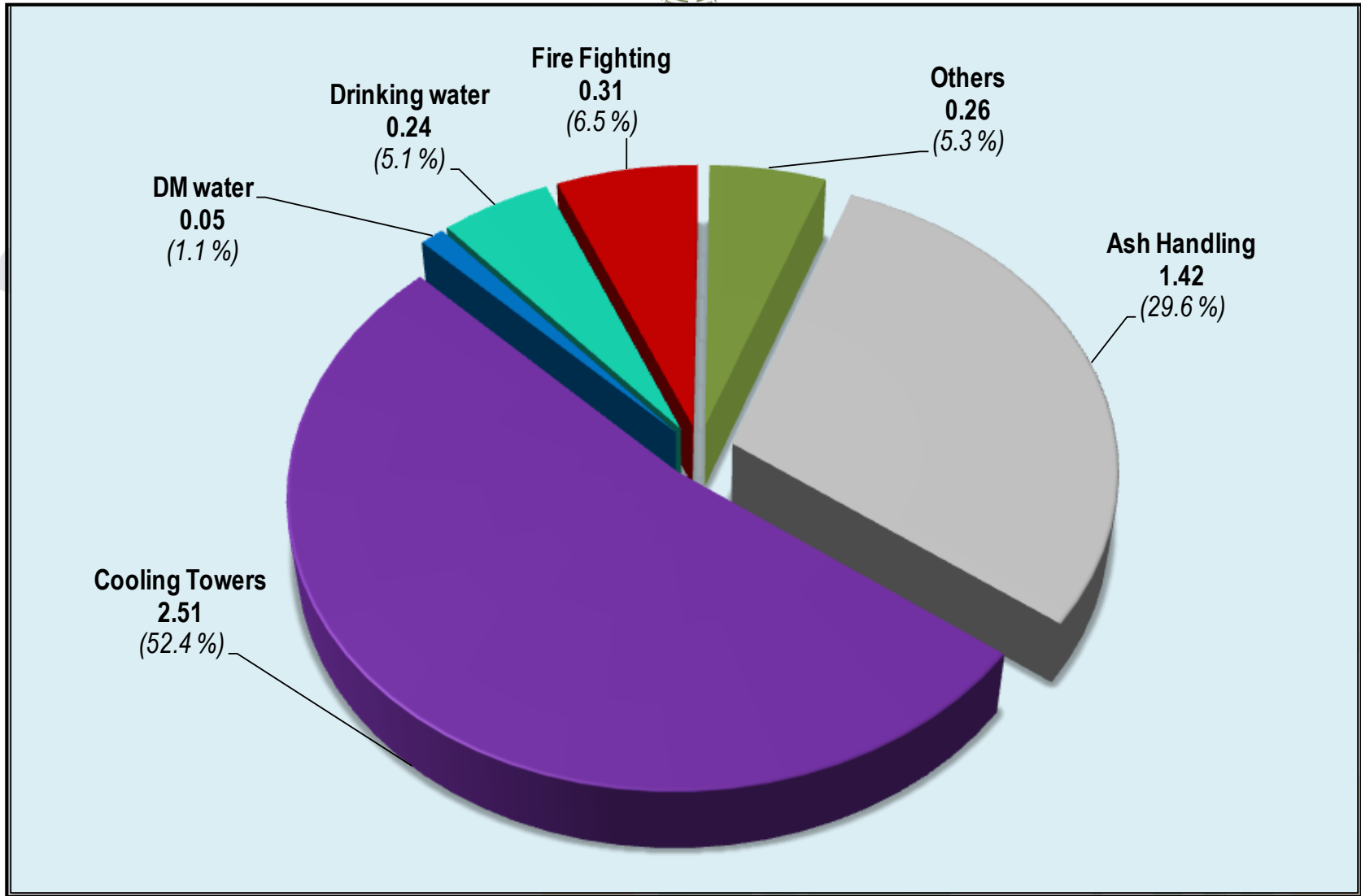


- **Establishment/investigation of water supply & distribution network**, pipes, pumps etc.
- **Establishment of complete water balance** overall and individual stages.

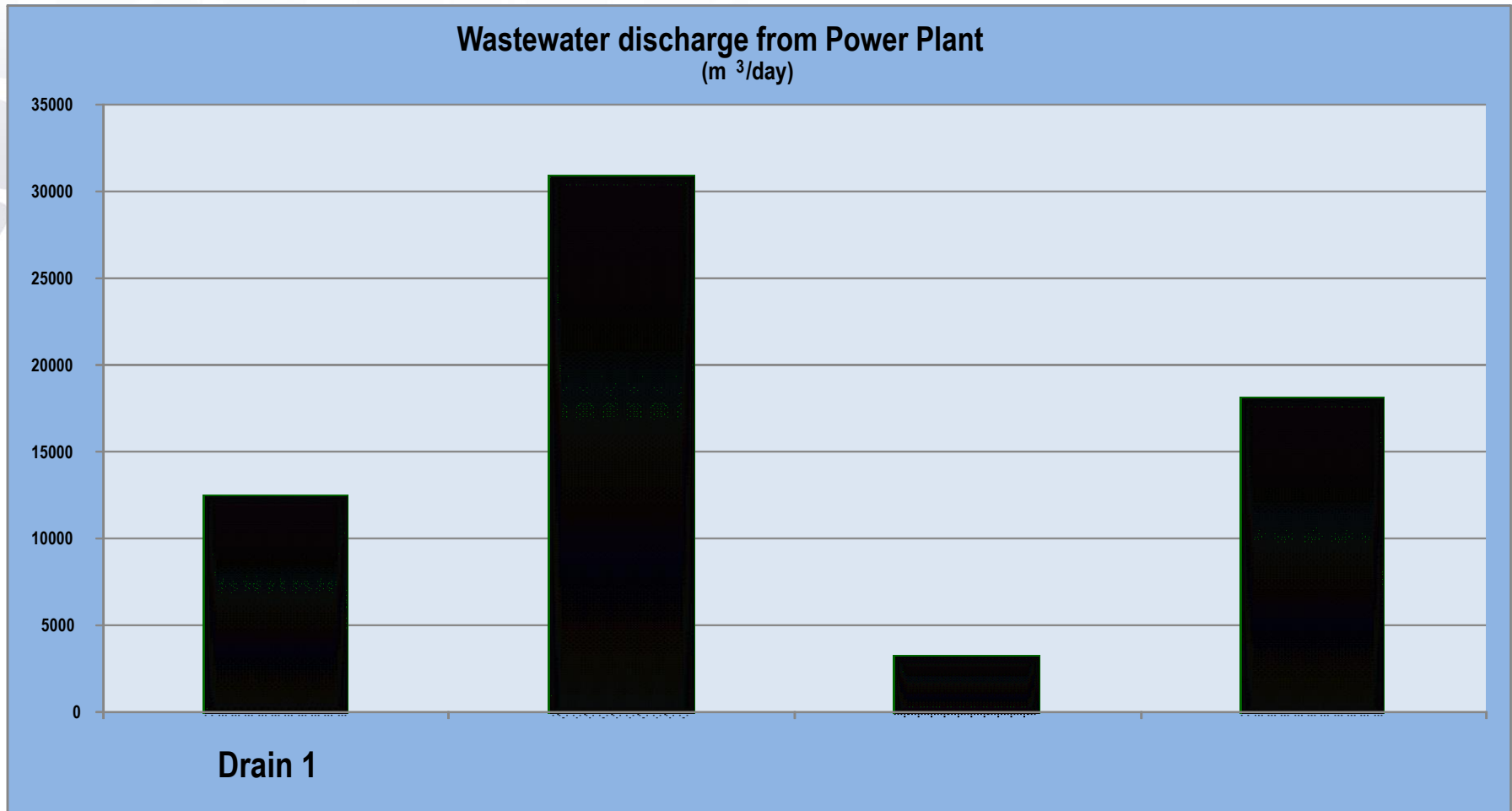
*(Including the raw water, clarified water, DM water, drinking water system; circulating water, fire water, service water, **cooling towers**, ash handling water, drain/sewage, residential colony drinking water etc.)*

- Assessment of **overall water consumption**
- Characterization of **water quality** in main streams and identification of options for recycle and reuse.
- Assessment of Cycle of Concentration (**COC**), **specific water consumption**.
- Identification of **leakages and losses** in the system.
- Identification of **scope for water conservation** with recommendation on **recycle and reuse**.





Actual Overall Specific Water Consumption – about 4.8- 5 m³/MW
Scope for optimizing (Achievable Target SWC) – 3 m³/MW



- Total Wastewater Discharged (*unused*) = 64000 m³/day (About 18% of Intake water)
- Wastewater quality reasonably good for recycling (Zero Discharge)



Leakage at pipe to aerator



Overflow & leakage



Overflows



Overflow



Burst pipe leakage jet



Leakage jet at pipe

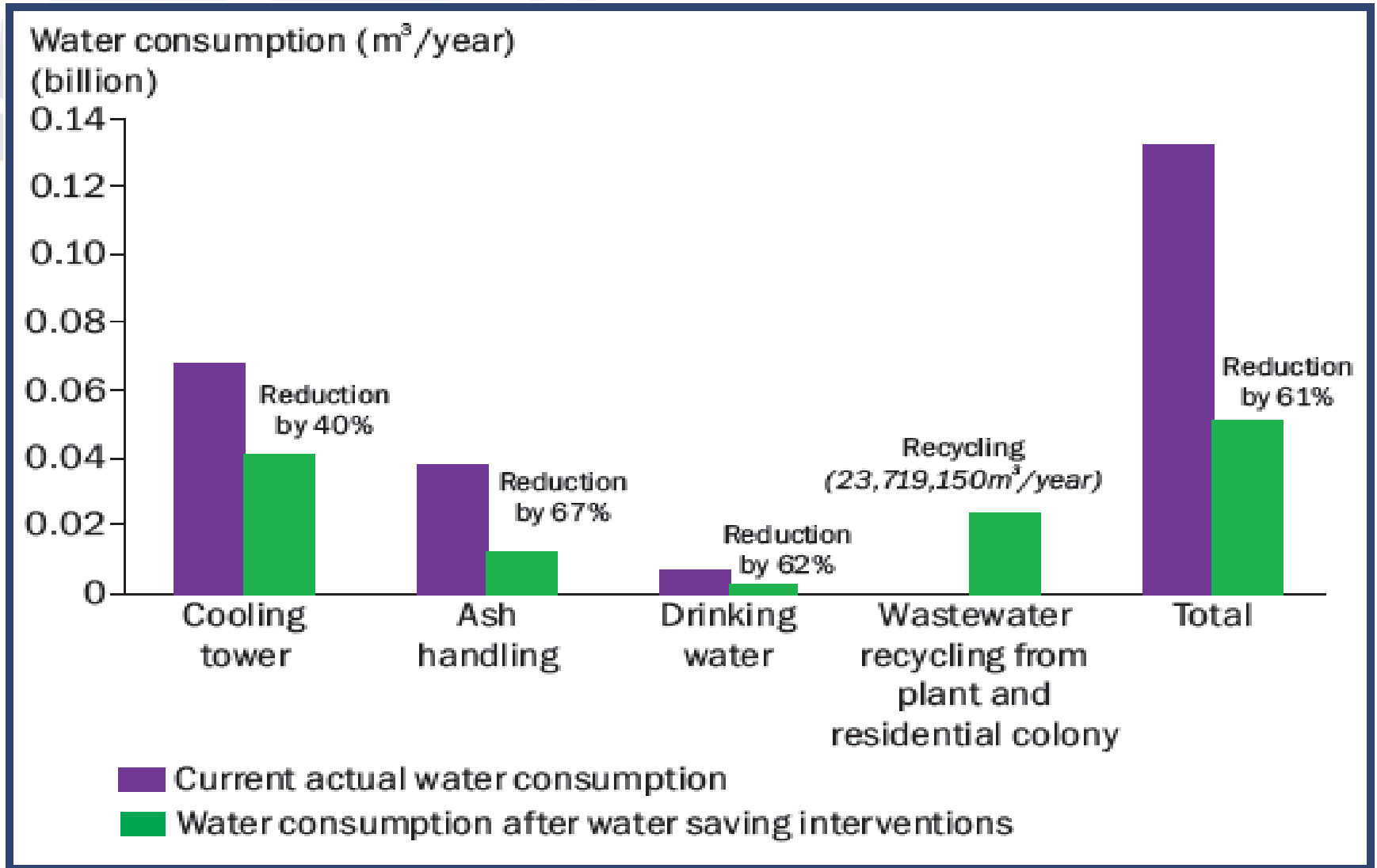




Recommendations for water conservation

- **Water for boiler auxiliary** (discharged as waste) should be reused .
- **High water loss (80-50%) in ash handling** should be brought down (overflows should be recycled, leakages plugged, Specific water consumption brought down)
- **Cooling Towers: COC** must be increased, **Specific water consumption** should be reduced (to about 1.5 m³/MW), **overflows** must be checked.
- **Township: Reduction in per capita water consumption** (to 150 lpcd).
- **Recycling** of about **64000 m³/day** of **wastewater** being discharged from the plant to achieve **Zero discharge** through a **treatment & recycling plant**.
- **Township STP discharge water** (suitable for horticultural uses) should be **reused** entirely thus **saving** significant water and **ensuring zero discharge**

Potential reduction in water consumption





Potential for water saving

- Immediate saving potential of **about** (81000 m³/day) **23% of total intake water;** *(18-26% in general)*
- A total overall water saving potential was about **60-65% of the total intake water (freshwater)** of the entire plant.
- **Significant financial savings** from water saving interventions of about **INR 7-9 Crores.** (70-90 Million Rs.)
- **Cost benefit** of water recycling system was positive with a **payback period** of just **2.3 years.**

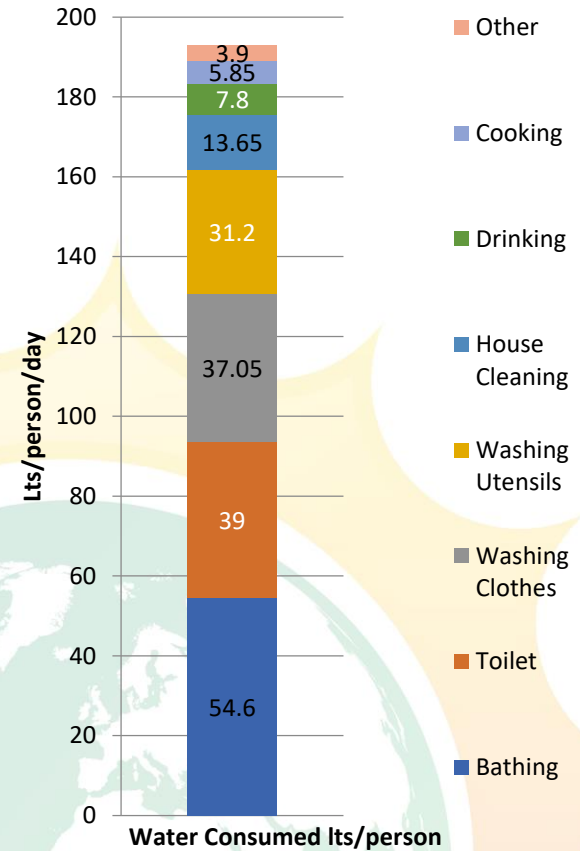
Domestic Water Use

- The Domestic Sector consumes 56 M³ of water every year
 - Of this majority is consumed by the Urban Sector
- This demand is estimated to increase by 4 folds in the next 20 years due to greater urbanization of Indian population
- About 500 Million urban Indians consume 135 – 196 liters of water per day per person
- 24 x 7 water supply is limited to just 15 – 20% of the urban population
- Domestic Water Supply is mostly not metered and a lump sum charge is levied
- With rural Indians, the consumption varies widely from just sustenance to less than 80 liters per day per person

Issues with domestic water supply in major Indian cities:

- Water leakages and lack of proper distribution main bane of the Urban population
- Lack of metering
- Inequitable supply of water between Urban and Rural Indians

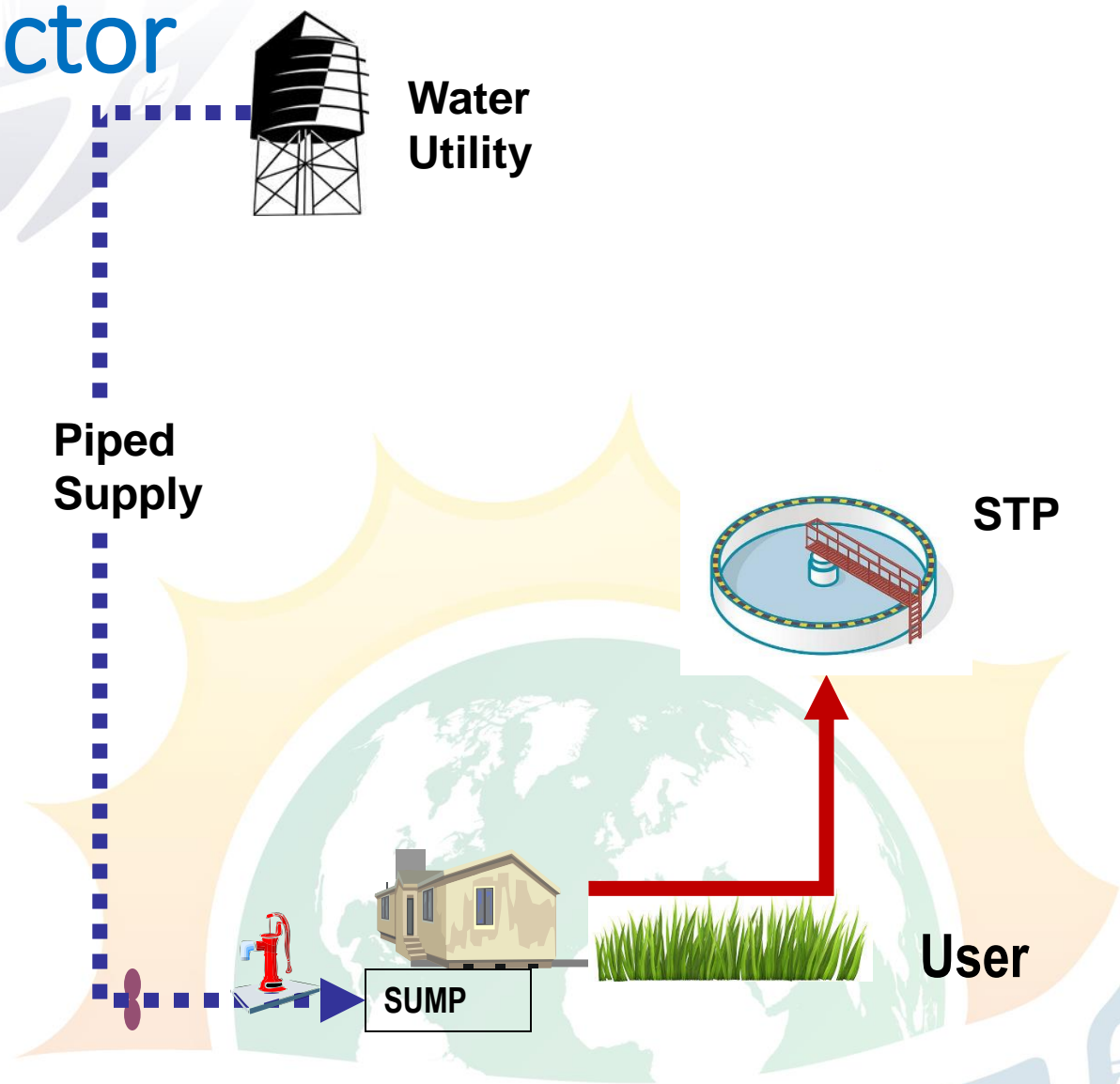
Water Consumed by Average Urban Indian

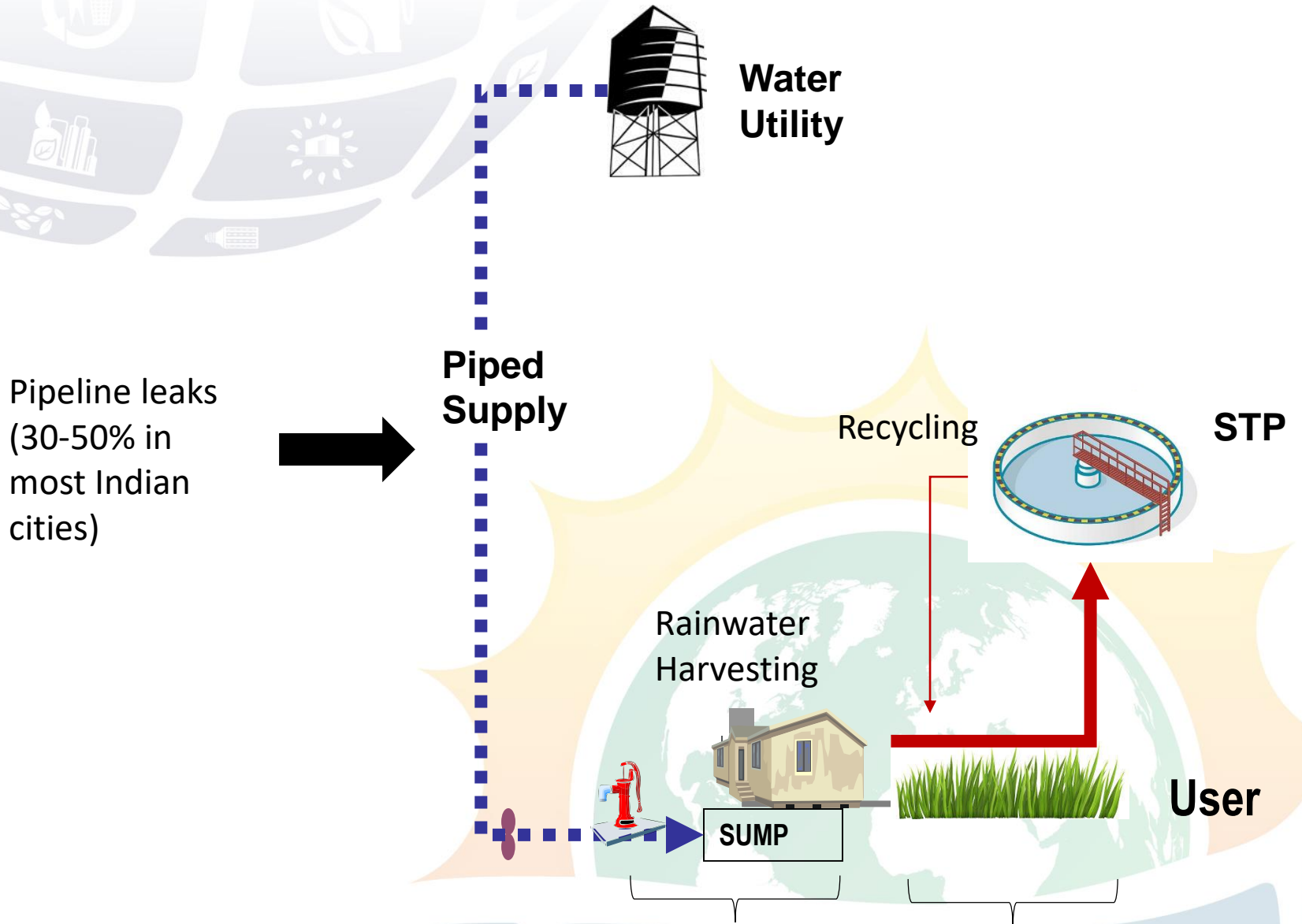


Source: Frost & Sullivan



Domestic Sector





Reasons for high water use in India

- ❑ Water is a natural resource
 - ❑ Must be 'freely' available to all its inhabitants
 - ❑ Should not be priced as it is nature's 'gift'
- ❑ Lot of our daily chores are based on water
- ❑ Lack of proper water pricing based on cost to serve
- ❑ High water wastage
 - ❑ Old pipelines, not maintained properly, leakages
 - ❑ Users not conscious about its use
 - ❑ Use of appliances using high quantities of water
 - ❑ Top loading washing machines
 - ❑ RO plants for water purification in homes
 - ❑ Unauthorized connections not accounted for
 - ❑ Lack of point of use metering
 - ❑ Lack of regulatory authority



Methods for decreasing water use



Automatic faucets



Sensor based efficient showers



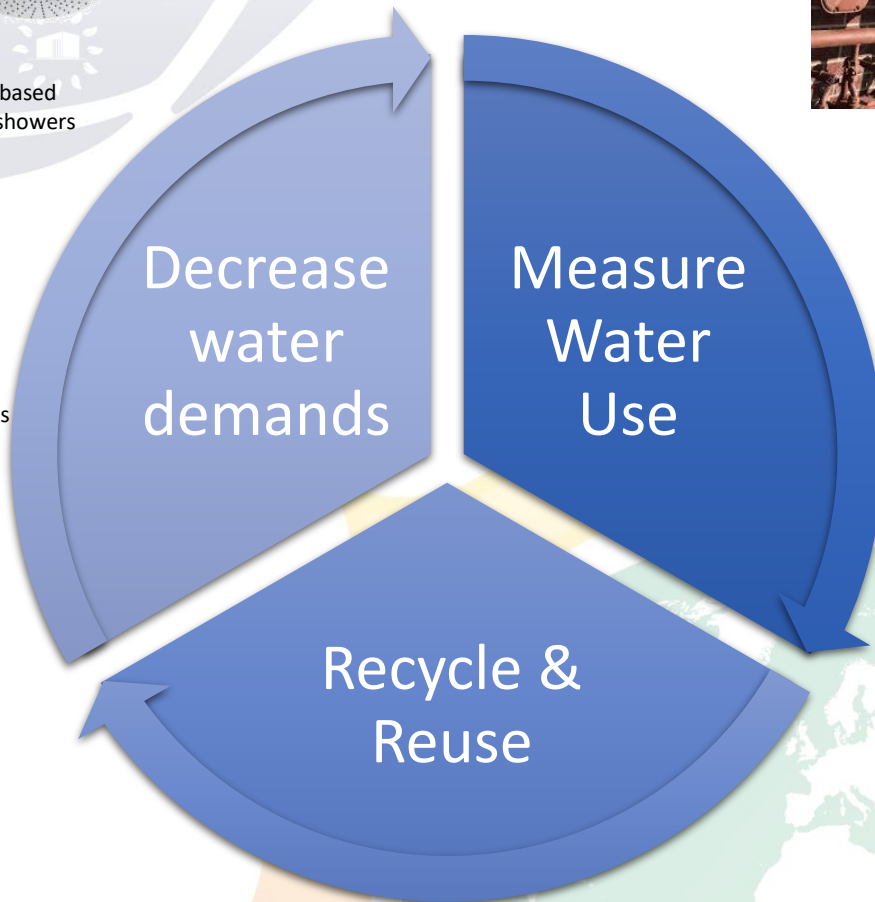
Low water consuming vacuum based WC



Front loading washing machines with Ionization



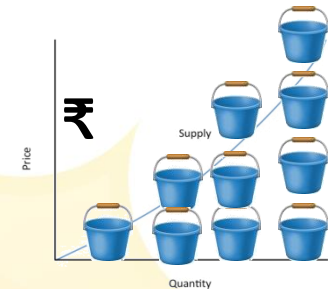
Dish Washers



Water Metering



Water Efficiency Rating



Price Water as per use



Recycle your water inside and out

TIPS TO SAVE WATER				
TOILET	SHOWER	TAP	CAR WASH	WASHING
Regular toilet 22.8 litres/flush	Regular shower 14 litres/minute	Regular faucet 19 litres/minute	Pipe water 100 litres	Washing machine 152 litres
Low-flow toilet 5 litres/flush	Low-flow shower 8.7 litres/minute	Low-flow faucet 5.7 litres/minute	Bucket of water 20 litres	Hand wash 60 litres

A family of four can save 9 to 11 flushes – or 300 to 240 litres a day

Western Cape Government

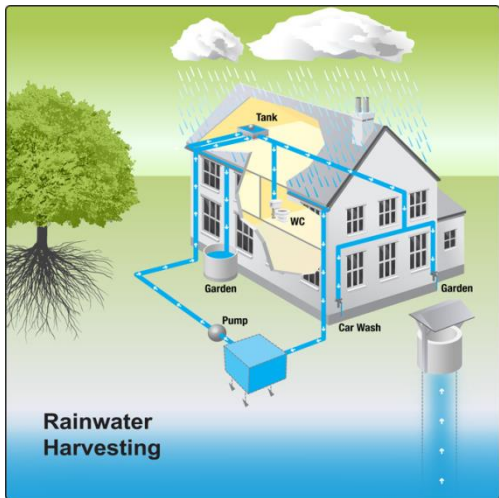
8 WAYS to save WATER at HOME

- Take shorter SHOWERS
- FIX LEAKING taps and toilets
- Don't rinse dishes under running water
- Install a water-saving toilet flush system
- Use a pool cover
- Pump used water to the garden
- Invest in indigenous plants
- Water your garden at night

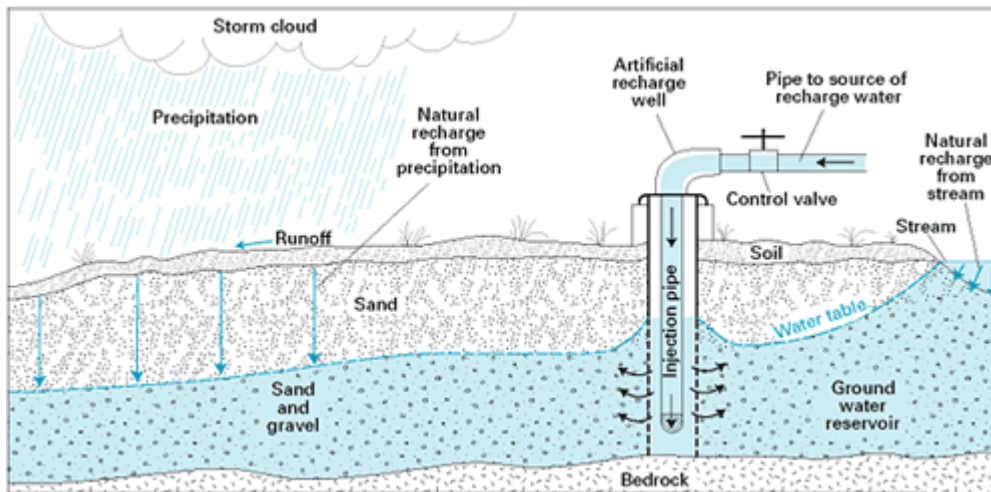
www.westerncape.gov.za

<p>I SAVE WATER BY CLOSING THE TAP</p>	<p>I WILL USE THE SAME GLASS TODAY</p>
<p>I WASH ONLY FULL LOADS</p>	<p>I RECYCLE THE WATER USED FOR WASHING CLOTHES TO FLUSH THE TOILET</p>
<p>I TURN OFF THE WATER WHEN BRUSHING MY TEETH</p>	<p>I TAKE A SHORT SHOWER AND TURN OFF THE WATER WHEN I SHAMPOO</p>

Increase Water Source – Capture the Loss

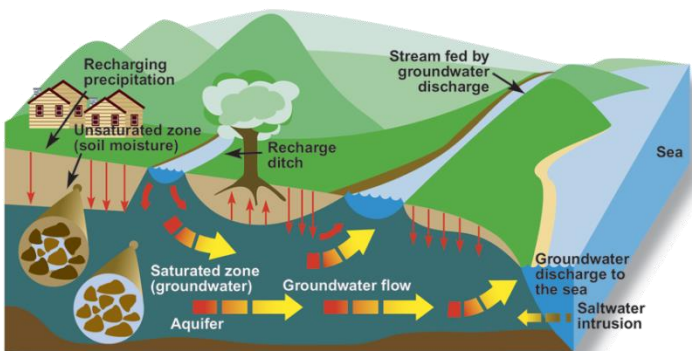


Rainwater Harvesting



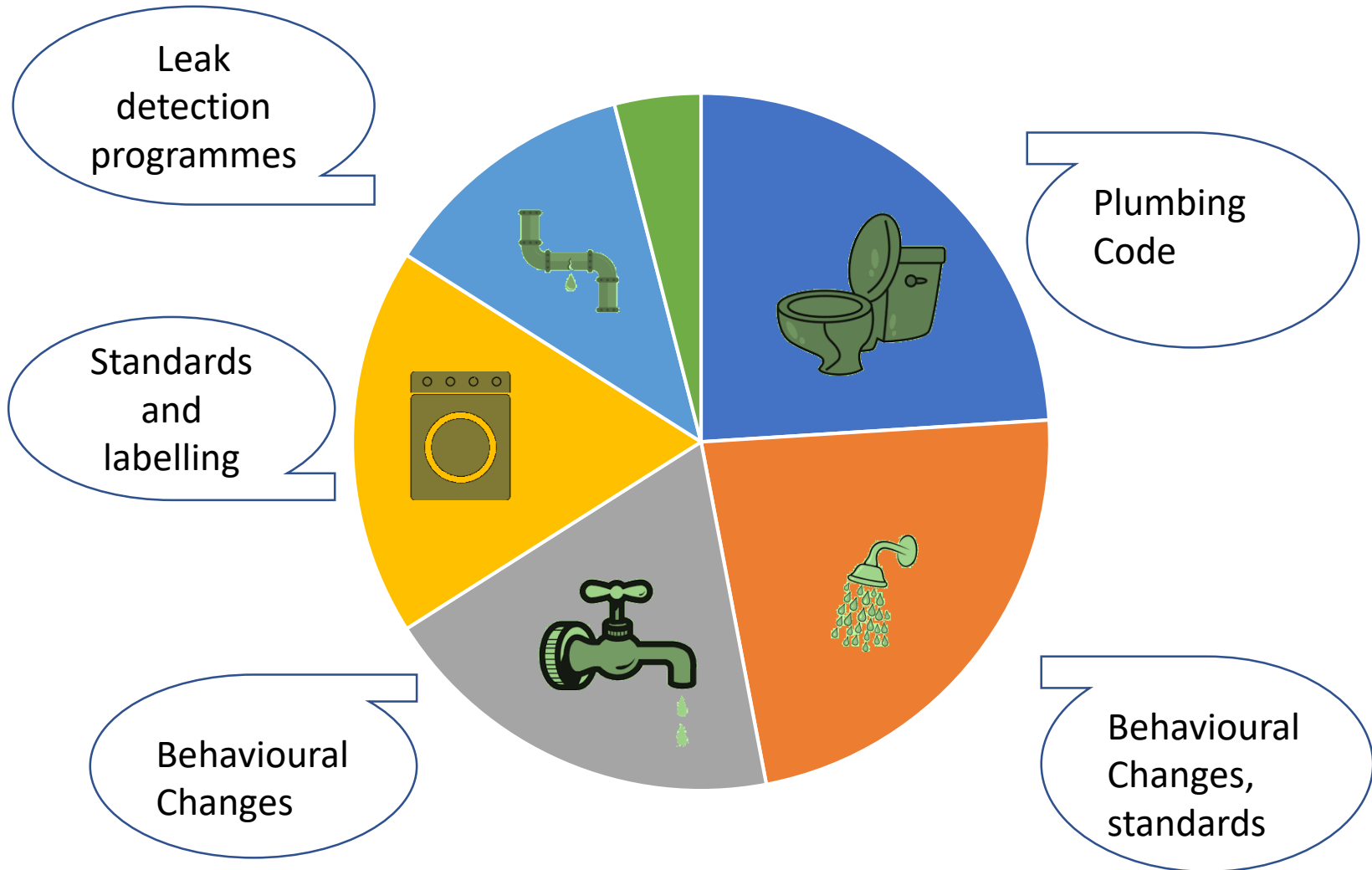
Groundwater Recharge

Groundwater flow



Make Checkdams

Urban water use efficiency -- Indoor



Current break-up and opportunities for water use efficiency

Source: Water Research Foundation, 2016

Urban water use efficiency -- Outdoor



Photo Credit: The Hindu, ATREE

- Most of the focus has been on indoor water use.
- Estimates from California, Arizona, claim savings from outdoor water use can be as high as 30% of total water use, especially during droughts.
- Xeriscaping, drip irrigation in cities still to take off in a big way.