DRINKING WATER SUPPLY AND MANAGEMENT FOR LEH TOWN, UT-LADAKH : WORKSHOP 11TH SEPT 2020

URBAN WATER DEMAND & SUPPLY MANAGEMENT FOR INDIAN CITIES : INSTITUTIONAL AND POLICY CONTEXT

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DEFINITION OF URBAN

CENSUS TOWN

- POPULATION > 5000
- ATLEAST 75% OF MALE WORKING POPULATION ENGAGED IN NON-AGRICULTURAL ACTIVITIES
- DENSITY > 400 PEOPLE PER SQ.KM

Statutory Town

All areas with Municipality / Corporation / Cantonment Board

WATER IN URBAN INDIA

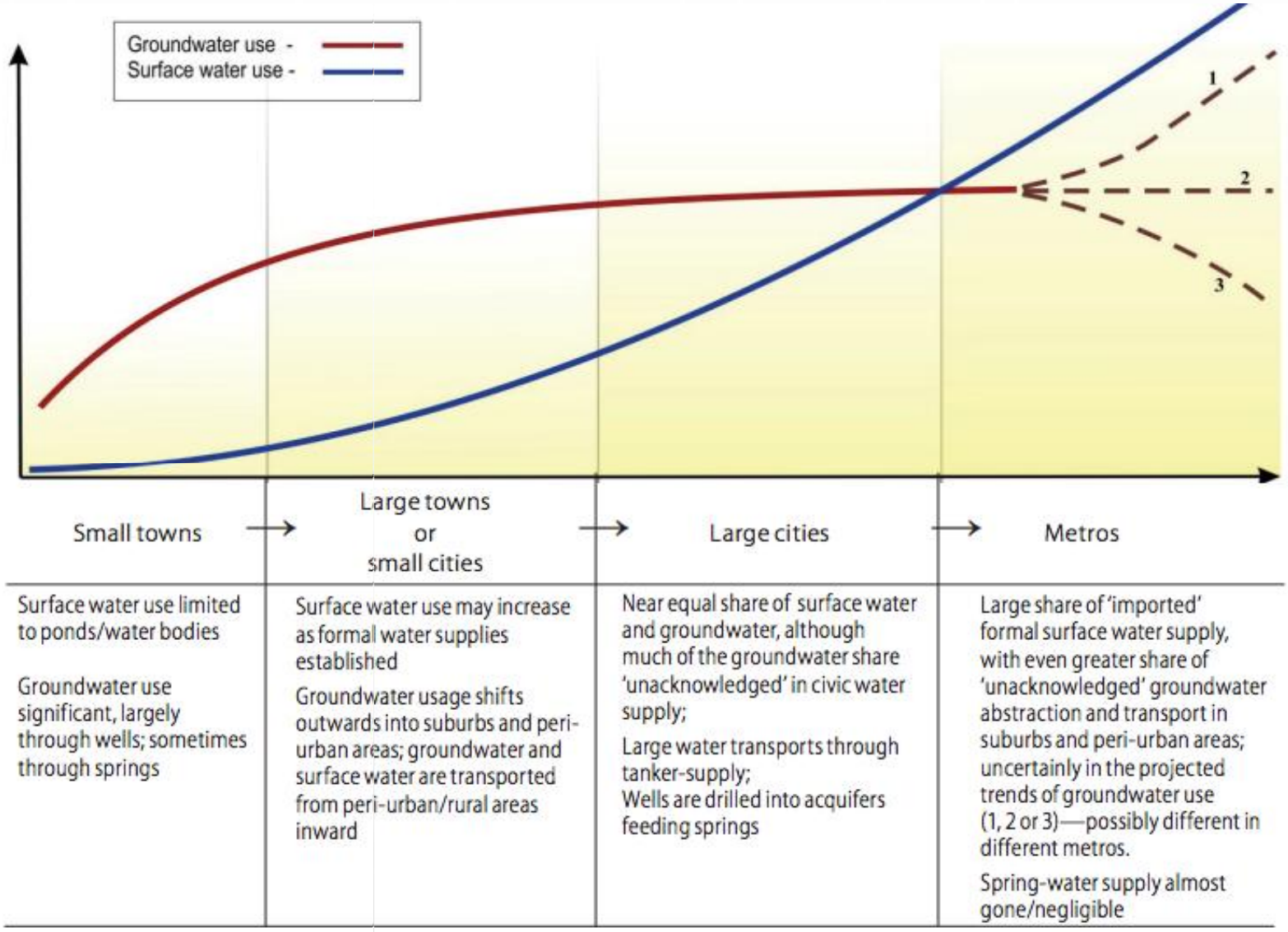
According to the Government of India, India has 17.74 % of the world's population , but only 2.45% of the world's land resources and 4.5% of fresh-water resources

80 % of Drinking Water and two-third of irrigation needs of India are conveyed by Ground Water. Furthermore, 60% of districts face groundwater over-exploitation and/or serious quality issues.

By 2030, the country's water demand is projected to be twice the available supply, implying severe water scarcity for hundreds of millions of people and an eventual ~6% loss in the country's GDP.

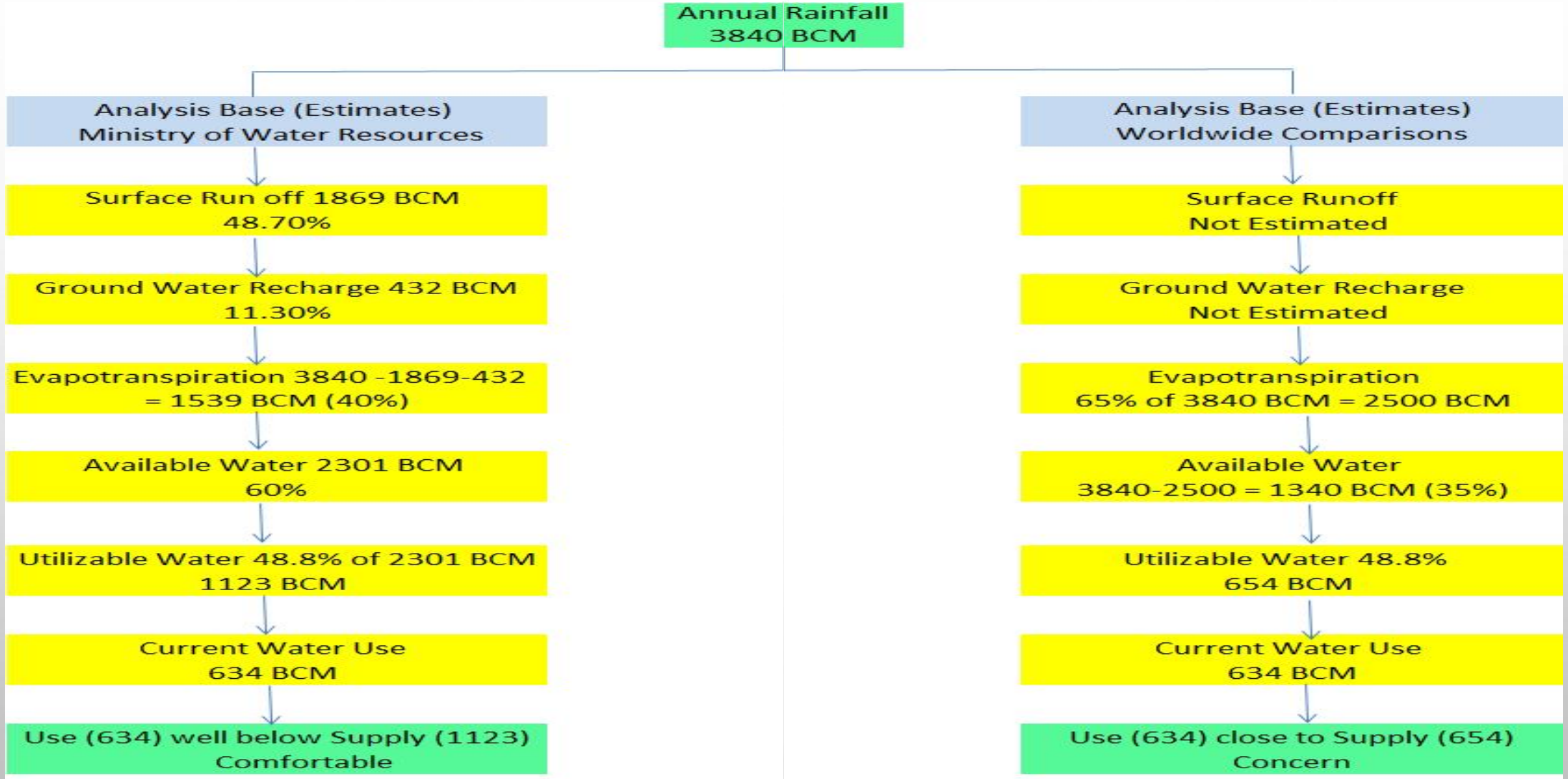
Source: Various sources; NITI, MoWR.

DO WE HAVE ENOUGH WATER LEFT IN OUR CITIES?



Small towns →	Large towns or small cities →	Large cities →	Metros
Surface water use limited to ponds/water bodies Groundwater use significant, largely through wells; sometimes through springs	Surface water use may increase as formal water supplies established Groundwater usage shifts outwards into suburbs and peri-urban areas; groundwater and surface water are transported from peri-urban/rural areas inward	Near equal share of surface water and groundwater, although much of the groundwater share 'unacknowledged' in civic water supply; Large water transports through tanker-supply; Wells are drilled into acquifers feeding springs	Large share of 'imported' formal surface water supply, with even greater share of 'unacknowledged' groundwater abstraction and transport in suburbs and peri-urban areas; uncertainly in the projected trends of groundwater use (1, 2 or 3)—possibly different in different metros. Spring-water supply almost gone/negligible

Source: Kulkarni and Mahamuni (2014).



Source: Narasimhan, T.N. and V.K. Gaur (2009): *A Framework for India's Water Policy*
National Institute for Advanced Studies, Bangalore

GROUNDWATER AVAILABILITY, NET DRAFT AND LEVEL OF DEVELOPMENT, 2011 : CGWB 2014

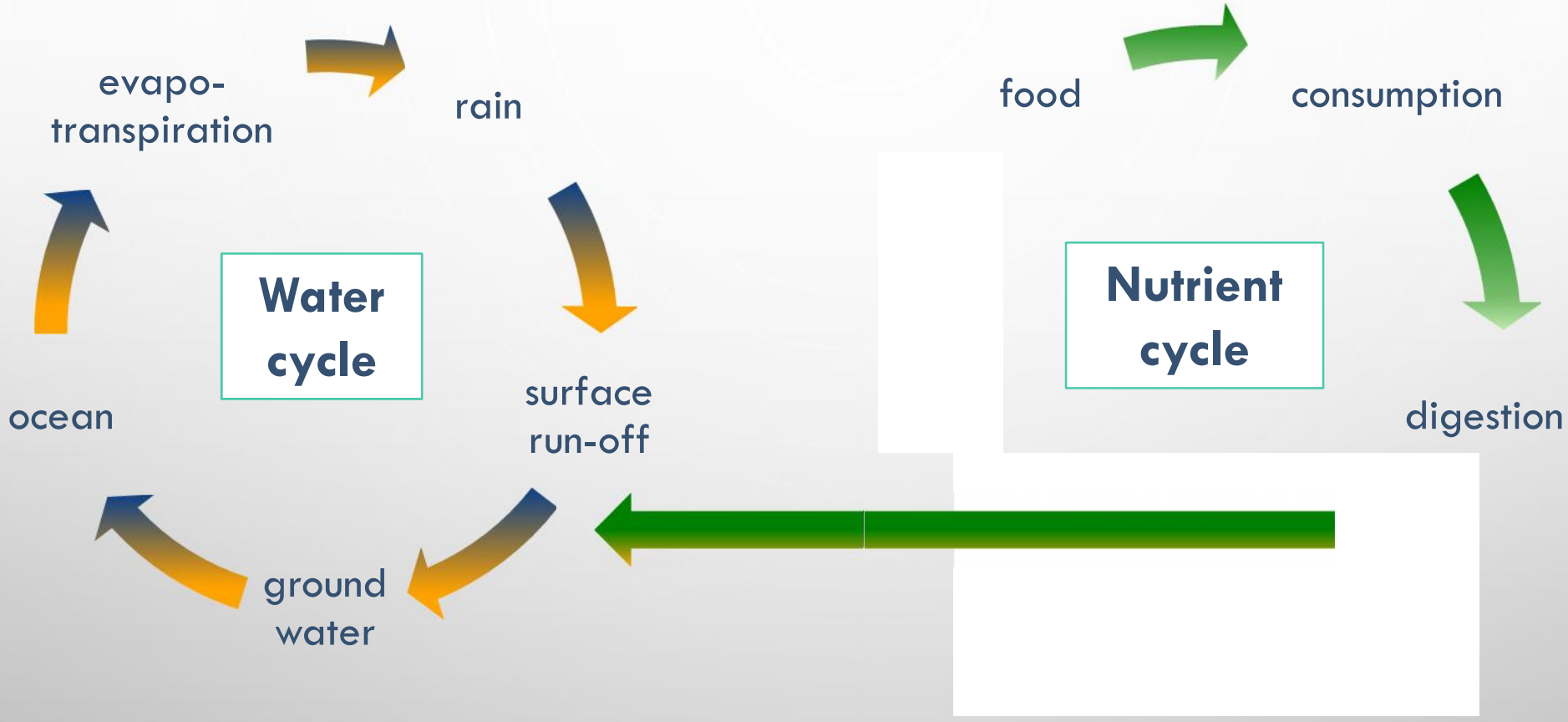
States	Net Annual Groundwater Availability (BCM/yr)	Net Draft (BCM/yr)	Impacton Ground Water Stocks (BCM/yr)	Level of GW Development (%)
Punjab	20.32	34.88	(-)14.83	172
Rajasthan	10.83	14.84	(-)4.01	137
Haryana	9.79	13.05	(-)3.31	133
Tamil Nadu	19.38	14.93	4.39	77
Gujarat	17.59	11.86	5.87	67
Uttar Pradesh	71.66	52.78	19.64	74
INDIA	398.16	245.05	154.71	62

URBAN WATER SUPPLY : KEY CHALLENGES

- **RAPID URBANISATION** LEADING TO INCREASED DEMAND FOR WATER :
  - AN INCREASINGLY DEPENDENCE ON DISTANT SURFACE WATER RESOURCES WHICH HAS RAMIFICATIONS IN TERMS OF HIGH COST OF WATER SUPPLY (CAPITAL COSTS OF CREATING CONVEYANCE INFRASTRUCTURE, COSTS OF PUMPING WATER AND TRANSMISSION LOSSES OVER LONG DISTANCES), ENVIRONMENTAL CONSEQUENCES AS THERE ARE LITTLE OR NO ATTEMPTS AT SOURCE CONSERVATION OR PROTECTION AND GROWING CONFLICTS AROUND WATER.
  - INCREASING EXTRACTION OF GROUND WATER WHICH IS LEADING TO RAPID DEPLETION OF AQUIFERS. THE GROUND WATER SOURCES ARE ALSO AFFECTED BY POLLUTION / CONTAMINATION.
- ONLY A **FRACTION OF WASTEWATER** BEING GENERATED BY CITIES (ABOUT 1%) IS BEING RECYCLED AND REUSED, THIS HAS ENORMOUS POTENTIAL TO HELP MEET THE EXISTING WATER DEMAND SUPPLY GAP.
- **WATER DISTRIBUTION SYSTEMS** ARE INEFFICIENT AND PLAGUED WITH DISTRIBUTION LOSSES, LOW HOUSEHOLD CONNECTION COVERAGE, LIMITED METERING LEADING TO HIGH LEVELS OF NON-REVENUE WATER (NRW)

- **POOR PRICING STRATEGIES** (INDIVIDUAL VS BULK USERS, DOMESTIC VS COMMERCIAL AND OTHER USES) AND COST RECOVERY MECHANISMS
- CHALLENGES RELATED TO **EXISTING INSTITUTIONAL ARRANGEMENTS** FOR WATER SERVICE DELIVERY
    - PRESENCE OF MULTIPLE INSTITUTIONS ACROSS THE THREE LEVELS OF GOVERNMENT (NATIONAL, STATE AND LOCAL) WITH OVERLAPPING JURISDICTIONS
    - SOME INSTITUTIONAL ARRANGEMENTS FOR WATER SERVICE DELIVERY (INCLUDING SEMI-AUTONOMOUS WATER BOARDS AND STATE LEVEL PARASTATALS) HAVE WEAK ACCOUNTABILITY TO THE LOCAL STAKEHOLDERS / CITIZENS
    - LACK OF INDEPENDENT REGULATORY AUTHORITY IN THE URBAN WATER SUPPLY SECTOR - GOVERNANCE AND SERVICE DELIVERY ROLES REST WITH THE SAME ENTITY
- CHALLENGES RELATED **TO INSTITUTIONAL CAPACITIES**
    - WEAK ORIENTATION OF EXISTING UTILITY / ULB STAFF ON WATER RESOURCE MANAGEMENT, CONJUNCTIVE USE OF WATER RESOURCES, DEMAND SUPPLY MANAGEMENT, ETC.
    - WEAK ORIENTATION OF EXISTING UTILITY / ULB STAFF ON THE IMPORTANCE AND METHODS FOR STAKEHOLDER ENGAGEMENT AND GENDER MAINSTREAMING
    - LIMITED ATTEMPTS AT COLLECTING GEO-CODED DATA ON WATER DISTRIBUTION AND USING THE SAME FOR PLANNING, MONITORING AND DESIGNING PERFORMANCE IMPROVEMENT STRATEGIES AND PLANS

INTERACTION OF WATER AND NUTRIENT CYCLES



Concept Source: Kramer, Pedro; (20th Jan 2014). Workshop on 'Establishing Operation & Maintenance Services for Decentralized Urban Sanitation Infrastructure in Karnataka', CDD Society-BORDA, Bangalore, India

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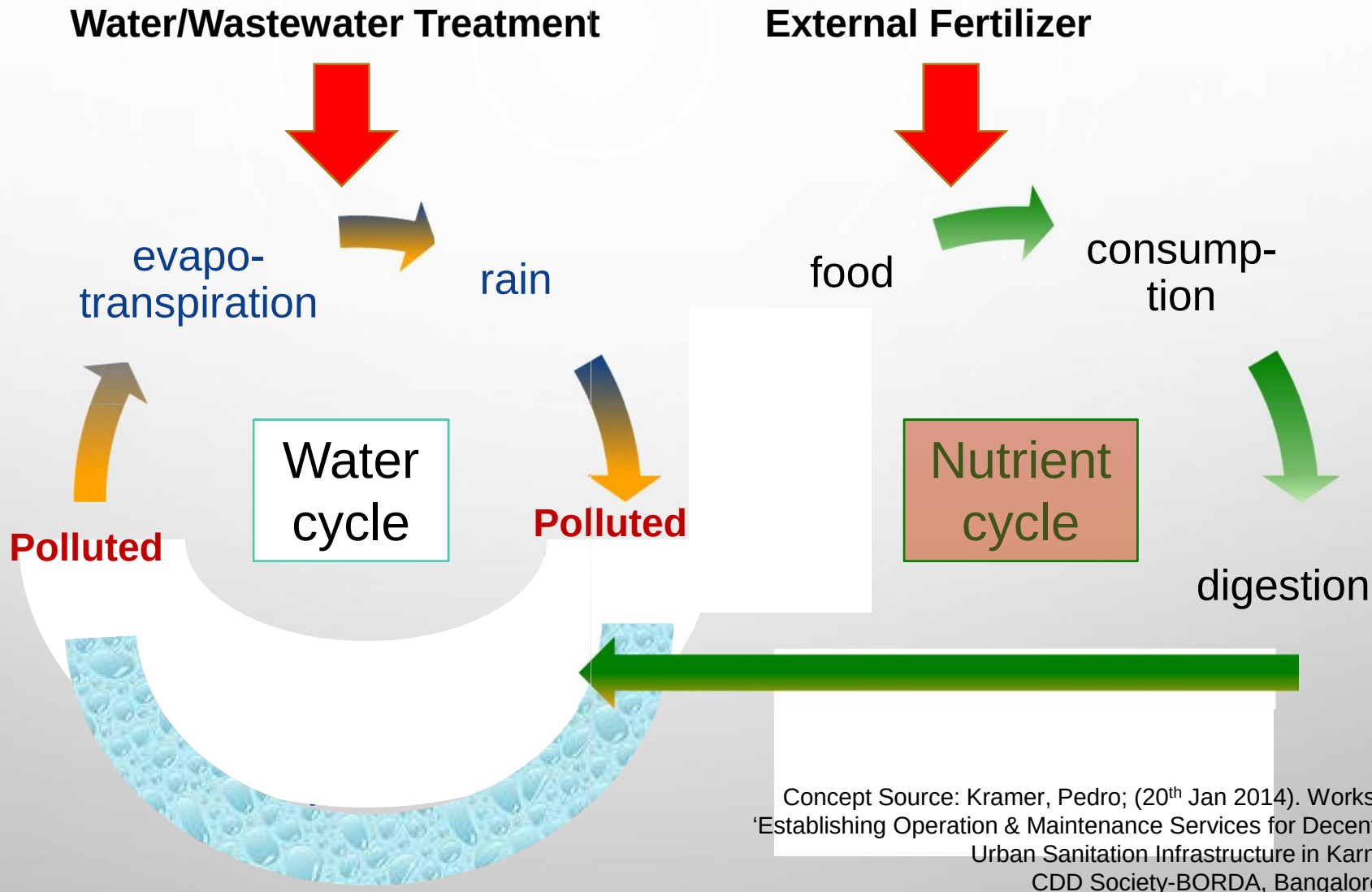


Concept Source: Kramer, Pedro; (20th Jan 2014). Workshop on 'Establishing Operation & Maintenance Services for Decentralized Urban Sanitation Infrastructure in Karnataka', CDD Society-BORDA, Bangalore, India

CENTRAL WATER COMMISSION

AS PER ISI-IS: 2296-1982, THE TOLERANCE LIMITS OF PARAMETERS ARE SPECIFIED AS PER CLASSIFIED USE OF WATER DEPENDING ON VARIOUS USES OF WATER.

- CLASS A: DRINKING WATER SOURCE WITHOUT CONVENTIONAL TREATMENT BUT AFTER DISINFECTION
- CLASS B: OUTDOOR BATHING
- CLASS C: DRINKING WATER SOURCE WITH CONVENTIONAL TREATMENT FOLLOWED BY DISINFECTION.
- CLASS D: FISH CULTURE AND WILD LIFE PROPAGATION
- CLASS E: IRRIGATION, INDUSTRIAL COOLING OR CONTROLLED WASTE DISPOSAL

WATER QUALITY STANDARDS

- INDIA FOLLOWS ITS OWN DRINKING WATER QUALITY STANDARDS AS SET OUT AND REVISED BY THE BUREAU OF INDIAN STANDARDS (BIS)
- EUROPE FOLLOWS EUROPEAN DRINKING WATER DIRECTIVES
- UNITED STATES FOLLOWS THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY (USEPA) STANDARDS AND CHINA FOLLOWS ITS OWN DRINKING WATER STANDARD GB3838-2002 (TYPE II)

BIS STANDARDS

- INTERNATIONAL STANDARDS FOR DRINKING WATER ISSUED BY WORLD HEALTH ORGANIZATION, 1984.
- MANUAL OF STANDARDS OF QUALITY FOR DRINKING WATER SUPPLIES. INDIAN COUNCIL OF MEDICAL RESEARCH 1971.
- MANUAL ON WATER SUPPLY AND TREATMENT (THIRD REVISION) CPHEEO, MINISTRY OF URBAN DEVELOPMENT, 1989.

1	Total Dissolved Solids (TDS)	mg/L*	500	2000
2	Colour	Hazen unit	5	15
3	Turbidity	NTU	1	5
4	Total Hardness	mg/L	200	600
5	Ammonia	mg/L	0.5	0.5
6	Free Residual Chlorine	mg/L	0.2	1.0
7	pH	--	6.5-8.5	6.5-8.5
8	Chloride	mg/L	250	1000
9	Fluoride	mg/L	1.0	1.5
10	Arsenic	mg/L	0.01	0.05
11	Iron	mg/L	0.3	0.3
12	Nitrate	mg/L	45	45
13	Sulphate	mg/L	200	400
14	Selenium	mg/L	0.01	0.01
15	Zinc	mg/L	5.0	15.0
16	Mercury	mg/L	0.001	0.001
17	Lead	mg/L	0.01	0.01
18	Cyanide	mg/L	0.05	0.05
19	Copper	mg/L	0.05	1.5
20	Chromium	mg/L	0.05	0.05
21	Nickel	mg/L	0.02	0.02
22	Cadmium	mg/L	0.003	0.003
23	E-Coli or Thermo tolerant coliforms	mg/L	NIL	NIL

REGULATORY FRAMEWORK

- LEGISLATIVE FRAMEWORK : CENTRAL AND STATE ACTS
- CENTRAL GOVERNMENT
  - POLICY & PROGRAMMES : NATIONAL WATER POLICY, NRDWP
  - NORMS : BIS STANDARDS
- STATE GOVERNMENT – WATER A STATE SUBJECT.
  - PUBLIC HEALTH ENGINEERING DEPARTMENTS (PHED) OR WATER BOARDS (DELHI), OR WATER CORPORATIONS (UP, MAHARASHTRA) ARE RESPONSIBLE FOR PLANNING, DESIGNING, IMPLEMENTATION AND OPERATION AND MAINTENANCE OF THE WATER SUPPLY SCHEMES
- URBAN LOCAL BODIES – MUNICIPAL BODIES OR BOARDS

BEST PRACTICES

- **SOURCE SUSTAINABILITY**
  - HIVRE BAZAR: COMPREHENSIVE WATER MANAGEMENT PLANNING
  - SEHJEEVAN-WASMO KUTCH PEOPLES WATER SCIENCE BASED SYSTEMS
  - GSDA MAHARASHTRA, JAL SWARAJYA WITH ASSISTANCE OF NGOS
- **COMMUNITY BASED NATURAL RESOURCE MANAGEMENT WITH DRINKING WATER AND SANITATION**
  - FES - ORISSA
  - GRAM VIKAS – ORISSA
- **DECENTRALISED SYSTEMS SUSTAINABILITY**
  - WASMO
  - HAND PUMP MAINTENANCE : UNICEF, UP
  - WELL BASED SUPPLY:
    - PRADAN: JHARKHAND, PURULIA
    - MAHITI UTTHAN: GUJARAT

Well Based Drinking Water Supply: PRADAN

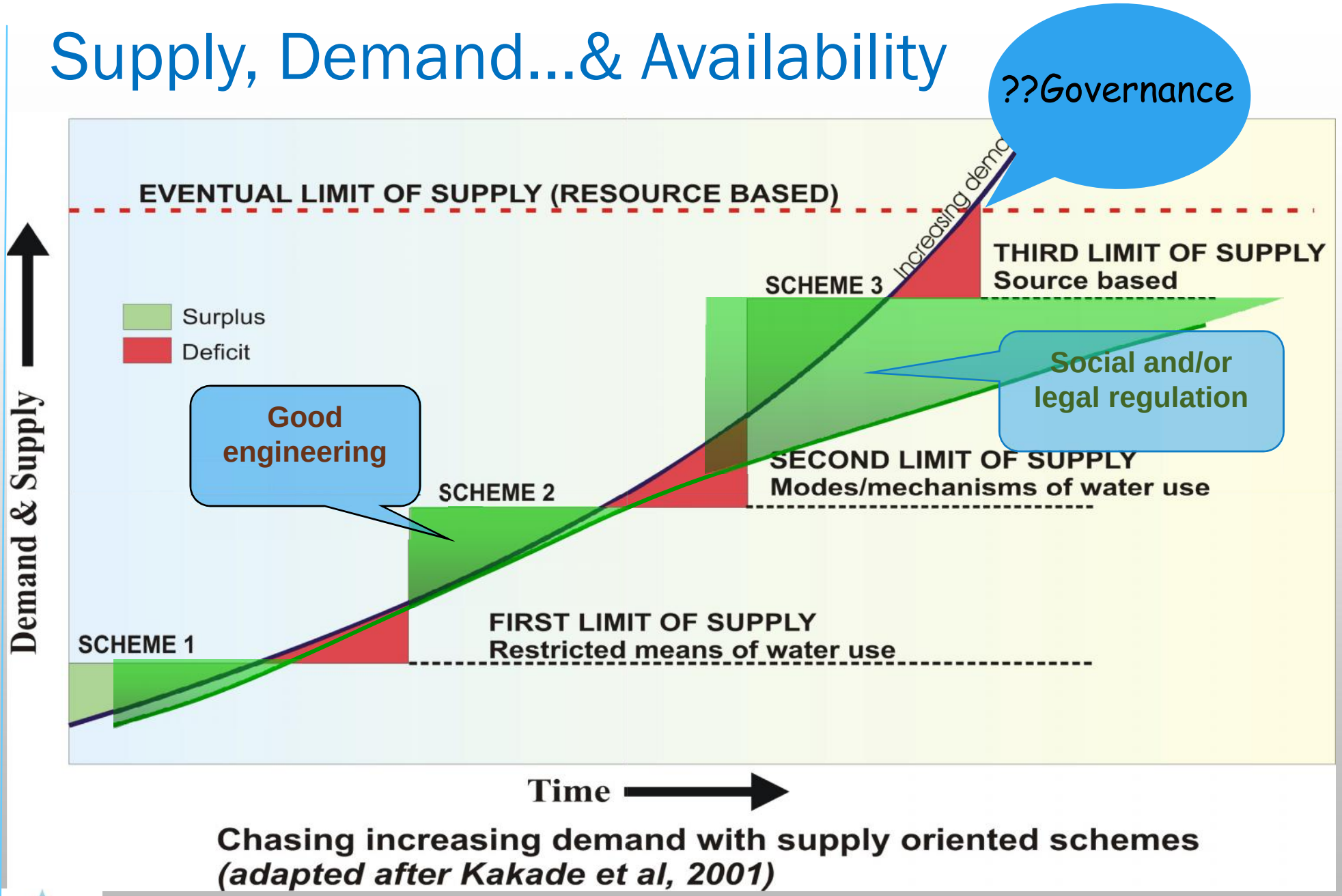
FOUNDATION FOR ECOLOGICAL SECURITY: DIVERSION BASED IRRIGATION, DRINKING WATER : KORAPUT

- Five schemes in four villages
- Total command area: 56.55 ha
- Total estimated cost of the project: Rs.19.60 lakhs

GRAM VIKAS SCHEME

- CORPUS FUND
- O&M: CONTRIBUTION FROM HARVESTS, MONTHLY PAYMENTS
- MOVING FROM FLAT RATE FEE (RS1-2 PER HH PA) TO WATER METERING
- USING ONLY RENEWABLE WATER SOURCES

Supply, Demand...& Availability

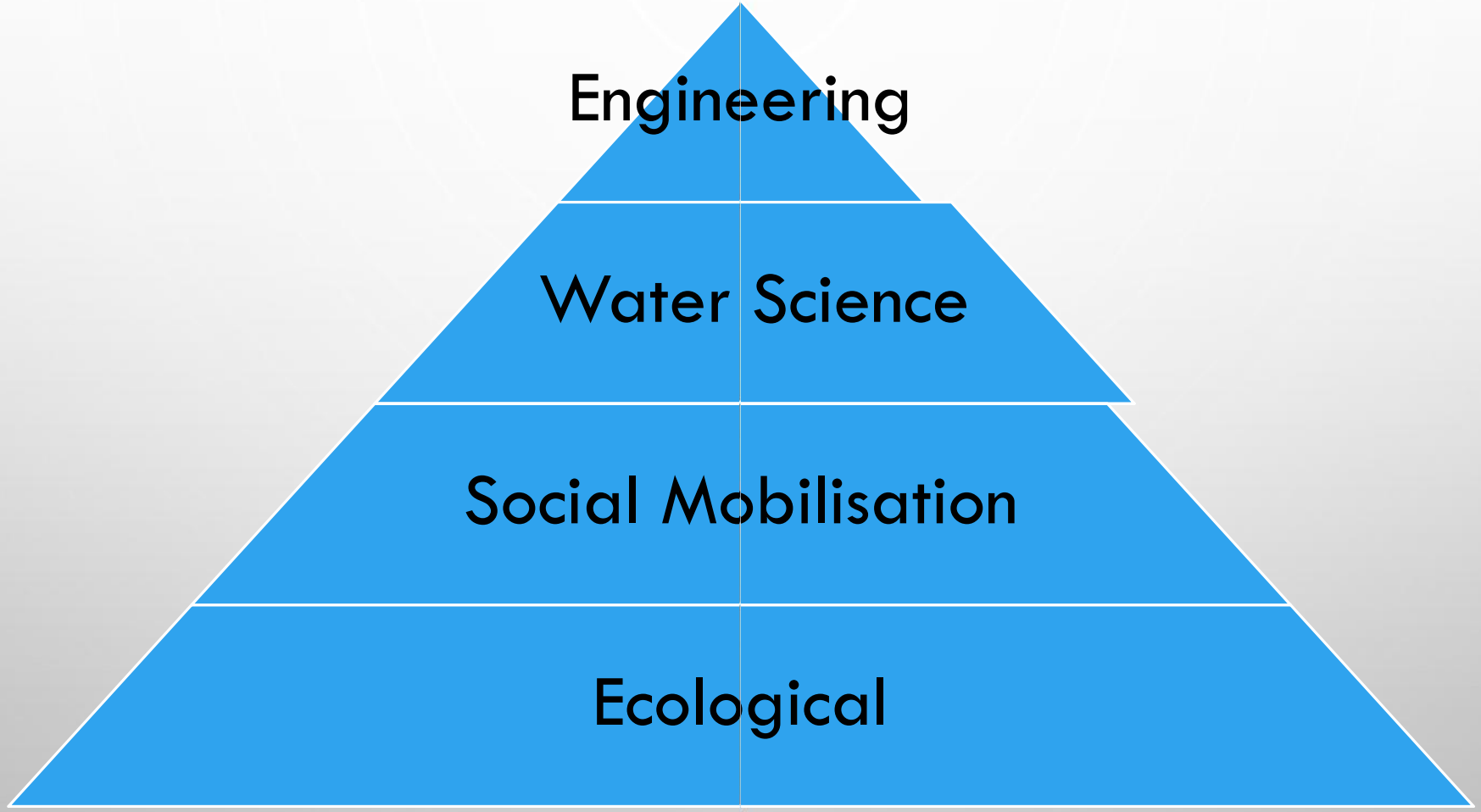


Chasing increasing demand with supply oriented schemes
(adapted after Kakade et al, 2001)

ACWADAM

Estimate availability, develop supplies and manage demand..*to ensure security*

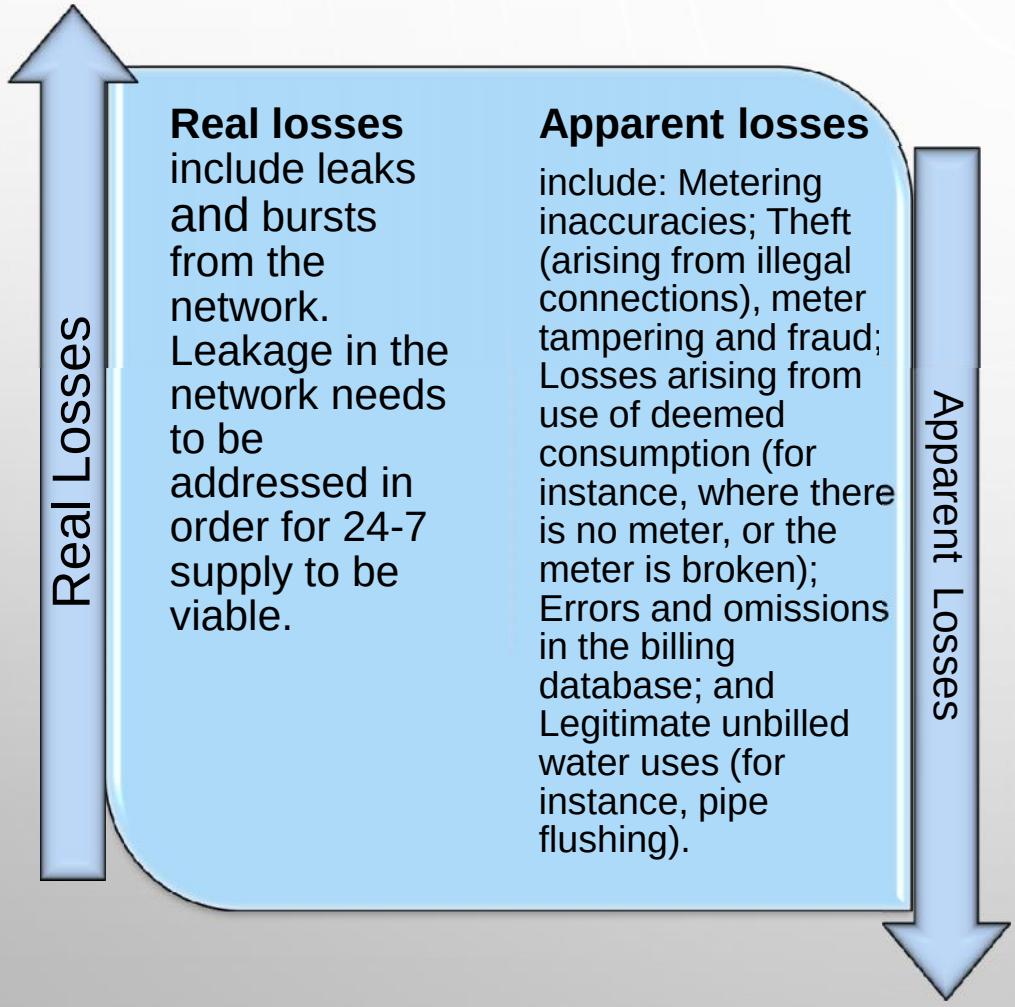
PRIORITIES FOR WATER SUPPLY



NON REVENUE WATER(NRW)

- WATER THAT HAS BEEN PRODUCED BUT IS “LOST” BEFORE IT REACHES THE CUSTOMER.
- THE AMOUNT OF WATER PRODUCED THAT DOES NOT EARN ANY REVENUES FOR THE ULB.

WATER LOSSES AND NON REVENUE WATER



STEPS ARE RECOMMENDED FOR REDUCING NRW

- **Detect Leaks Acoustically and fix them**
- **Perform District Metering**
- **Managing Distribution System Pressure**
- **Analyse and reduce Water meter tampering**

DRINKING WATER SUPPLY NORMS : CPHEEO GUIDELINES

	Classification of towns/cities	Recommend maximum water supply levels (lpcd)
1	Towns provided with piped water supply but without sewerage system existing/planned	70+ 15% for leakage
2	Cities provided with piped water supply where sewerage system exists/planned	135+ 15% for leakage
3	Metropolitan and Mega cities provided with piped water supply where sewerage systems existing	150+ 15% for leakage

WATER SUPPLY Norms		
S. No.	Indicator	Benchmark
1.	Coverage of Water Supply connections	100%
2.	Per Capita Supply of Water	135 lpcd
3.	Extent of Non-revenue Water	15%
4.	Extent of Metering	100%
5.	Continuity of Water supplied	24 Hours
6.	Efficiency in redressal of customer complaints	80%
7.	Quality of Water Supplied	100%
8.	Cost Recovery	100%
9.	Efficiency in Collection of Water Charges	90%

Water Usage per person per day, IS 1172: 1993

Category of Use	Water Needed (liters/day)
Drinking	5
Cooking	5
Bathing	55
Washing clothes	20
Washing utensils	10
Floor washing	10
Flush	30
Total requirement/day	**135**

LEH WATER SUPPLY CASE STUDY : BORDA/LEDEG

Figure 3:
Peak Summer Population

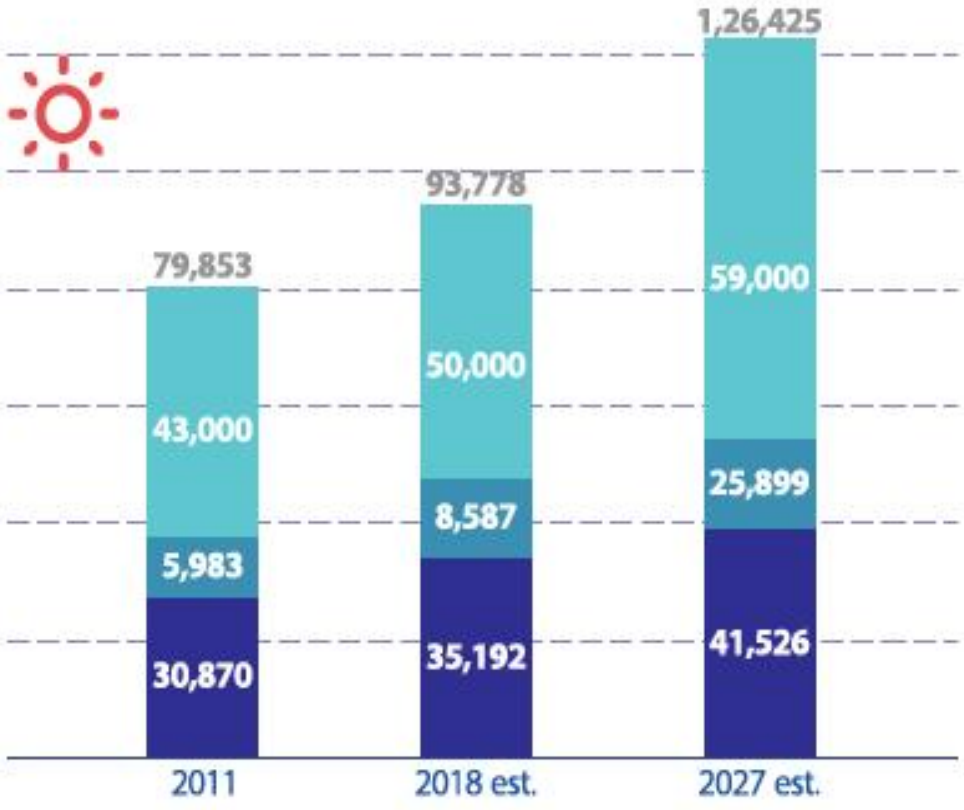


Figure 4:
Winter Population

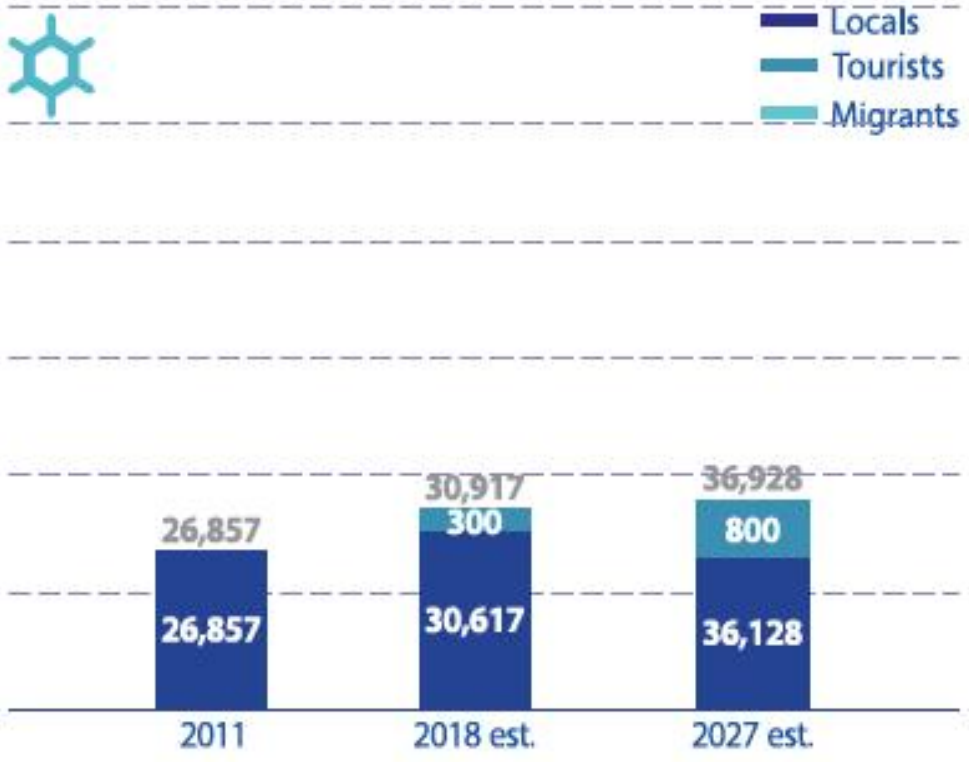
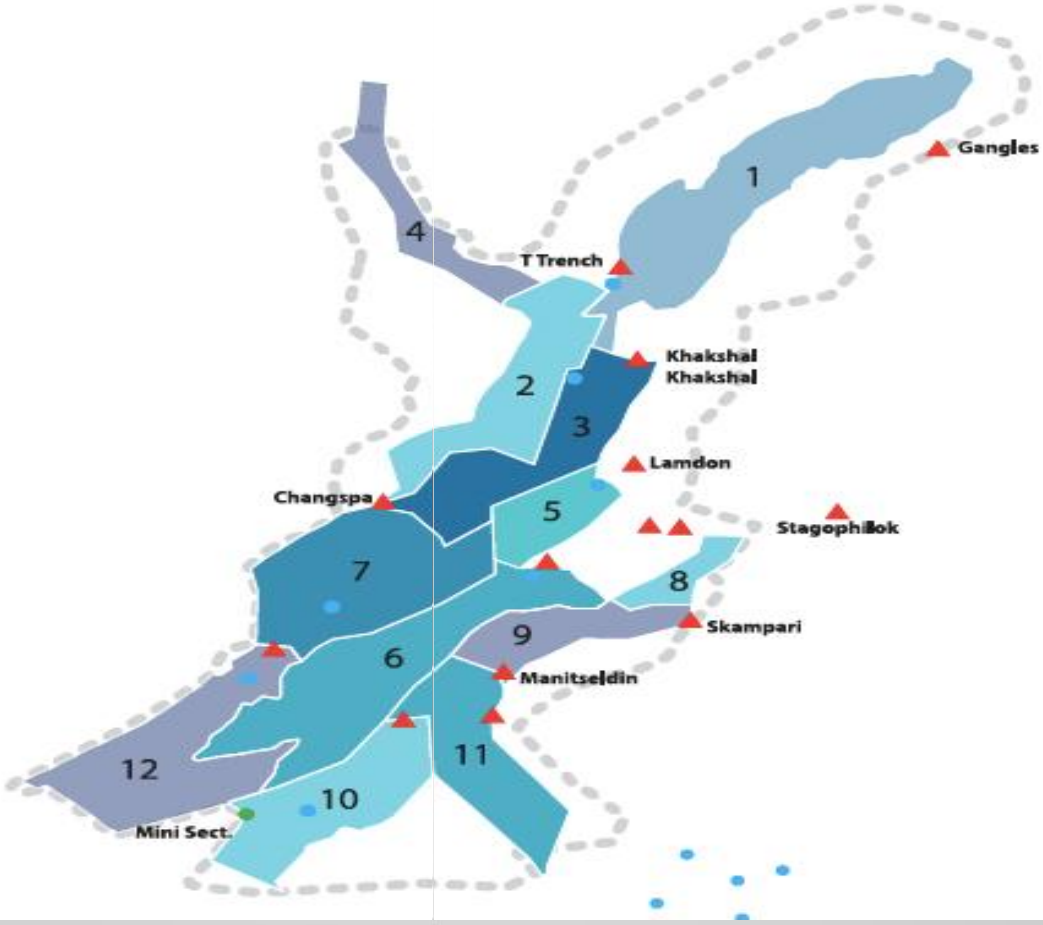


Figure 11:
PHE Zones of Leh

- Service Reservoir
- Service Reservoir
- Service Reservoir



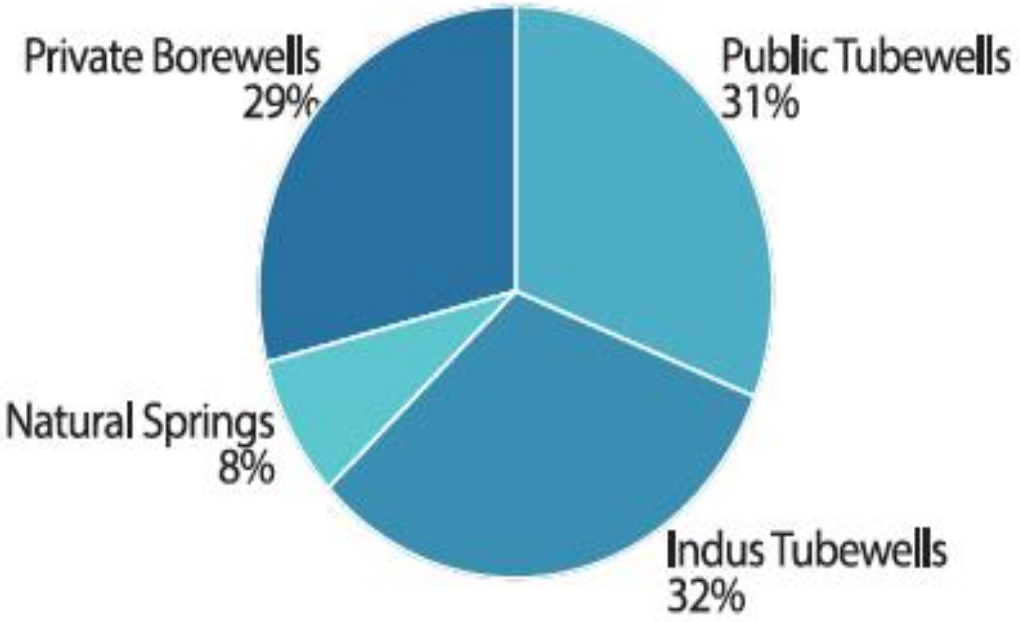
Current Water Usage

	Summer			Winter		
Category	**Population**	**LPCD**	**Usage (MLD)**	**Population**	**LPCD**	**Usage (MLD)**
Residents	35,192	75	2.64	30,617	50	1.53
Tourists	8,587	100	0.86	300	60	0.02
Workers	50,000	30	1.50	0		
Total	**93,778**	**53**	**5.00**	**30,917**	**50**	**1.55**

Ideal Water Requirement to meet needs comfortably

	Summer			Winter		
Category	**Population**	**LPCD**	**Usage (MLD)**	**Population**	**LPCD**	**Usage (MLD)**
Residents	35,192	100	3.52	30,617	60	1.84
Tourists	8,587	100	0.86	300	60	0.02
Workers	50,000	60	3.00		-	
Total	**93,778**		**7.38**	**30,917**		**1.86**

Sources of Water in Leh



Estimate of **Water Extracted by Private Borewells**

	Category	MLD
a.	Water from Indus tubewells	2.10
b.	Water from PHE tubewells in Leh	2.05
c.	Water from Springs	0.55
d.	**Total (a+b+c)**	**4.70**
e.	Losses @ 25%*	1.17
f.	Net Water supplied by PHE (d-e)	3.53
g.	Current water usage	5.00
h.	Hence, water from private borewells (g-f)	1.47
i.	Wastage of water from private borewells (8%)	0.13
j.	Water extracted from private borewells	1.60

WATER SUPPLY CONTEXT OF LEH

- **DOES NOT FACE SHORTAGE OF WATER SUPPLY** BUT A WATER MANAGEMENT CHALLENGE
  - ALREADY HAS INFRASTRUCTURE TO SUPPLY CLOSE TO 8 MLD OF WATER WHILE WATER REQUIRED IS ABOUT 5 MLD
  - (DURING THE PEAK SUMMER TOURIST SEASON) BUT DUE TO SOME GAPS IN THE LEH WATER SUPPLY SYSTEM, SUPPLY IS ONLY 2.1 MLD.
- **EXCESSIVE DEPENDENCE ON UNDERGROUND WATER** WHICH IS BECOMING POLLUTED
  - TRADITIONALLY, SNOW MELTED WATER THROUGH SURFACE STREAMS, LOCALLY CALLED YURAS, PROVIDED 90% OF WATER USED BY PEOPLE OF LEH, AND THE REMAINING 10% CAME FROM NATURAL SPRINGS. TODAY,
  - HOWEVER, 92% OF DOMESTIC WATER IS FROM UNDERGROUND SOURCES, OF WHICH 70% IS FROM LEH'S AQUIFERS.

- **AN OPERATING COST PROBLEM**: WHILE THE NEW WATER DISTRIBUTION NETWORK HAS BEEN BUILT AT A CAPITAL INVESTMENT OF RS. 70.5 CR. (RS. 20,033 PER CAPITA CONSIDERING 2018 RESIDENT POPULATION OF 35,200), THE GOVERNMENT'S OPERATING COST FOR PROVIDING WATER IS LIKELY TO INCREASE FROM RS. 1.65 CR. TO RS. 3.94 CR PER YEAR OR EVEN HIGHER
- **CURRENT TARIFFS** COLLECT ONLY RS. 9.5 LAKHS, OR UNDER 6% OF PRESENT OPEX
    - THE TOWN CHARGES A FIXED TARIFF PER HOUSEHOLD OR COMMERCIAL CUSTOMER. WHILE ONE PROBLEM IS THAT THE TARIFF IS TOO LOW, THE BIGGER PROBLEM COULD BE THAT FIXED PRICING CREATES NO INCENTIVE TO SAVE WATER.
- **HIGH WATER LOSSES** : ABOUT RS. 40 LAKHS PER YEAR, CONSIDERING TOTAL COST OF WATER DELIVERY IS RS. 1.65CR.
- **PHE AND MCL** SHARE VAGUELY DEFINED RESPONSIBILITIES OF OPERATING THE WATER SYSTEM, WITHOUT A STABLE AND QUALIFIED TEAM THAT IS HELD RESPONSIBLE FOR ITS LONG-TERM MANAGEMENT.
- EQUITY IN SUPPLY
- WATER CONSERVATION

Shift of dependency over the past 15-20 years from **90% snow melted** surface water to **92% groundwater** sources.

The PHE department is expanding the system for **peak supply capacity** of **12.8 MLD**.

PHE's current **installed capacity is 8.16 MLD**, and about **4.7 MLD is supplied**.

Private borewells supply about **29%** of water used, or about **1.5 MLD**.

Groundwater quality varies seasonally as influx of **pollutants** is **highest in summer** .

Murtsey tube well is a major source of water as it supplies almost **40% of tankers**, and has **high turbidity, nitrates** and **fluorides**.

Current water supply by Zone*

Zone	Estimated Population	Total PHE Supply (MLD)	Water Usage (MLD)	Avg LPCD
Z1: Gangles	915	0.08	0.0	82
Z2: T-Trench	1,564	0.23	0.1	144
Z3: Khakshal	3,128	0.26	0.2	84
Z4: Gyamtsa / Gompa	235	0.01	0.0	62
Z5: Chubi	6,400	0.44	0.6	67
Z6: Old Leh/ Jumabagh	9,514	0.32	0.8	33
Z7: Tukcha	5,071	0.38	0.5	69
Z8: Skampari	26,173	0.47	0.8	18
Z9: Nimoling	28,128	0.45	1.0	16
Z10: Murtsey	7,820	0.41	0.6	52
Z11: Housing Colony	2,909	0.29	0.2	101
Z12: Skara	1,955	0.29	0.1	146
Total	**94,433**	**3.60**	**5.0**	**38**

8 public tankers, owned and operated by PHE, supply water to about **2,000 households** in areas that do not have household connections or Public Stand Posts.

Tanker supply costs 4.5 times more than piped water supply: **Rs 49/KL vs Rs 11/KL.**

Comparison of O&M for tanker and piped system

O&M Head	Public Tanker	Piped system
Fuel or Electricity	51,50,880	68,49,120
Labour	10,65,800	14,34,200
Maintenance & Repairs	14,60,000	5,40,000
Annual O&M Cost	76,76,680	88,23,320
Annual water supplied (KL)	1,57,680	7,96,032
Cost per KL	**Rs. 49**	**Rs. 11**

Table 3: Economics of water management in Dehradun

Particulars	Values
Energy cost (Electricity)	INR 1982.87 lakhs
Repair and Maintenance	INR 11370 lakhs
Operation (man power & raw material)	INR 26799 lakhs
Miscellaneous cost (cost of major replacement)	INR 2591 lakhs
Total cost	INR 42742.87 lakhs
Annual water pumped to city (estimated)	12742 KL
Water cost (excluding the operation, repair, maintenance, and misc cost)	INR 3.35/ KL

There are **no bulk or consumer meter installed** to measure the actual quantum of water supplied, consumed and lost in transit.

Till November 2018, around **66% of households have been connected** i.e. around **3,818 out of 5,800** households have been connected to the new network.

Middle Leh, with its concentration of hotels, guest houses and migrant workers, has a **significant gap between water usage and supply** from PHE, resulting in large number of private borewells.

Most connections are taken without the formal process and documentation.

Drinking water supply shortage appears to be due to **operational constraints** including the incomplete **distribution network**, which should be completed in **2020**.

There are **16 Service Reservoirs** (4 including those under-construction) across Leh with cumulative daily storage capacity of **16,25,000 gallons** or **6.18 Million Liter**.

Storage capacity is **not a bottleneck** to increase water supply to Leh town.

Water quality in reservoirs is **not monitored.**

Quantity of **water discharged each day** is also **not monitored** making it impossible to accurately track water consumption and wastage/losses.

DELHI WATER SUPPLY & MANAGEMENT

ACCESS OF SAFE WATER AND BASIC SANITATION – CENSUS 2011 RESULTS

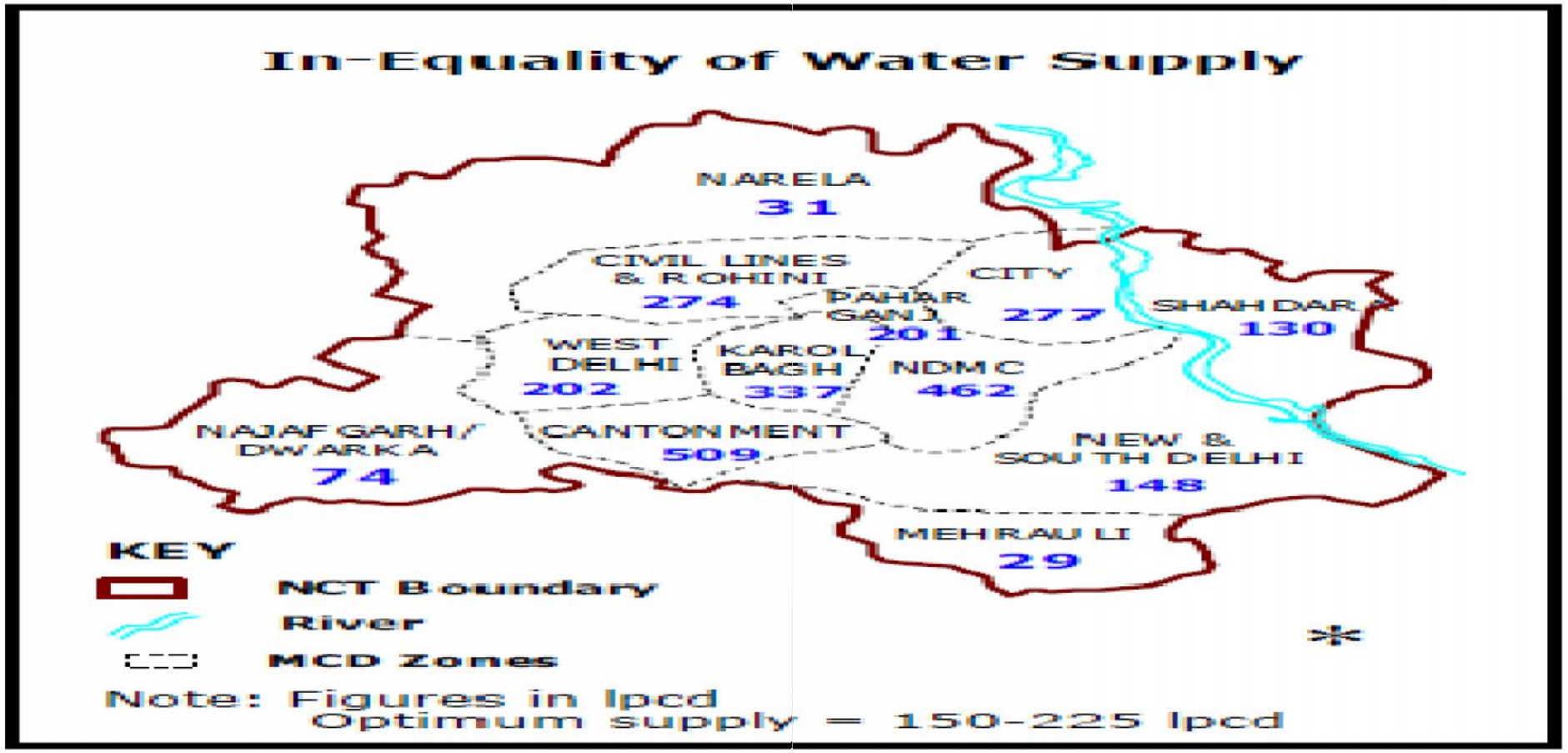
- ONLY 78.4 PER CENT HOUSES HAVE PROVISION FOR DRINKING WATER ON PREMISES, 3.3 PER CENT STILL DEFECATE IN THE OPEN.
- 99.1 PER CENT OF CITY HOUSEHOLDS HAVE ELECTRICITY SUPPLY, JUST 78.4 PER CENT HAVE PROVISION FOR DRINKING WATER ON PREMISES. ONLY 59.3 PER CENT OF THE HOUSEHOLDS ARE CONNECTED WITH A PIPED SEWERAGE NETWORK, 4.2% OF THE HOUSEHOLDS HAVE NO DRAINAGE CONNECTIVITY FOR WASTE WATER.
- 89.5 PER CENT OF THE 33.40 LAKH HOUSEHOLDS IN DELHI HAVE WATER CLOSETS (LATRINE) ON THEIR PREMISES, WHILE 3.3 PER CENT DEFECATE IN THE OPEN.
- HOUSEHOLDS WITH ACCESS TO DRINKING WATER WITHIN THE PREMISES IS ONLY MARGINALLY UP FROM 74.9 PER CENT IN 2001 TO 78.4 PER CENT IN 2011. TAP WATER IS AVAILABLE TO 81.3 PER CENT HOUSEHOLDS AS AGAINST 75.3 PER CENT IN 2001. OF THESE, 75.2 PER CENT HOUSEHOLDS GET TREATED TAP WATER, WHILE 6.1 PER CENT GET UNTREATED TAP WATER.
- HTTP://WWW.INDIASANITATIONPORTAL.ORG/2255

Year	Name of Water Treatment Plant	Supply capacity	
		Million Gallons/day	Million Litres/Day
Commissioned by 2010	Chandrawal 1 & 2	90	410
	Wazirabad 1,2,3	120	550
	Haiderpur1, 2	200	910
	Nangloi	40	180
	Sonia Vihar	140	640
	Haiderpur recycling	20	90
	Total WTPs	710	3223
	Ground water	100	460
	TOTAL	810	3680
Commissioned in 2011	Bawana	20	90
	Recycling at 3 WTPS	30	135
	Dwarka	50	230
	Okhla	20	90
	TOTAL	930	4222

- **PRESENTLY, 810 MGD (3680MLD) OF WATER IS BEING SUPPLIED BY THE DELHI WATER BOARD** TO THE CITIZENS OF DELHI, MOST OF THEM IN URBAN DELHI. IN ADDITION TO THE WATER SUPPLIED BY DJB, THE CONSUMERS USE WATER FROM PRIVATE WELLS AND HAND PUMPS.
- THIS TRANSLATES INTO AN **ACTUAL AVAILABILITY OF 820 MGD** (3726 MLD) AFTER FACTORING LOSSES FROM CANAL SYSTEM AND GROUNDWATER ABSTRACTION OF AN ESTIMATED 100 MGD

Delhi Habitation Status

Category	Population in millions	Percentage of Total Population
Jhugi Jhompri Colonies/Squatters	2.07	14.82
Designated Slum Areas	2.66	19.05
Unauthorised colonies	0.74	2.30
Regularised Unauthorised colonies	1.78	12.75
Resettlement colonies	1.78	12.75
Rural villages	0.74	5.30
Urban villages	0.89	6.37
Planned colonies	13.96	23.71
TOTAL	13.96	100.00



Source: Delhi 1999 – A Fact Sheet NCRPB

PPP PILOT PROJECTS IN DELHI FOR IMPROVING EFFICIENCY:

24X7 SUPPLY
SERVICE IMPROVEMENT

PPP Area	Company	Major Stake	Indian partner	Contract	Capital investment
Nangloi	Nangloi Water Services Pvt Ltd	Veolia Water India Pvt Ltd	SWACH Environment Pvt Ltd	24x7 Water Supply O&M contract	Rs.687 crore
Mehrauli Vasant Vihar	MVV Water Utility Pvt Ltd	SPML	SPML	Water Service Improvement O&M contract	Rs.32 crore
Malviya Nagar	Malviya Nagar Water Services Pvt Ltd	Suez 76%	SPML 24%	24x7 Water Supply O&M contract	Rs.143 crore

PPP CONTRACTS: KEY FEATURES

- 12-15 YRS O&M CONTRACTS
- PRIVATE OPERATOR MAKES 30% CAPITAL INVESTMENT
- BILLING MANAGED BY PRIVATE OPERATOR, GETS CREDITED INTO DJB ESCROW ACCOUNT NOT PRIVATE OPERATOR
- PRIVATE OPERATOR - VOLUMETRIC PAYMENT;
  - NET OPERATOR RATE = RS.X/KL WATER SUPPLIED FOR 24X7
  - MANAGEMENT FEE + NOR FOR SERVICE IMPROVEMENT
- INCENTIVES TO PRIVATE OPERATOR
  - NRW, BILLING AND COLLECTION EFFICIENCY
  - ELECTRICITY SAVING

KEY FEATURES

- DJB – TO BECOME AN O&M CONTRACTS MANAGEMENT AGENCY
- SERVICE IMPROVEMENT(ONE) AND 24X7 WATER SUPPLY CONTRACTS(TWO)
- PRIVATE OPERATOR GETS
  - RETURN ON INVESTMENT + RECOVERY OF INVESTMENT
  - FEE FOR SERVICES
- 24X7 WATER SUPPLY: EQUITY FACTORED INTO THE CONTRACT
  - NO PENALTIES FOR TERMINATION IF EQUITY IS FLOUTED
- FREE OR CHEAP WATER SUPPLY TO PRIVATE OPERATOR
- ELECTRICITY COST IN NANGLOI COVERED BY DJB, INFLATION PROTECTED FOR MALVIYA NAGAR

MALVIYA NAGAR PPP

- 80% OF THE 32,000 WATER CONNECTIONS IN MALAVIYA NAGAR FALL UNDER THE DJB TARIFF SLAB FOR MIXED CONSUMER CATEGORY. CHARGED TWICE THE WATER TARIFF VS. DOMESTIC CATEGORY
- AVERAGE WATER TARIFF HIKED FROM RS.7.56/KL TO RS.15.14/KL IN 2010-11
- DJB COST OF WATER SUPPLY : RS.8.54/KL.
- NOR OF SUEZ : RS. 10.87/KL

LOGIC OF PPP

- IMPROVE REVENUES
- IF HIGHER INCOME CITIZENS PAY A HIGHER SLAB RATE, COULD BE DONE WITH A SOCIAL AIM OF SUBSIDIZING THE POOR, AND NOT FOR JUSTIFYING PRIVATE WATER BUSINESS OPERATIONS ?

WATER SAVING

- NRW = LEAKAGES + FREE WATER SUPPLIED BY DJB TANKERS + WATER THEFT + WATER SUPPLIED BUT NOT BILLED
  - REDUCTION IN FREE WATER SUPPLY IS NOT EFFICIENCY
  - BILLING OF ALL WATER SUPPLIED DOES NOT CONVERT INTO WATER SAVING
- PRIVATE OPERATOR PROTECTED
  - FREE WATER SUPPLIED BY TANKERS – BILLED TO DJB
- INCENTIVE TO REDUCE NRW - LINKED TO REDUCED NOR PAYMENT. DOES NOT NECESSARILY IMPLY WATER SAVING.

COST EFFICIENCY

	Mehrauli SPML	24x7 Malviya Nagar Suez	24x7 Nangloi Voelia	Overall for Delhi
Pvt Operator Water supply cost	Rs.4.11/KL + O&M Fee Rs.169 crore	Rs.10.84/KL	Rs.14.99/KL	
DJB water supply cost before PPP		Rs.8.54/KL	Rs.4.86/KL	Rs.8.95/KL

- APPROX 7% ANNUAL INFLATION ADJUSTED NOR FOR PRIVATE OPERATOR
  - DJB TARIFFS WILL RISE BY 10% EVERY YEAR OR DJB WILL START BEARING LOSSES

ISSUES FOR TARIFF CONSIDERATION

- HOW MUCH TO CHARGE FOR WATER, SEWERAGE AND SOLID WASTE MANAGEMENT?
  - FULL COST RECOVERY VS PARTIAL
  - CROSS SUBSIDY WITHIN A CITY/ULB/STATE/NATION
- HOW TO DECIDE WATER TARIFFS
  - UTILITY/REGULAR? FOR PRIVATE ENTITIES, ROLE OF REGULAR MORE THAN JUST PRICING. EG UK OFFWAT.
- PRIVATISATION IMPLICATIONS ON TARIFFS
  - MASSIVE NEW PRIVATISATION INFRASTRUCTURE INVESTMENTS
  - MAKING ONE SERVICE ATTRACTIVE – SEPARATING WATER FROM SEWERAGE
- URBAN SANITATION POLICY AND SBM IMPLICATIONS
  - PUBLIC TOILETS – PRIVATISE AND CSRS
  - PUBLIC TOILETS 40% GOI CONTRIBUTION IN CONSTRUCTION, NIL O&M
  - DECENTRALISED SEWAGE SYSTEMS – NIL GOI INCENTIVES
  - SOLID WASTE MANAGEMENT – EXPENSIVE WASTE TO ENERGY VS. COMPOSTING AND RE USE

URBAN WATER SUPPLY POLICY : RECOMMENDATIONS

- **GOVERNANCE**
  - ESTABLISHING AN **"INTEGRATED URBAN WATER MANAGEMENT AUTHORITY" AT THE STATE LEVEL** TO BE MADE RESPONSIBLE FOR PLANNING, MONITORING, COORDINATION AND IF NEEDED FINANCING FOR PROMOTING INTEGRATED WATER RESOURCE MANAGEMENT AND RELATED PRACTICES. THE AUTHORITY WILL BE HEADED BY THE CHIEF SECRETARY OF THE STATE AND HAVE HEADS OF RELATED LINE DEPARTMENT AS ITS MEMBERS ALONG WITH REPRESENTATIVES FROM CIVIL SOCIETY ORGANIZATIONS, PRIVATE SECTOR AND SECTOR EXPERTS.
  - ESTABLISH **A CITY/URBAN LEVEL CO-ORDINATION MECHANISM.** FOR MUNICIPAL CORPORATIONS THE COMMITTEE IS TO BE HEADED BY THE MUNICIPAL COMMISSIONER OR COMMISSIONER, URBAN DEVELOPMENT AUTHORITY. FOR MEDIUM AND SMALL TOWNS THE COMMITTEE IS TO BE HEADED BY THE DISTRICT COLLECTOR WITH MUNICIPAL COMMISSIONER AS THE CONVENER.
  - ENSURING **ACCOUNTABILITY OF WATER SERVICE DELIVERY AGENCY** TO THE LOCAL GOVERNMENT AND CITIZENS BY MAKING APPROPRIATE AMENDMENTS TO THE EXISTING MUNICIPAL ACTS
  - EVERY **STATE TO HAVE AN INDEPENDENT REGULATOR FOR URBAN WATER** AFTER A THOROUGH ASSESSMENT OF APPROPRIATE INSTITUTIONAL FRAMEWORK BASED ON REVIEW OF GLOBAL BEST PRACTICES (INCLUDING BUT NOT LIMITED TO THE EXPERIENCE OF US, UK, AUSTRALIA AND MANILA)

- **PLANNING FOR INTEGRATED WATER MANAGEMENT AT THE CITY LEVEL**
  - ALL ULBS / UTILITIES TO DEVELOP A MUNICIPAL INTEGRATED WATER MANAGEMENT PLAN INTEGRATING THE PRINCIPLES OF WATER RESOURCE MANAGEMENT, CONJUNCTIVE USE OF WATER, DEMAND SIDE MANAGEMENT AND WASTE WATER MANAGEMENT RECYCLING AND REUSE
  - THE MUNICIPAL INTEGRATED WATER MANAGEMENT PLAN IS TO BE DEVELOPED FOLLOWING DETAILED MULTI STAKEHOLDER CONSULTATIONS. URBAN CITIZENS, ESPECIALLY THE URBAN POOR SHALL BE ENGAGED THROUGH THE EXISTING COMMUNITY ENGAGEMENT PLATFORMS EXISTING AT THE WARD LEVEL (INCLUDING WATER USER ASSOCIATIONS, RESIDENT WELFARE ASSOCIATIONS, COMMUNITY BASED ORGANIZATIONS AND WARD COMMITTEES)
  - GOVERNMENT OF INDIA TO PROVIDE A ONE-TIME GRANT FOR THE PREPARATION OF MUNICIPAL INTEGRATED WATER MANAGEMENT PLAN WHICH WILL BE BASED ON THE SIZE CLASS WITHIN WHICH THE URBAN CENTRE FALLS (WITH A HIGHER GRANT AMOUNT FOR LARGER CITIES)
- **UNIVERSAL ACCESS TO WATER SUPPLY**
  - IN ORDER TO ENSURE THAT ALL URBAN CITIZENS HAVE ACCESS TO PIPED WATER SUPPLY THE GOVERNMENT OF INDIA ALONG WITH STATE GOVERNMENTS WILL INCENTIVIZE HOUSE CONNECTIONS BY PROVIDING A ONE-TIME SUBSIDY FOR INDIVIDUAL HOUSE CONNECTIONS (COVERING COSTS RELATED TO CONNECTION FEE, CHARGES FOR EXTENSION OF WATER PIPELINE, ROAD CUTTING CHARGES, ETC.). IT IS PROPOSED THAT WHILE GOVERNMENT OF INDIA WILL CONTRIBUTE RS 4,000 PER HOUSE CONNECTION THE STATE GOVERNMENT WILL CONTRIBUTE RS 8,000.

- **CAPACITY BUILDING OF SERVICE PROVIDERS**
  - INTEGRATED WATER MANAGEMENT INCLUDING WATER RESOURCE MANAGEMENT, CONJUNCTIVE USE OF WATER RESOURCES, DEMAND SIDE MANAGEMENT, RECYCLING AND REUSE OF TREATED WASTEWATER, ETC.
  - STAKEHOLDER ENGAGEMENT INCLUDING URBAN POOR COMMUNITIES, PRIVATE PROVIDERS, BUSINESSES, ETC.
  - GENDER MAINSTREAMING FOR ENSURING THAT NEEDS AND ASPIRATIONS OF WOMEN AS CONSUMERS ARE TAKEN ON BOARD WHILE PLANNING AND DELIVERING SERVICES
- **AWARENESS GENERATION AND BEHAVIOUR CHANGE COMMUNICATION** (BCC) INPUTS TARGETING ALL KEY STAKEHOLDERS INCLUDING HOUSEHOLDS, BUSINESSES, PRIVATE PROVIDERS, INSTITUTIONS, CITY MANAGERS AND ELECTED REPRESENTATIVES TO ENSURE A BUY-IN FOR AN "INTEGRATED APPROACH TO WATER RESOURCE MANAGEMENT" AND TO BRING INTO EFFECT A POSITIVE BEHAVIOR SHIFT TOWARDS WATER CONSERVATION AND REUSE.
- **DATA MANAGEMENT AND UTILITY PERFORMANCE MONITORING SYSTEM**
  - INSTITUTIONALISING A NATIONAL LEVEL RANKING EXERCISE FOR CITIES / TOWNS WITH RESPECT TO ADOPTION OF AN INTEGRATED APPROACH TOWARDS WATER RESOURCE MANAGEMENT
  - ESTABLISHING A NATIONAL LEVEL ONLINE REAL TIME DASHBOARD TO MONITOR PROGRESS RELATED TO ENSURING UNIVERSAL ACCESS TO WATER SUPPLY
  - ALL ULBS AND OTHER SERVICE DELIVERY AGENCIES (INCLUDING PARASTATALS, WATER BOARDS, ETC.) WILL PUT IN PLACE A PERFORMANCE MONITORING PLAN FOR ASPECTS SUCH AS ASSET MANAGEMENT, NRW MANAGEMENT, ENERGY AND WATER EFFICIENCY, ETC.
  - ULBS TO REPORT WATER SUPPLY AND WASTE WATER MANAGEMENT RELATED SERVICE LEVELS ON A YEARLY BASIS

THANK YOU

MORE REPORTS ON URBAN SANITATION :

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