Performance of MSNA

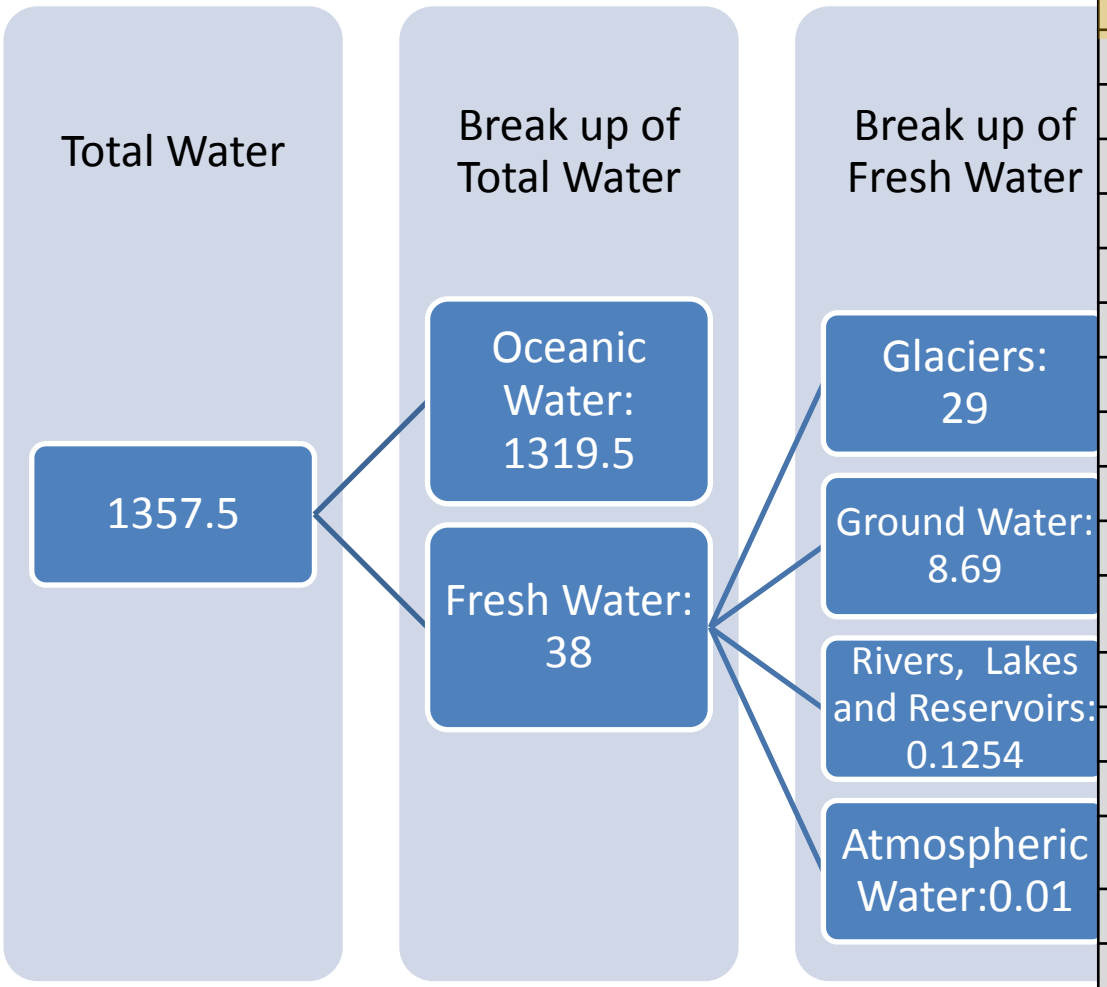
Dr Sanjay Dahasahasra

Former Member Secretary, Maharashtra Jeevan Pradhikaran,
Water Network and 24/7 System Specialist, World Bank,
Former President, Indian Water works Association

Water Available on the Earth

Quadrillion Cubic Meter (Q

1 QCM = 1,000,000,000,000,000 m^3=



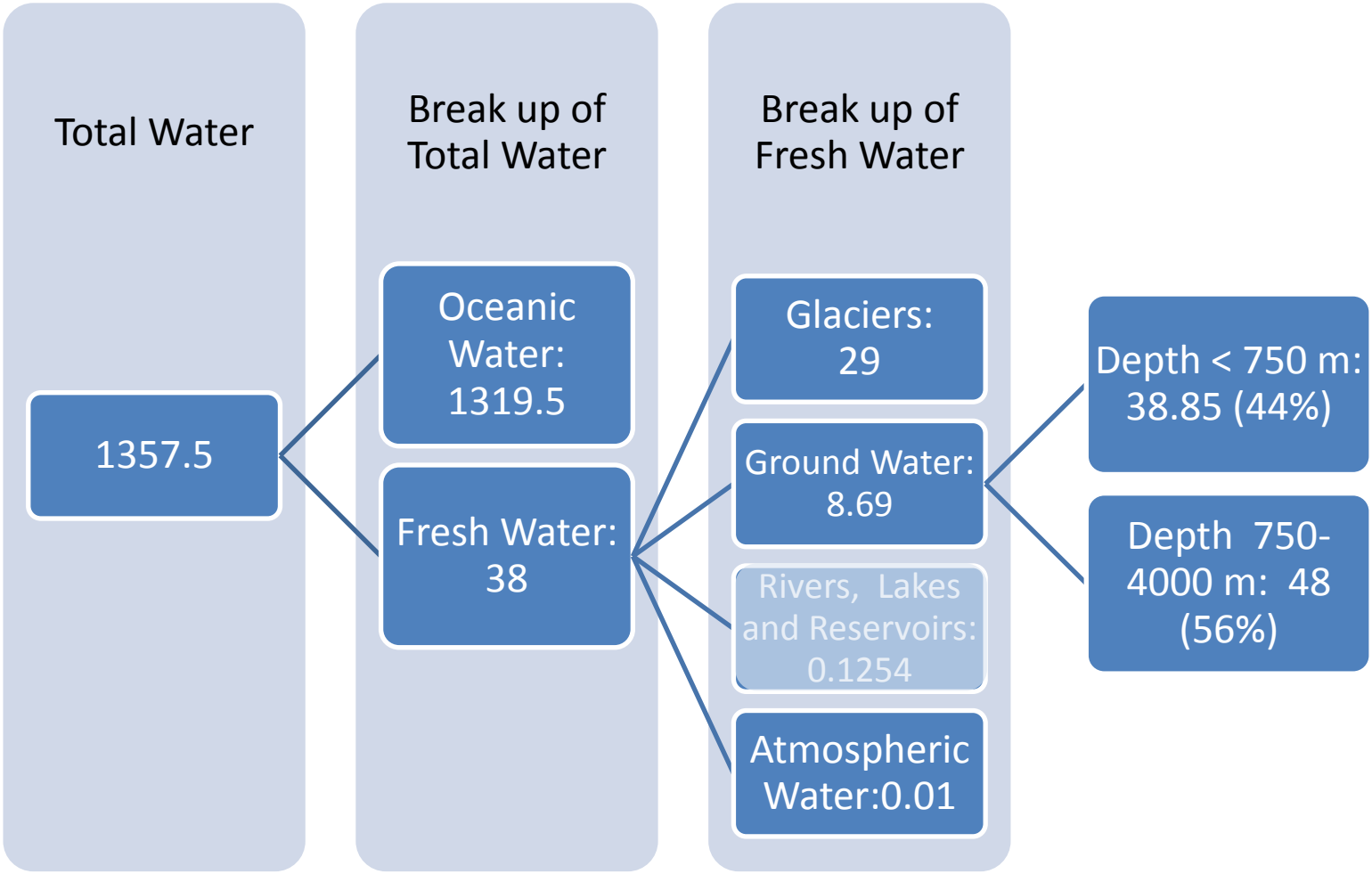
Million	10^6
Billion	10^9
Trillion	10^{12}
Quadrillion	10^{15}
Quintillion	10^{18}
Sextillion	10^{21}
Septillion	10^{24}
Octillion	10^{27}
Nonillion	10^{30}
Decillion	10^{33}
Undecillion	10^{36}
Duodecillion	10^{39}
Tredecillion	10^{42}
Quattuordecillion	10^{45}
Quindecillion	10^{48}
Sexdecillion (Sedecillion)	10^{51}
Septendecillion	10^{54}
Octodecillion	10^{57}
Novemdecillion	10^{60}
Vigintillion	10^{63}
Centillion	10^{303}

Source: Approach Paper, On Developing Regulations for Bulk Water Pricing in the State of Maharashtra, MWRRA

Water Available on the Earth

Quadrillion Cubic Meter (QCM)

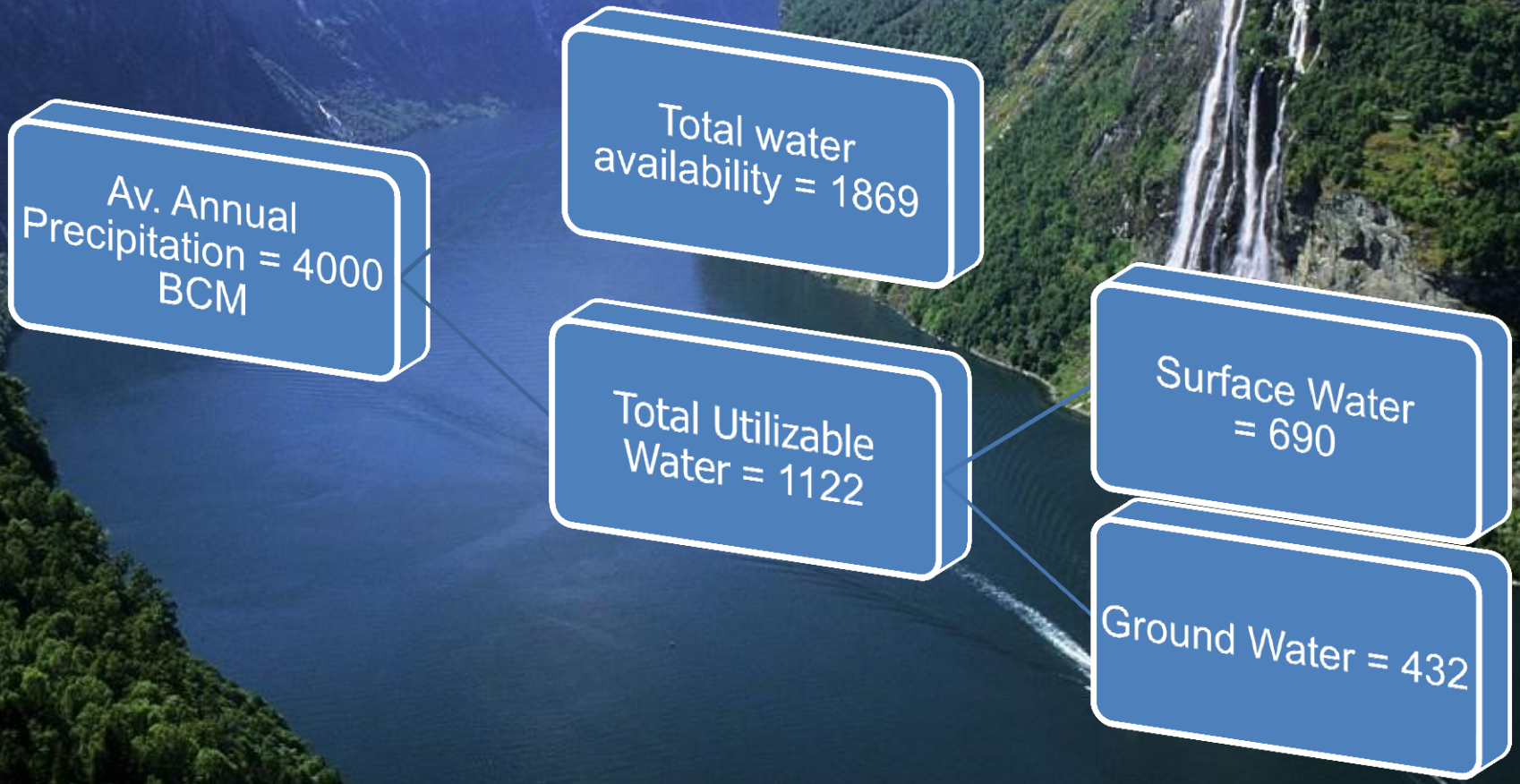
1 QCM = 1,000,000,000,000,000 m^3= 10^{15} m^3



Source: Approach Paper, On Developing Regulations for Bulk Water Pricing in the State of Maharashtra, MWRRA

Availability of Water in India

1 BCM = 10^9 m^3



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Water Available on the Earth

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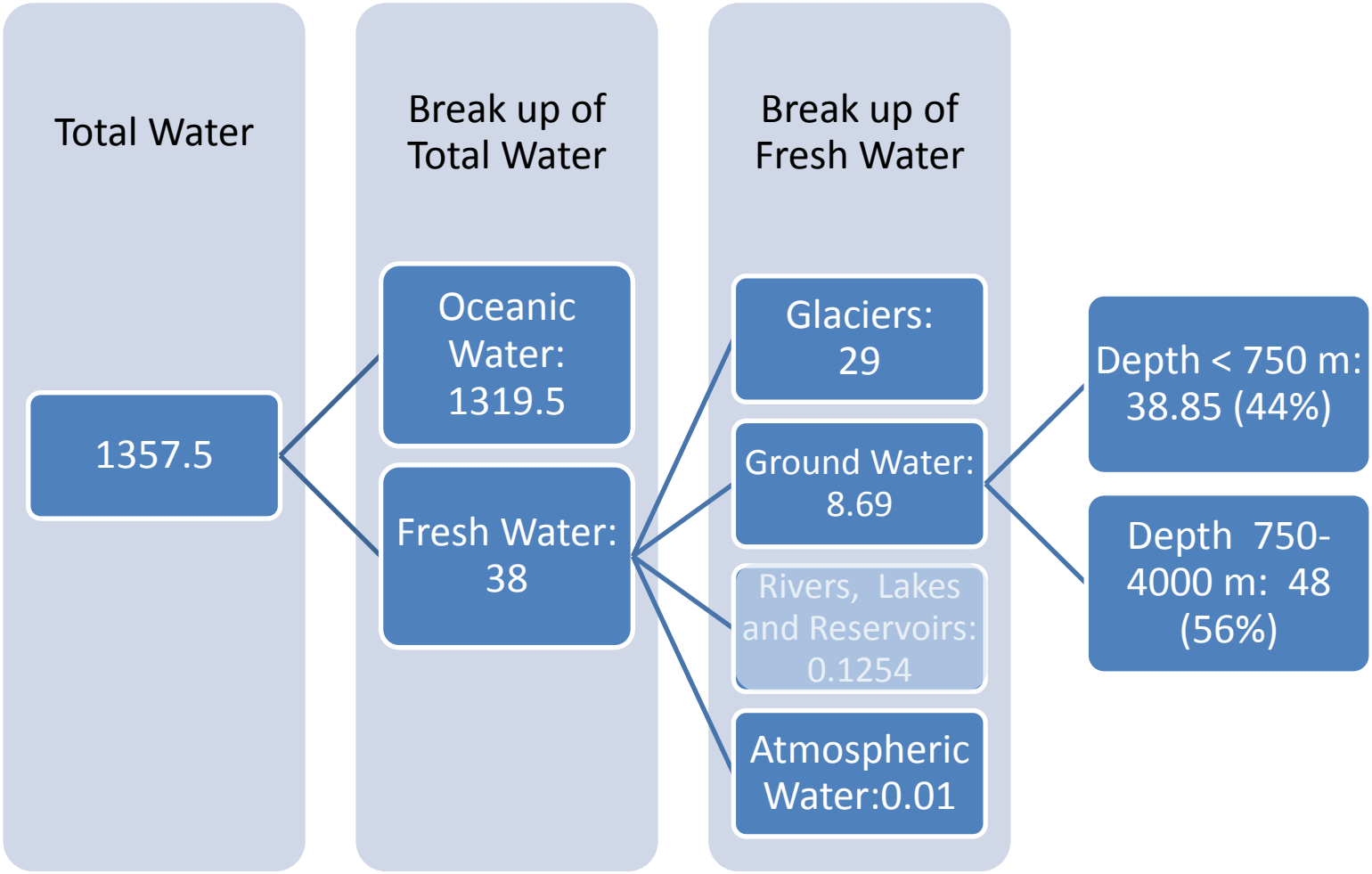
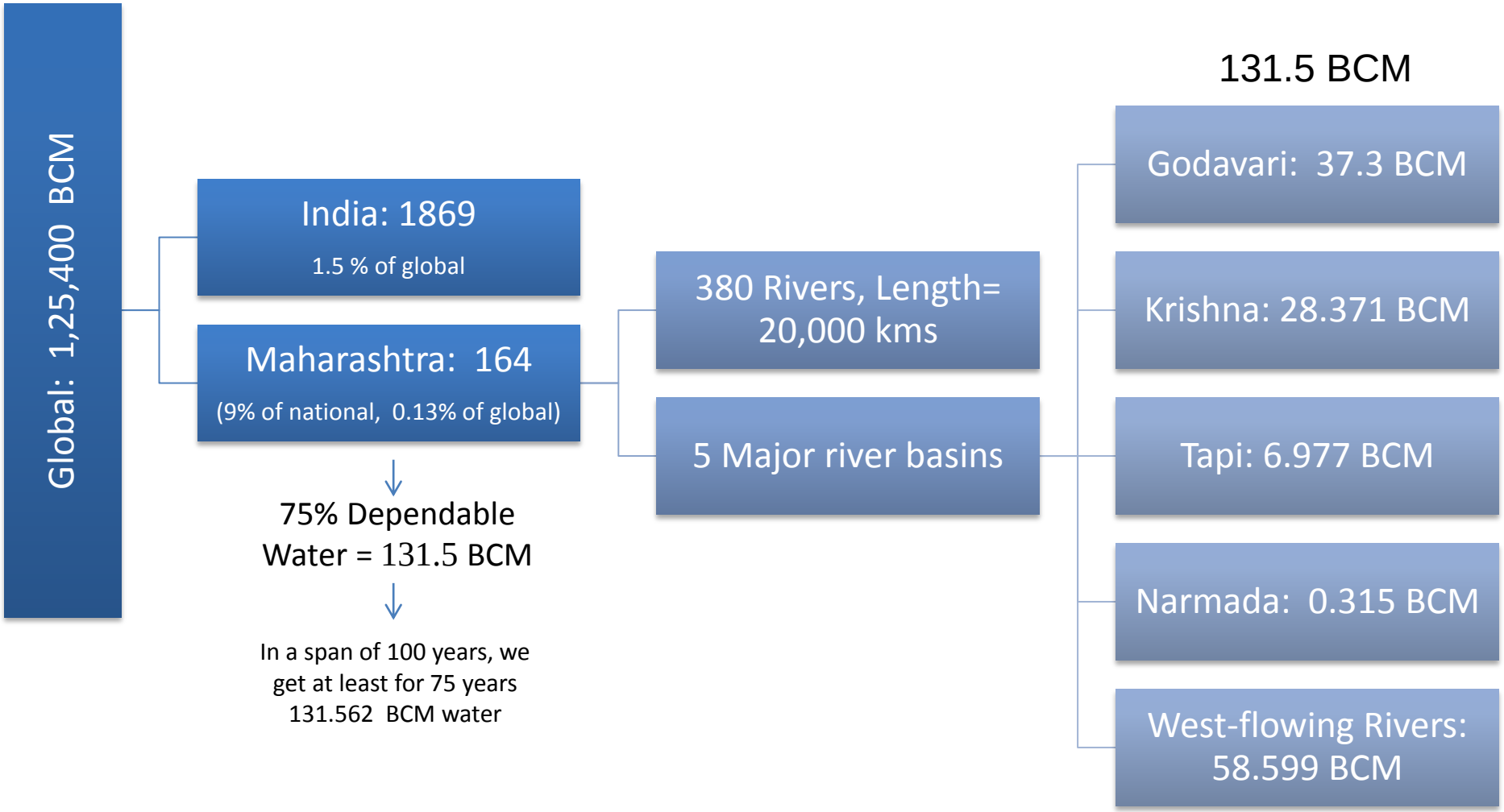


Source: Approach Paper, On Developing Regulations for Bulk Water Pricing in the State of Maharashtra, MWRRA

Water in Maharashtra

(Billion Cubic Meter, BCM)

1 QCM = 1 million BCM



Source: Approach Paper, On Developing Regulations for Bulk Water Pricing in the State of Maharashtra, MWRRA

Maharashtra

- Population = 11,23,72,972
- Area = 307,731 km^2
- 2nd Most populous
- 3rd Largest state by area

Breath of India

One of the wealthiest states in India

Contributes- 25% of the industrial output

23.2% of its GDP in 2010-11

Maharashtra

- Maharashtra is the world's second most populous "first-level administrative country sub-division"

- Were it a nation in its own right, Maharashtra would be the world's tenth most populous country ahead of Mexico

Rank	Subdivision	Type	Country	Population	Area km²
1	**Uttar Pradesh**	State	**India**	**199,581,477**	240,928
2	Maharashtra	State	India	112,372,972	307,713
3	**Guangdong**	Province	**China**	**104,303,132**	177,900
4	Bihar	State	India	103,804,637	94,163
5	Shandong	Province	China	95,793,065	156,700
6	Henan	Province	China	94,023,567	167,000
7	West Bengal	State	India	91,347,736	88,752
8	Andhra Pradesh	State	India	84,665,533	275,045
9	**Punjab**	Province	**Pakistan**	**84,632,500**	205,344

Source: wikipedia.org

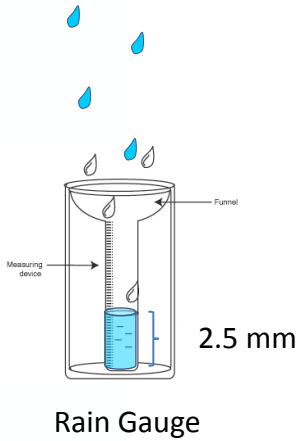
Maharashtra's Water Wealth

1 BCM = 10^9 m^3

380 rivers, Length=20,000 kilometers

- Average rainfall = 1360 mm
- Average rainy days = 55

Consumption: 23.9 BCM	
	Irrigation=20.3, BCM
	Drinking water = 2.85 BCM
	Industry= 0.8 BCM



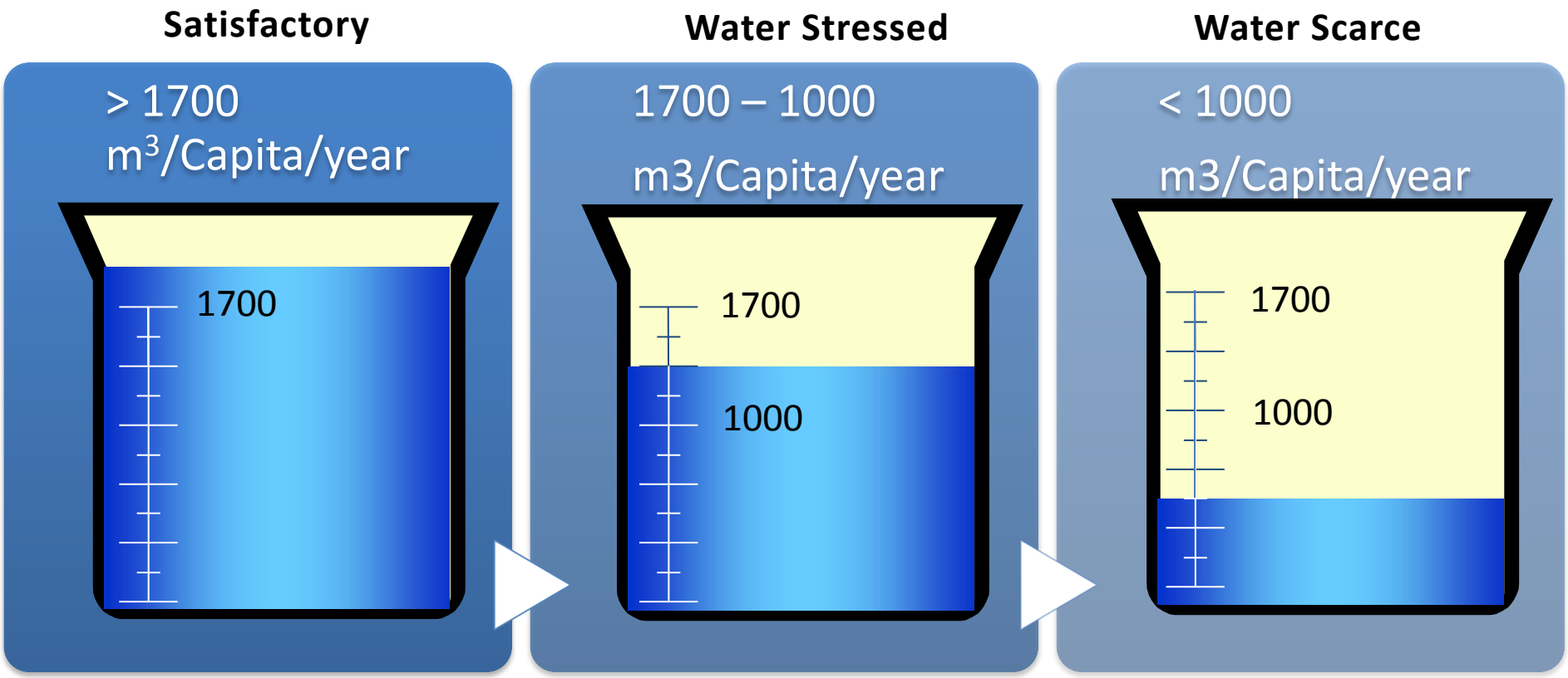
Rain Gauge

rainfall > 2.5 mm

- Gr. Water = 31.5 BCM, withdrawal = 7.3 BCM,
- Evaporation: max: 2475 mm (Nashik), Min: 1478 mm (Konkan)

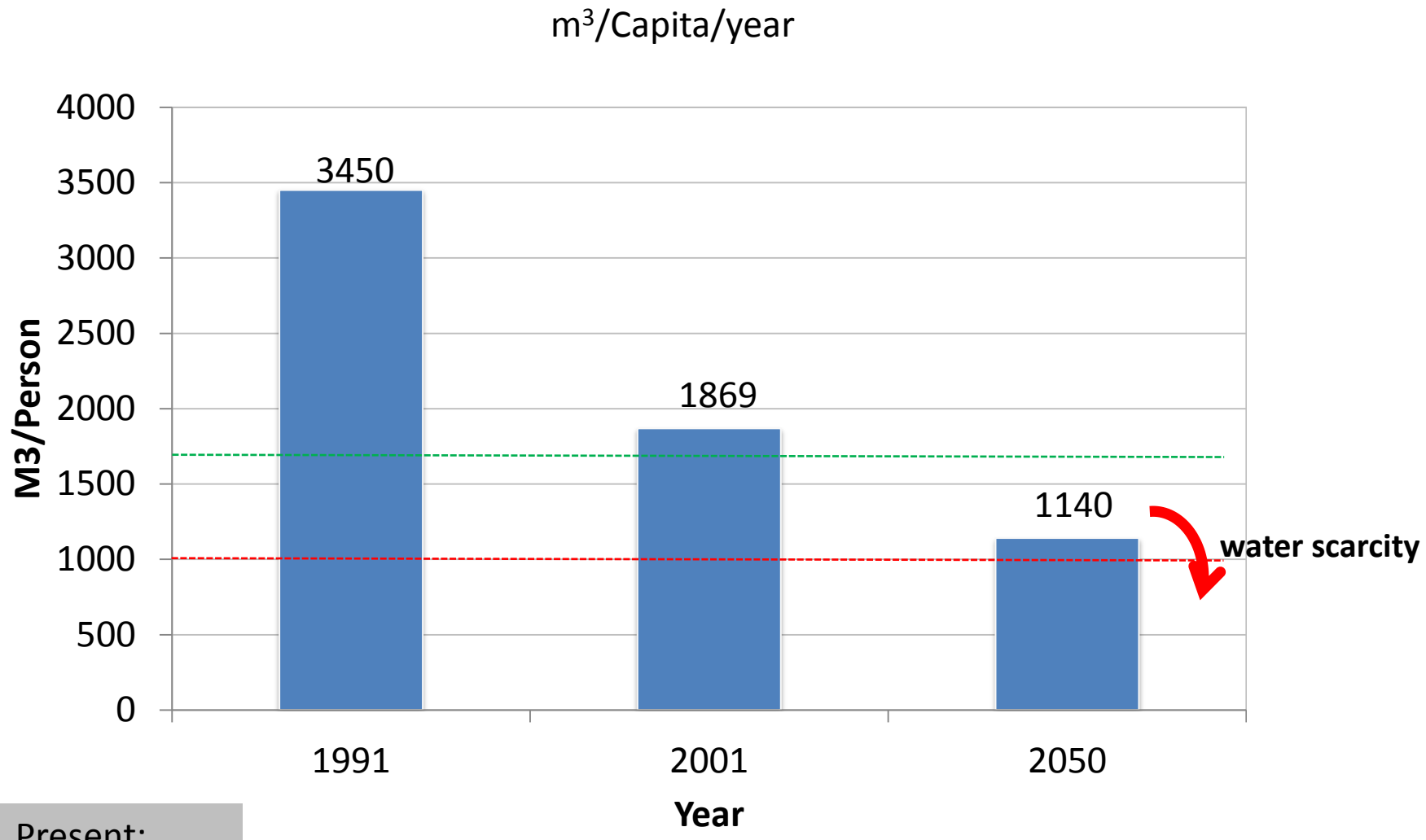
Availability of Water

Falkenmark Indicators



Source: (1) Daily Samna, 20 Feb 2009; (2) www.pik-potsdam.de

Per Capita Supply of Water

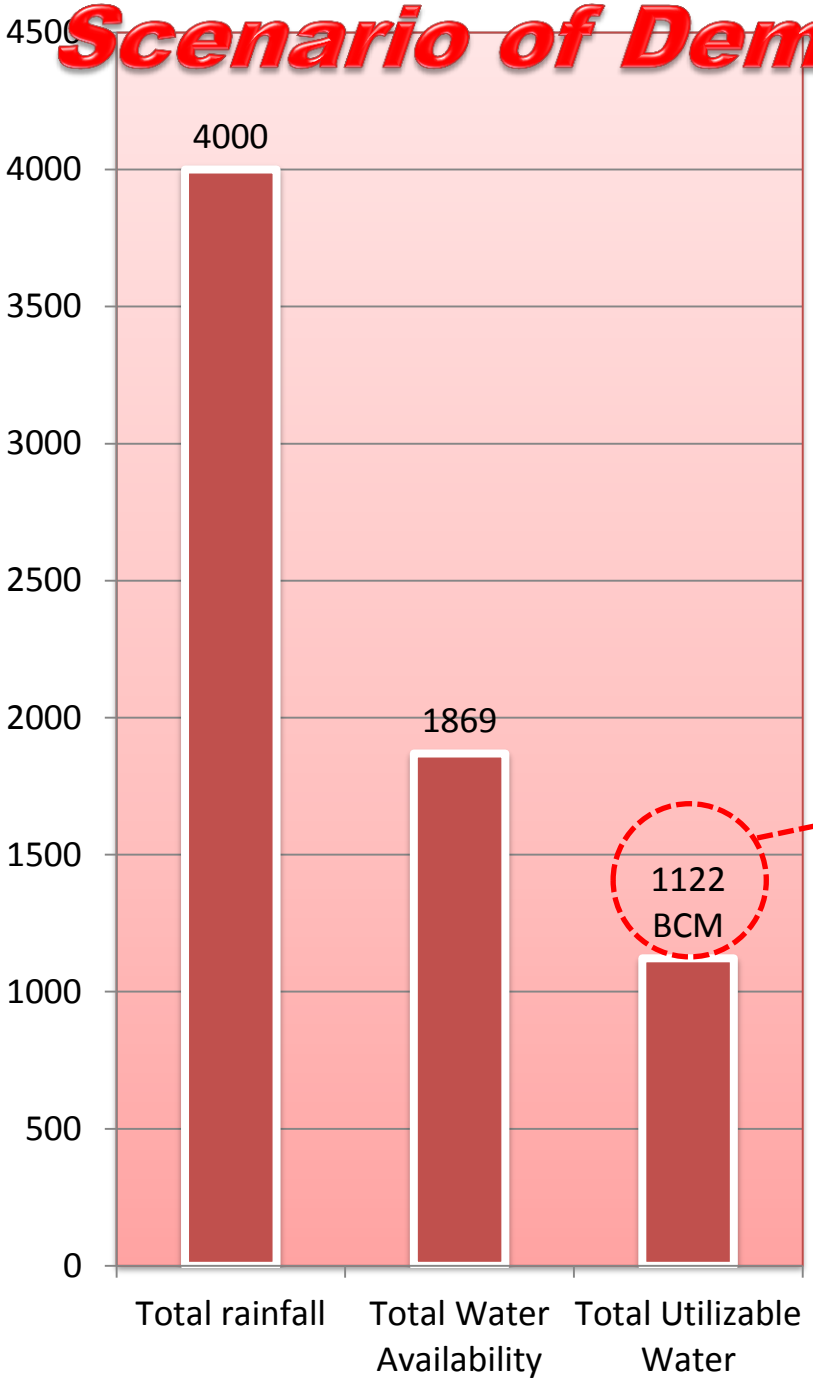


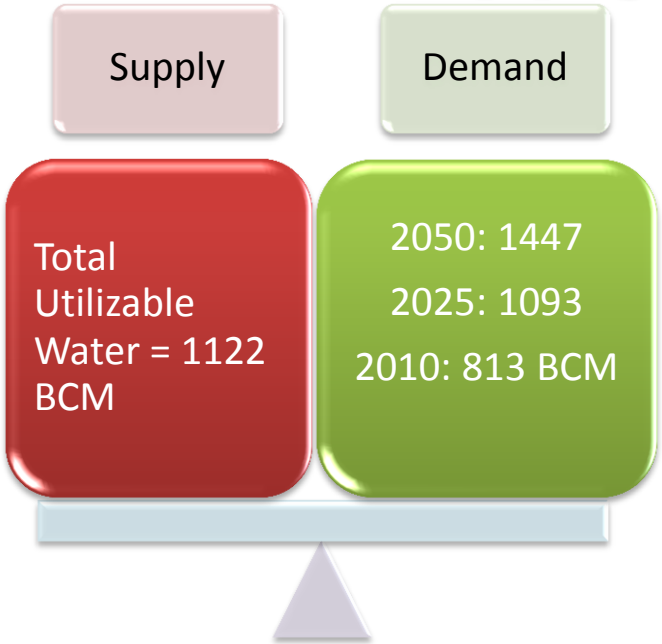
Present:

- India: 1830
- Maharashtra: 1360

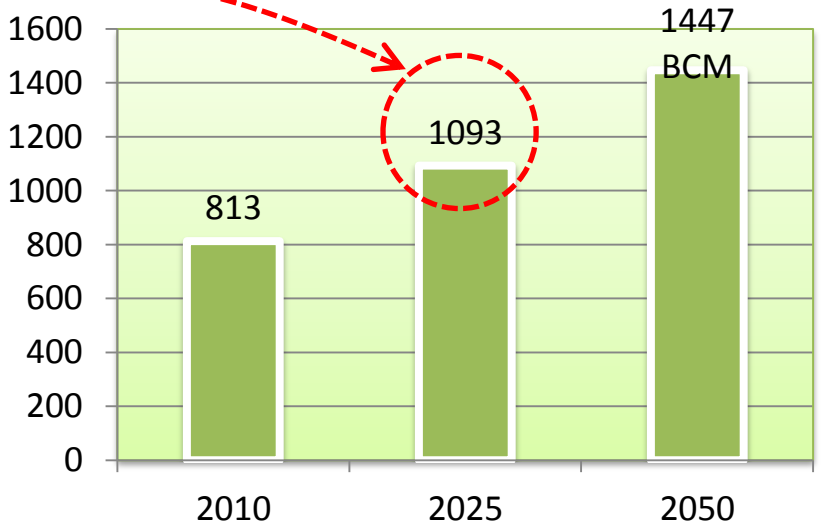
Source: (1) Daily Samna, 20 Feb 2009; (2) www.pik-potsdam.de

Scenario of Demand and Supply: 2025

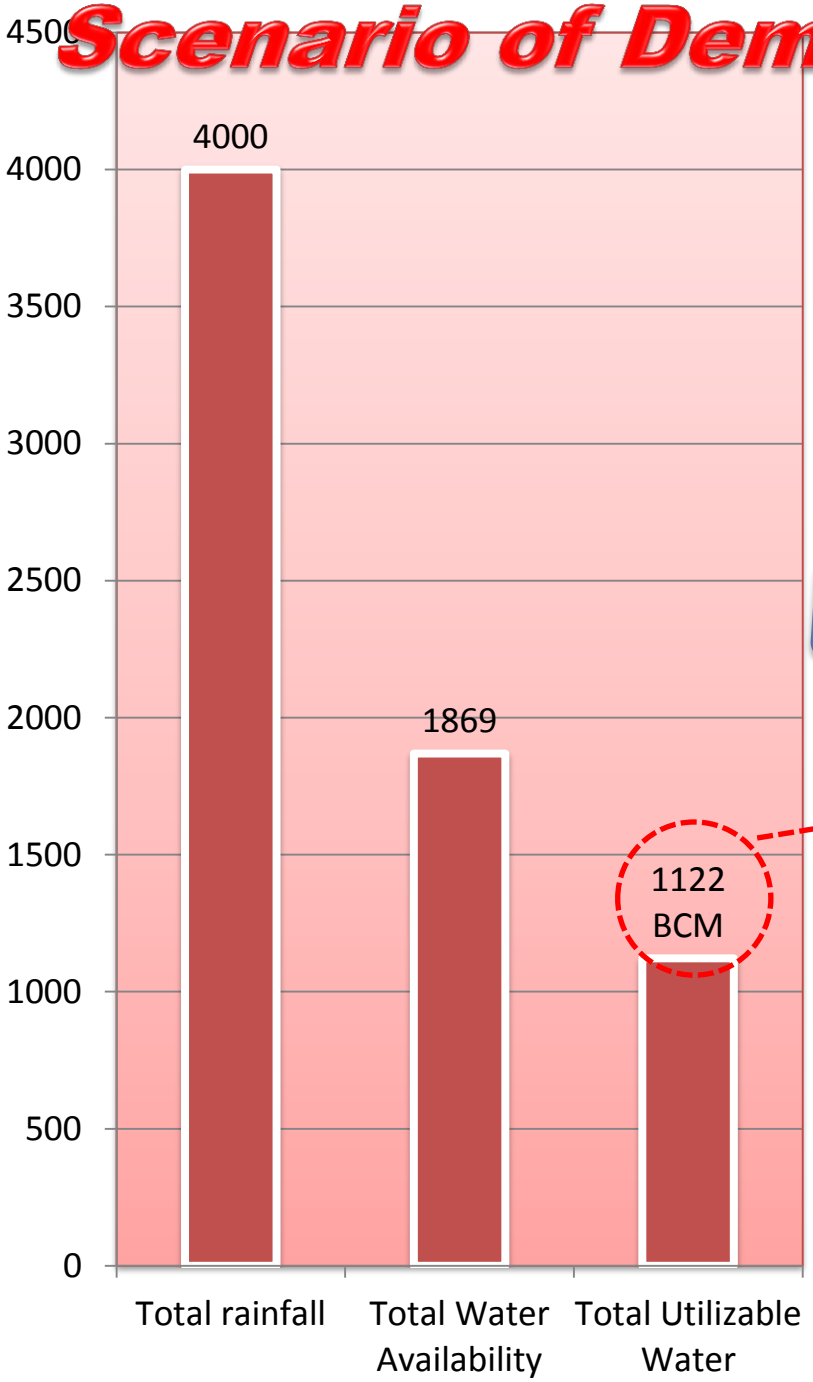




1 BCM = 10^9 m^3



Scenario of Demand and Supply: 2050



Availability

Demand

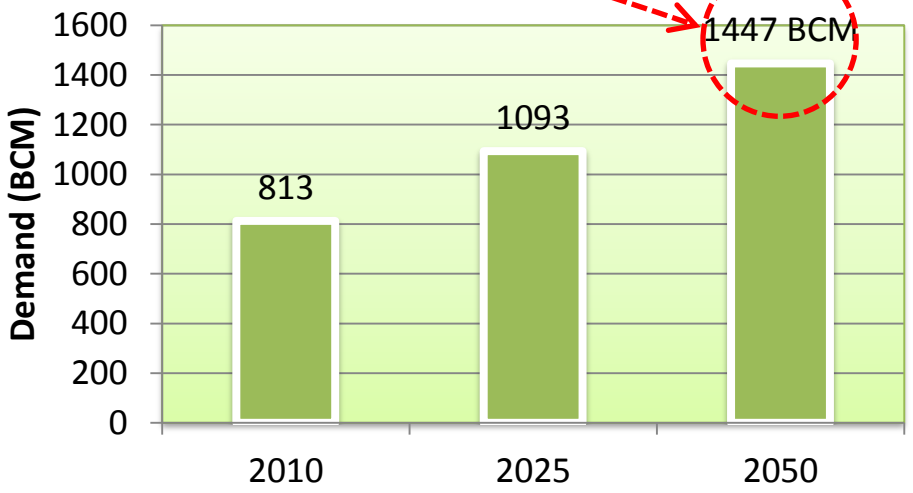
2050:1447

2025:1093

2010: 813

Utilizable Water=1122

1 BCM = 10^9 m^3

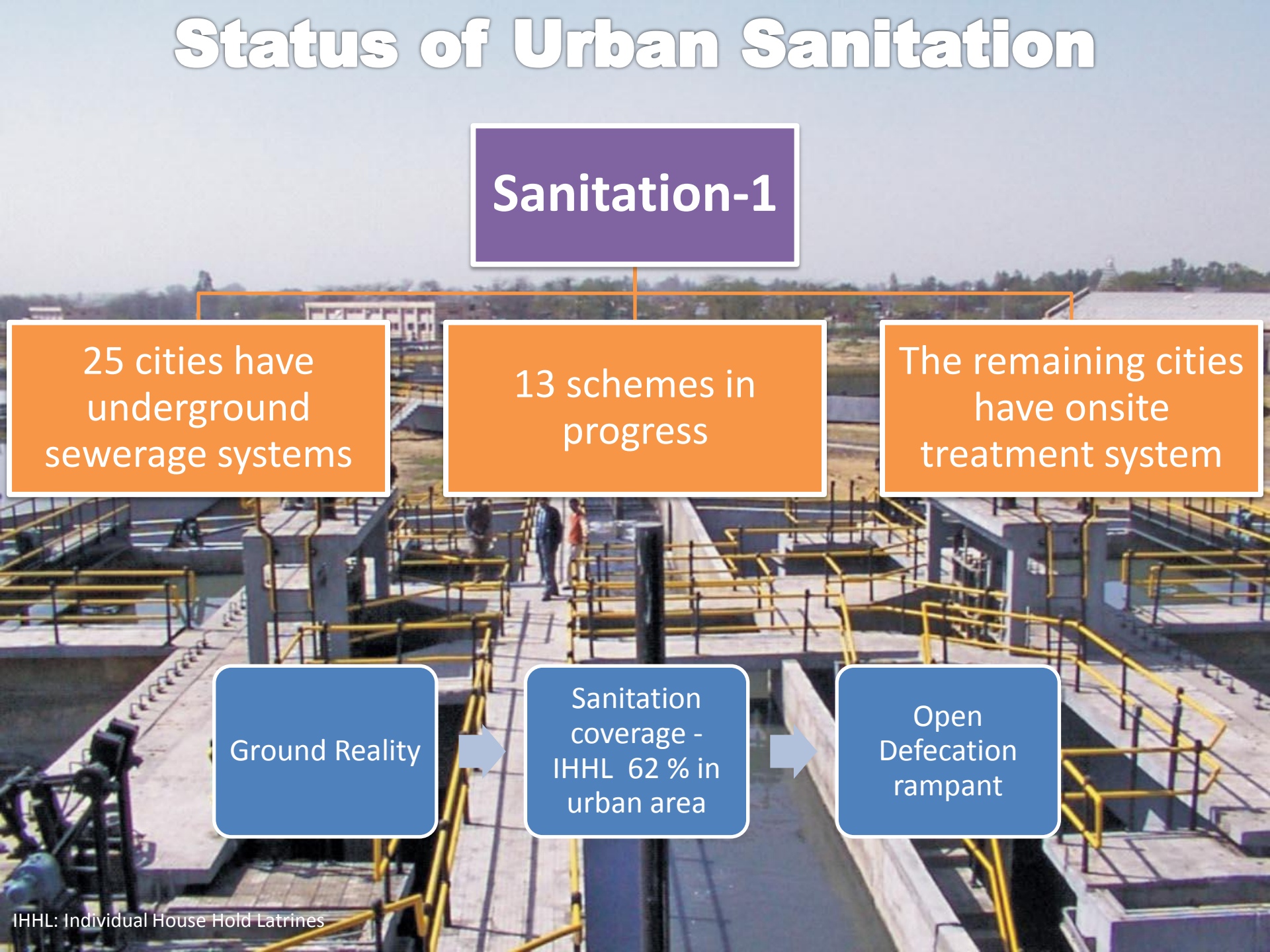


Status of Urban Water Supply

Water Supply

- All the cities have PWS Schemes
- 370 Completed
  - Cost = Rs. 70 Billion
- 173 In Progress
  - Rs. 31 Billion invested
  - Rs. 15 Billion required for completion

Status of Urban Sanitation



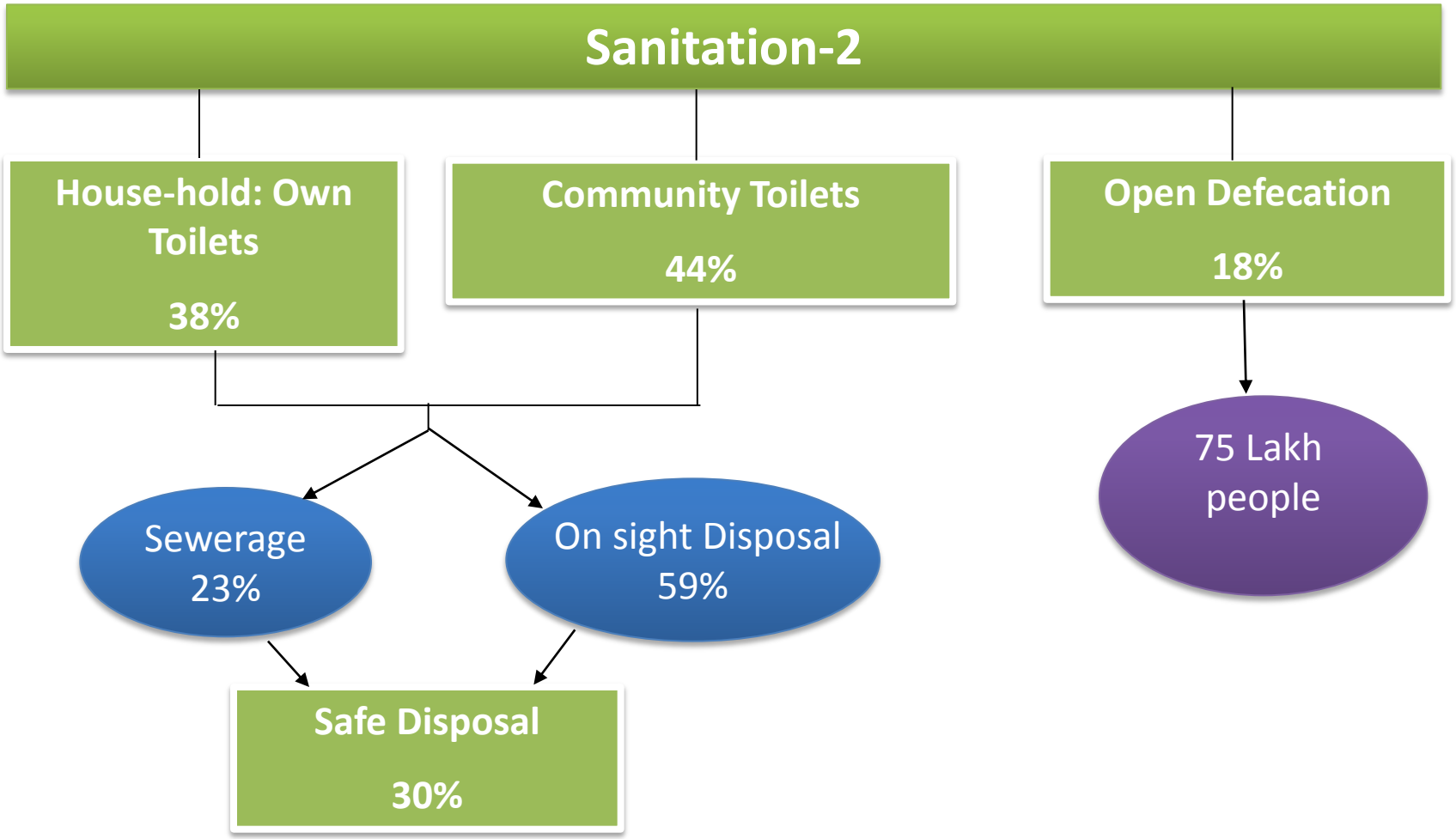
Sanitation-1

- 25 cities have underground sewerage systems
- 13 schemes in progress
- The remaining cities have onsite treatment system

Ground Reality → Sanitation coverage - IHHL 62 % in urban area → Open Defecation rampant

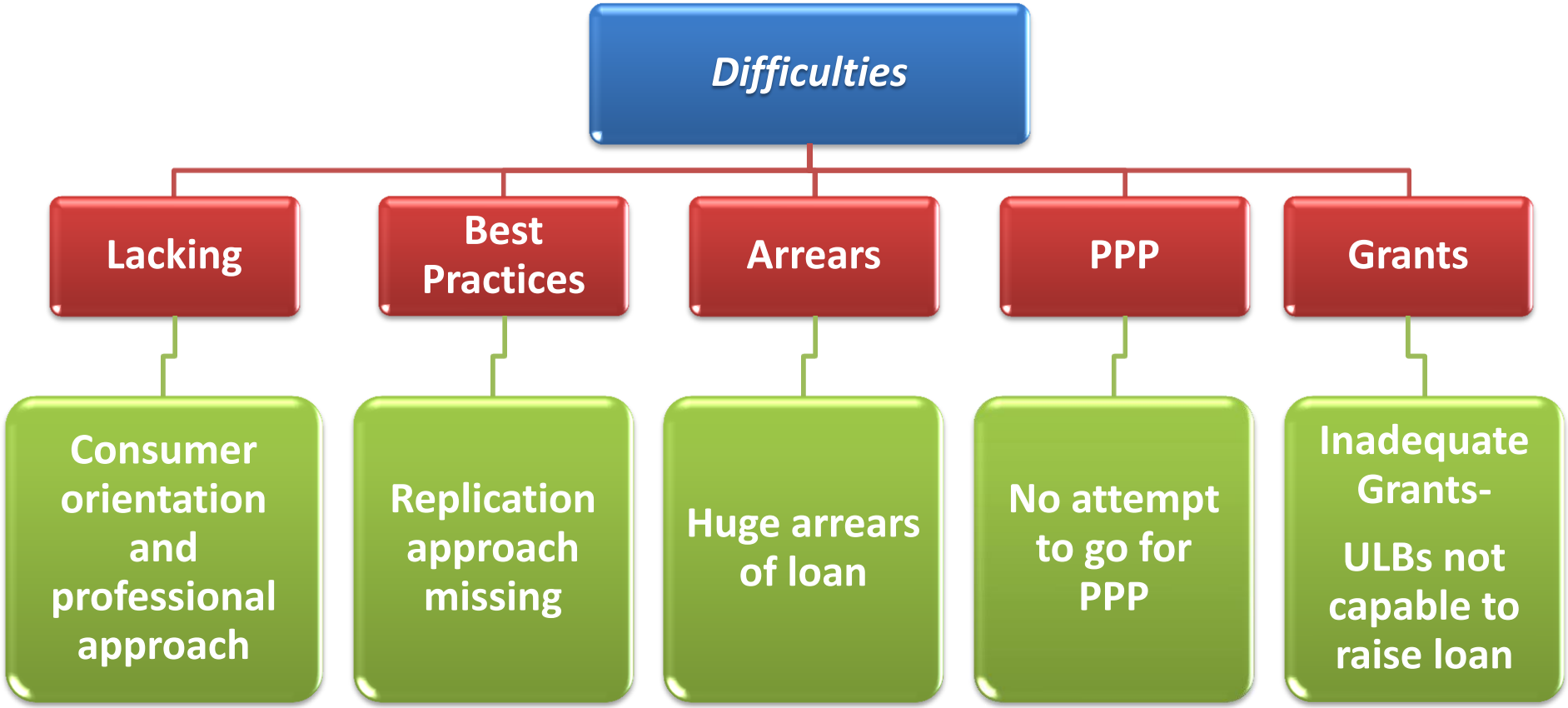
IHHL: Individual House Hold Latrines

Status of Urban Sanitation

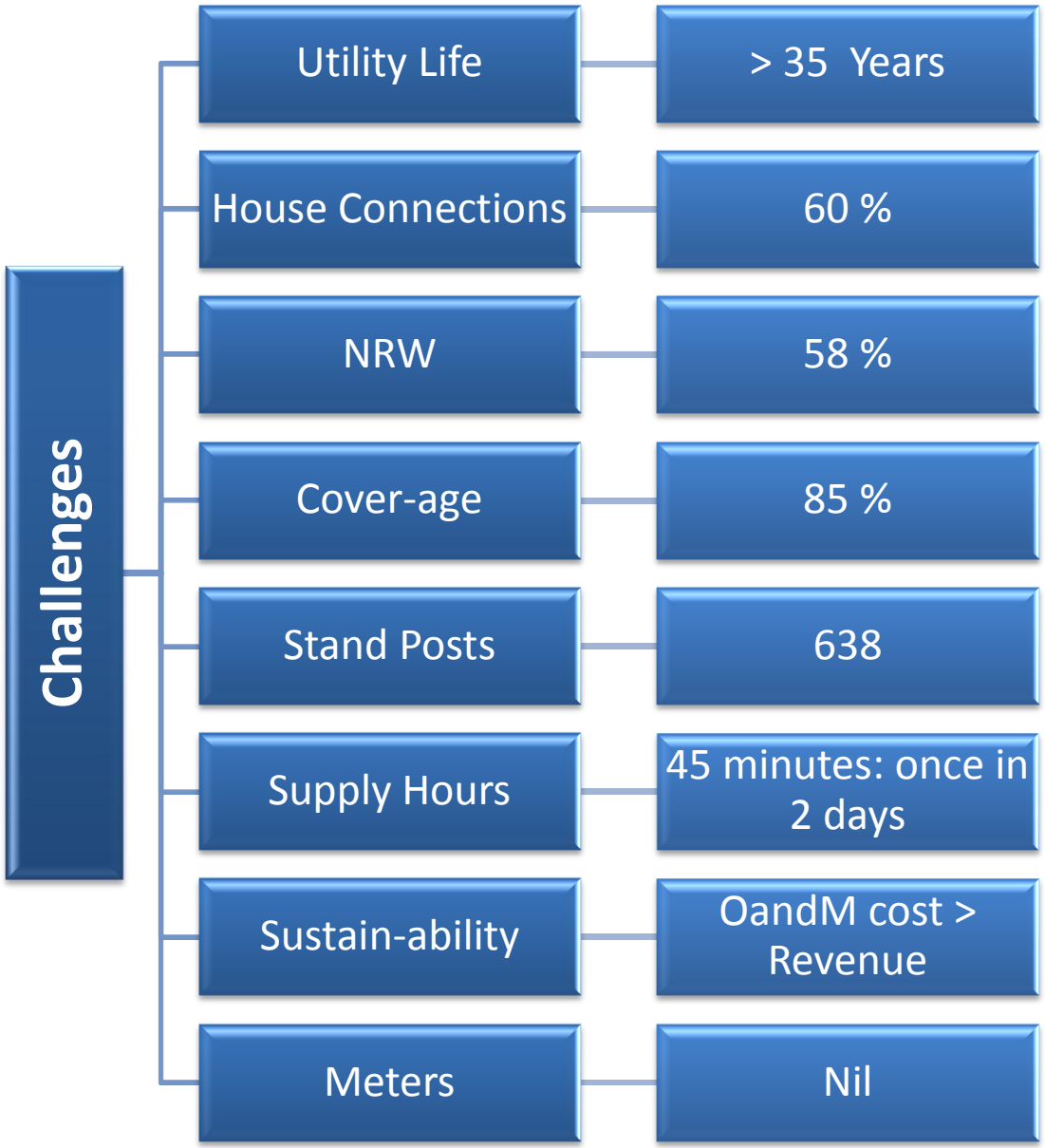


Status of Urban Solid Waste Management

What are Difficulties of Urban Water Sector?



What are Challenges in Water Sector?



Challenges in Water Sector

Quality of Water

- Water is contaminated by the human and animal waste
- Well-being of a human -> safe water is required

Requirement:

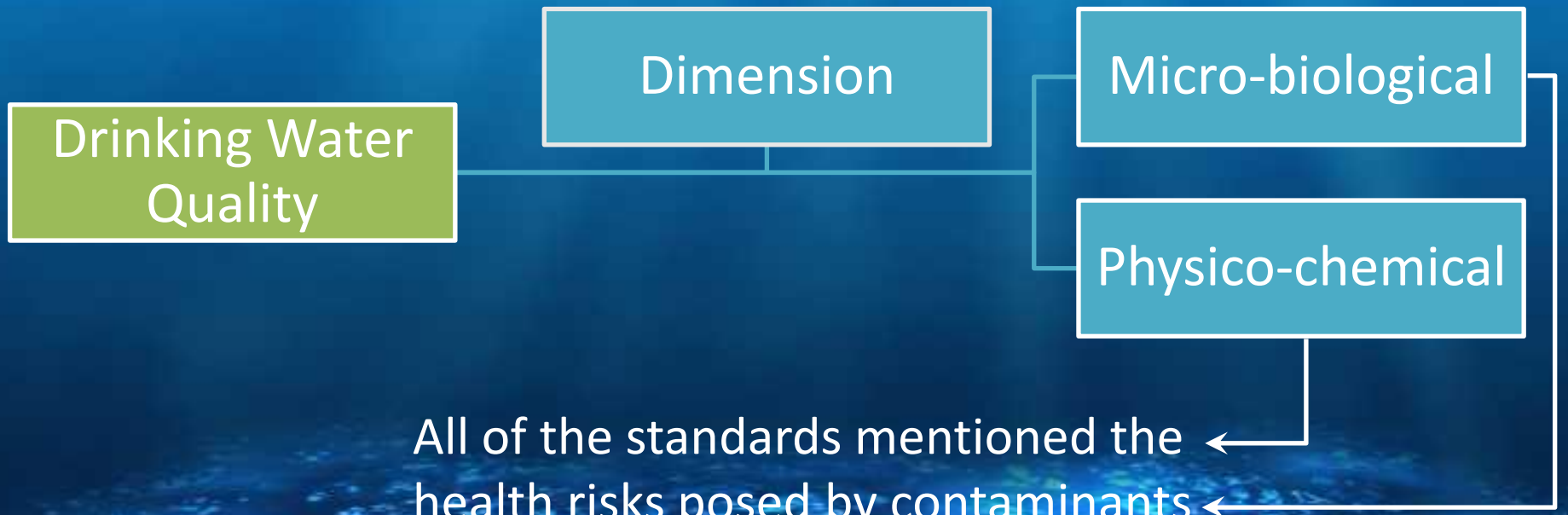
- Only 10 coliforms in 100-ml are allowed
- E. coli should not be present in a 100-ml sample of water

Challenges in Water Sector

Quality of Water

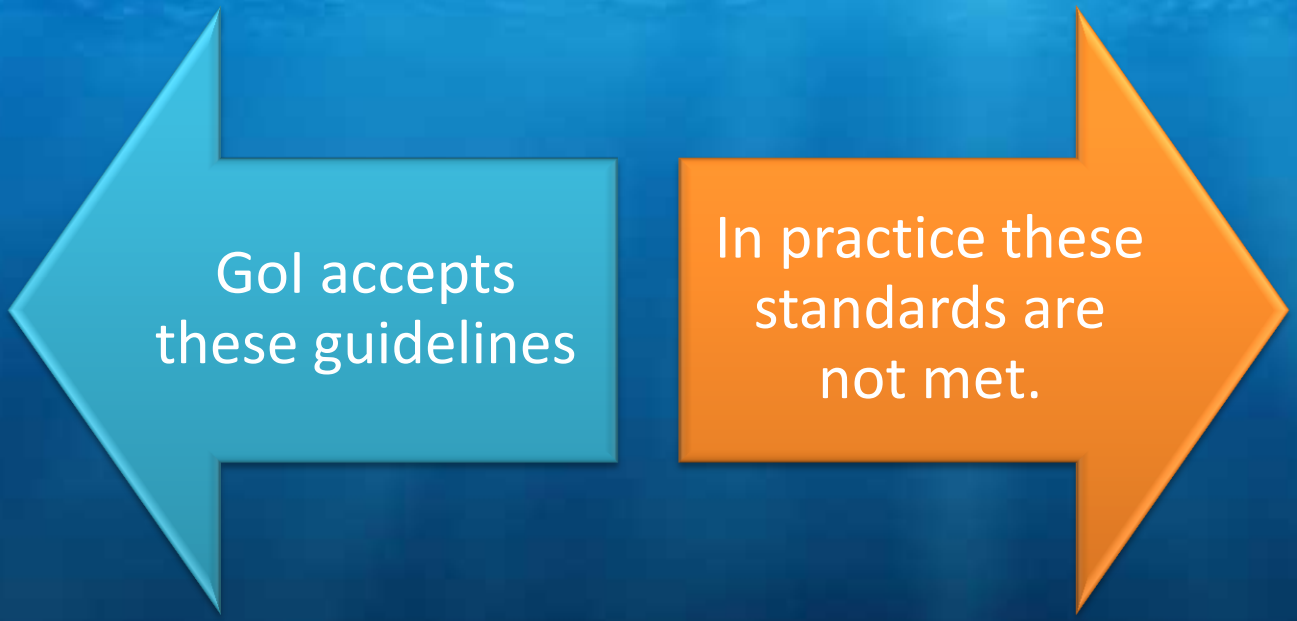
Challenges in Water Sector

Quality of Water



Challenges in Water Sector

Quality of Water



- India loses 90 million days a year due to waterborne diseases,
- costing Rs 6 billion in production losses and treatment.

Outcome- Urban Water Supply and Sanitation Program

Program	Investment (Rs Crores)	Physical Achievement	Service Standards	ULB's Achievement
Urban Water Supply	7000	379 schemes	24x7 water supply	2 Small towns and some wards in 2 Cities
Sewerage	1000	26 schemes	100% sewerage connected system	None
Toilet Management	60	52000 seats	ODF ULB	None
Solid Waste Management	12th FC Grants	Few Projects	ULB managing Solid Waste scientifically	None

Maharashtra Sujal and Nirmal Abhiyan

Sujal and Nirmal Abhiyan

Areas of Reforms in Urban Cities

Water Supply

Sewerage and Sullage

Toilet Management

Solid Waste Management

Objectives

Perfo NA

Aims

- To provid f the city witho
- Equitable
- To discuss
- Difficulties f
- Achieve one o the galaxy of develo

Ingredients of MSNA

Time Frame of MSNA

- House to House Survey
- Bulk Meter
- Water + Energy Audit
- Hydraulic Model
- Pressure Management
- GIS Mapping
- PPP in OandM
- Computer Billing
- Preparation of city sanitation plan
- Solid waste collection and disposal

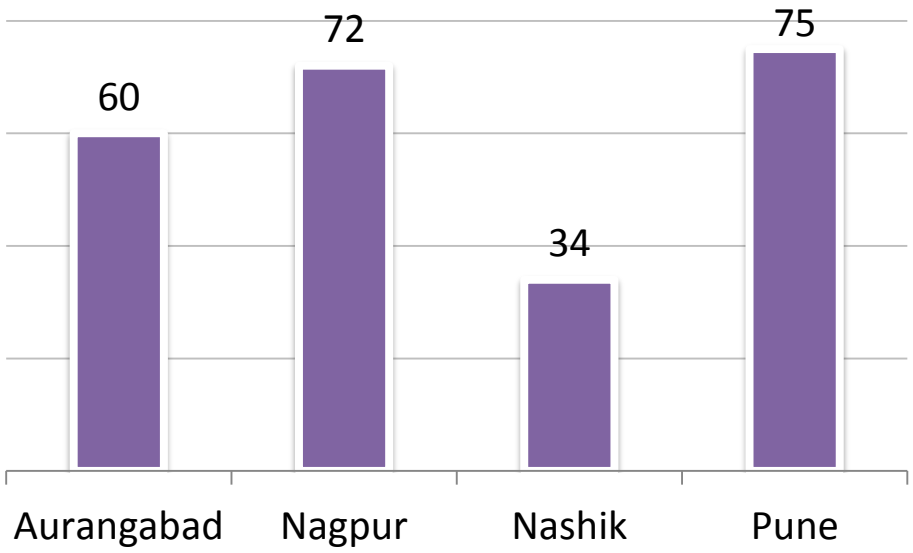
- 24x7 System
- Metering 100%
- Collection efficiency (100%)
- Sewerage including STP

2009-12 → 2012-17 → 2017-25

- 24x7 in pilots
- Sustainable sources
- Metering 80%
- Collection efficiency (80%)
- Sewerage system
- MIS
- Tariff framing
- Solid waste M.
- ODF cities

World-class water supply and sanitation for all 252 cities

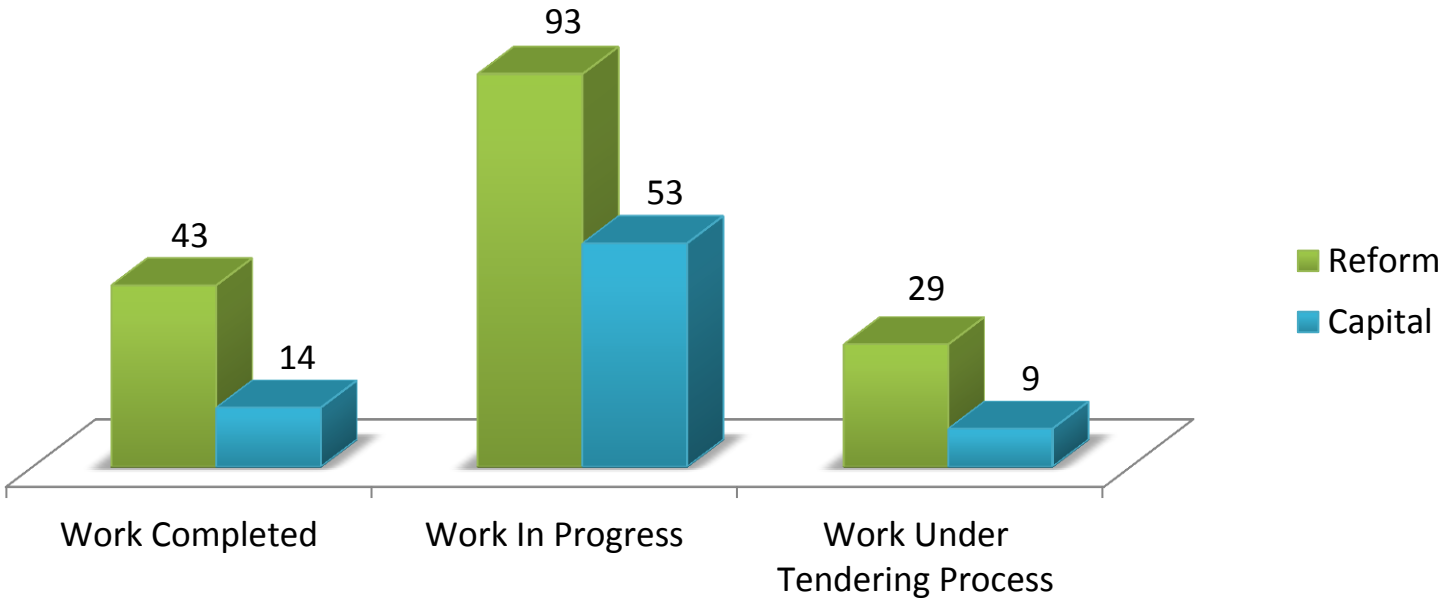
MSNA STATUS



Division	Works sanctioned	Completed Works	Works in progress	Works not started	Tech. sanction awaited
Aurangabad	60	21	32	5	2
Nagpur	72	26	36	9	1
Nashik	34	1	31	2	0
Pune	75	9	47	18	1
Total	241	57	146	34	4

MSNA STATUS

Works	Number
Reform (R)	124
Capital (C)	35
Capital+Reform	82
Total	241

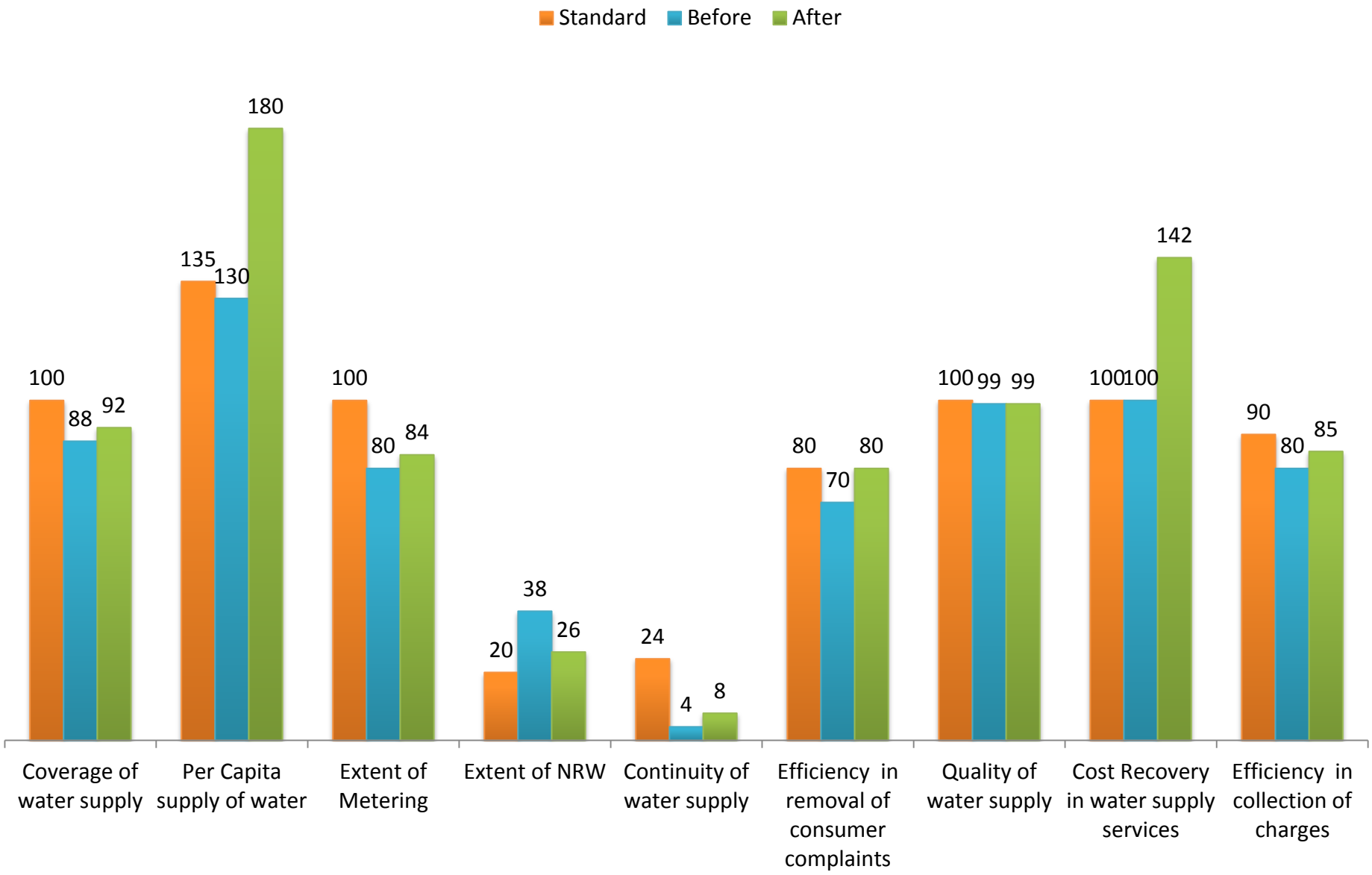


Appreciation of MSNA Program

(World Bank)

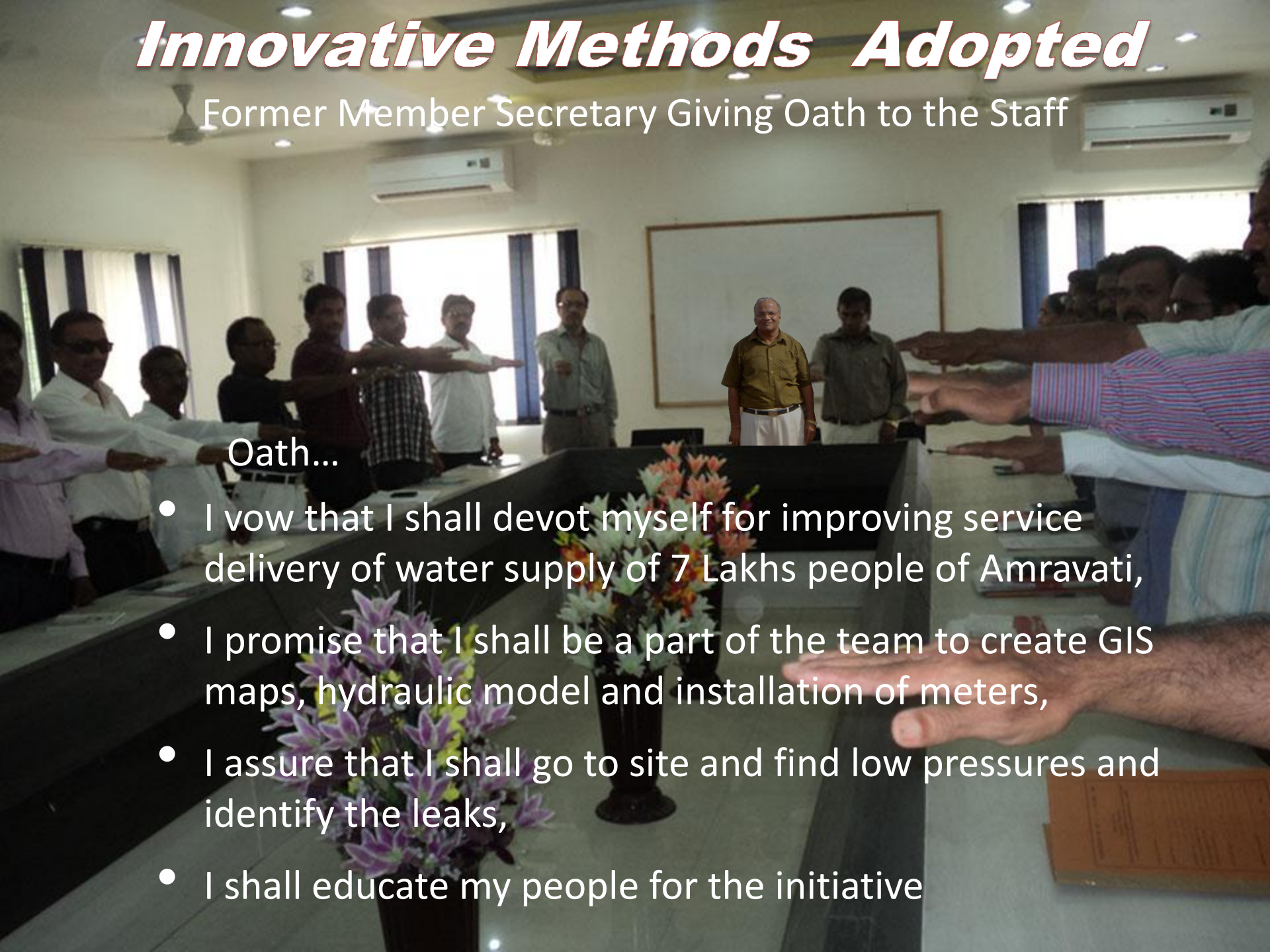
MSNA Impact

(Badlapur)



Innovative Methods Adopted

Former Member Secretary Giving Oath to the Staff



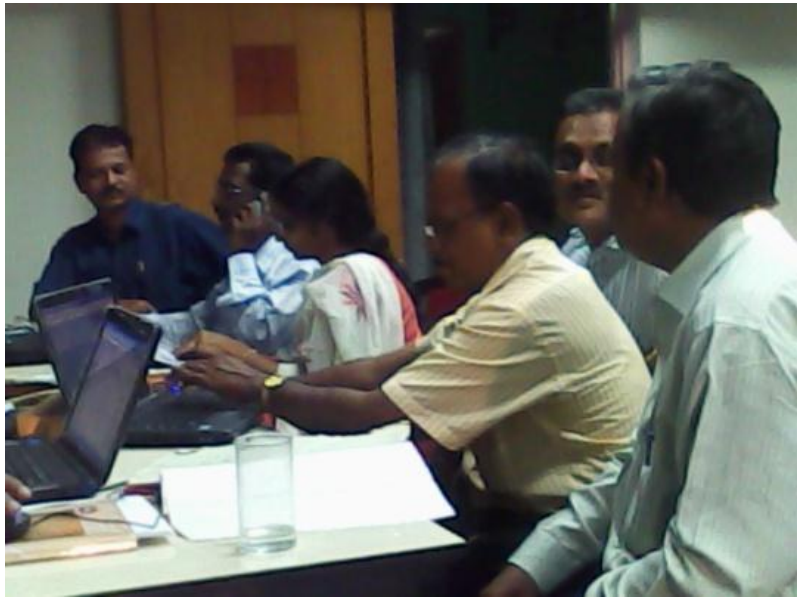
Oath…

- I vow that I shall devot myself for improving service delivery of water supply of 7 Lakhs people of Amravati,
- I promise that I shall be a part of the team to create GIS maps, hydraulic model and installation of meters,
- I assure that I shall go to site and find low pressures and identify the leaks,
- I shall educate my people for the initiative

How System Maps Created by CMU?

- Not entire set of drawings was available with the department.
- Tracking of the pipelines laid in different time frame was a daunting task.
- Therefore, MJP has created a special task team, called as Change Management Unit (CMU).

Change Management Unit at work



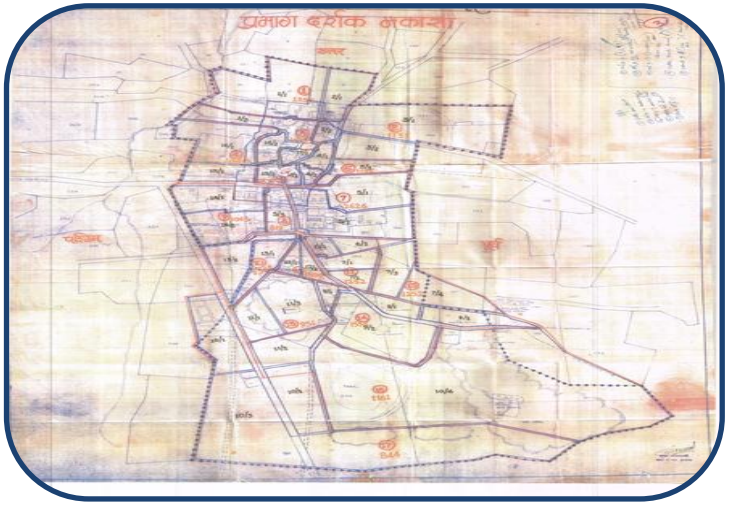
Group of engineers for creation of hydraulic model

REFORM COMPONENTS

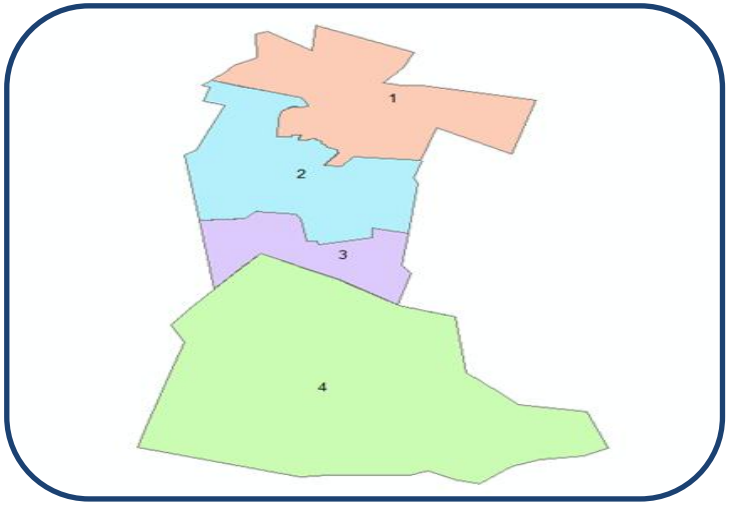
State Level Committee Approved Reform Agenda Improve Efficiency and sustainability of Water Works of ULB	Consumer Survey
	Water Audit
	Energy Audit
	Installation of Bulk Meters
	Hydraulic Modeling
	Pressure Management
	GIS Mapping
	Computerized Billing and Collection System

Impact of MSNA

City Limits - Extents



Before



After

- Old ward boundary Maps
- Improper Demarcation of City Extents
- Hand Drawn – Not to scale maps were available

- Ward Boundaries and City Limits are demarcated which are now properly based on GIS and field survey
- GIS based City Maps are prepared

Impact of MSNA

Satellite Image

Before

After

- Satellite Image was not available
- Old DP Maps were referred
- Minute Details – Street Level Details were not available

- Google or Satellite Image with very high Resolution (0.5m) are available
- Image can be used for
  - Development Planning,
  - Property Tax, Sewer,
  - Solid Waste Management

Impact of MSNA

Properties

Before

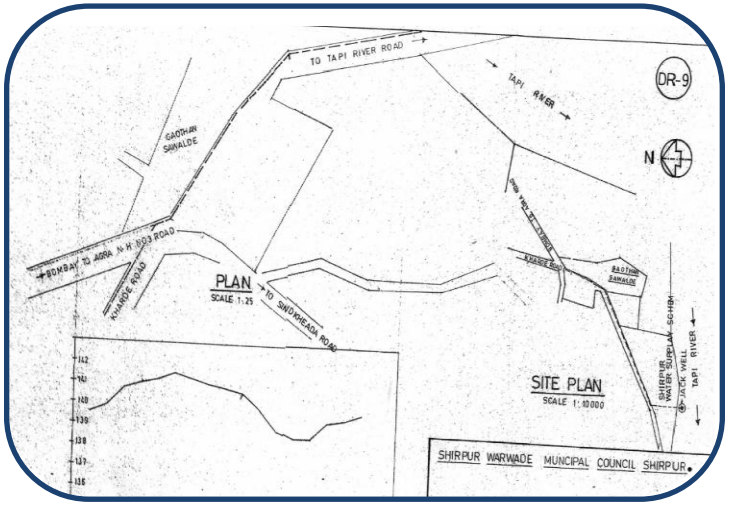
- Digitized maps were not available
- Properties were not mapped
- Properties were not uniquely identified

After

- Root level digitized maps are prepared
- Each and every property is mapped on GIS
- Every property is uniquely identified in a GIS based system

Impact of MSNA

Water Network Data



Before

- Water networks maps not available
- Information of elements of water network was not available
- Maps were old, not to scale, hand drawn and in disintegrated manner
- Differences in ground reality and available records

After

- Survey: GIS water network maps prepared
- Updated information of water network is attached to map
- Gaps between ground reality and available records are resolved by physical verification
- Information: at a click on GIS System
- Powerful tool for Asset Management and decision making

Impact of MSNA

Stand-posts

Before

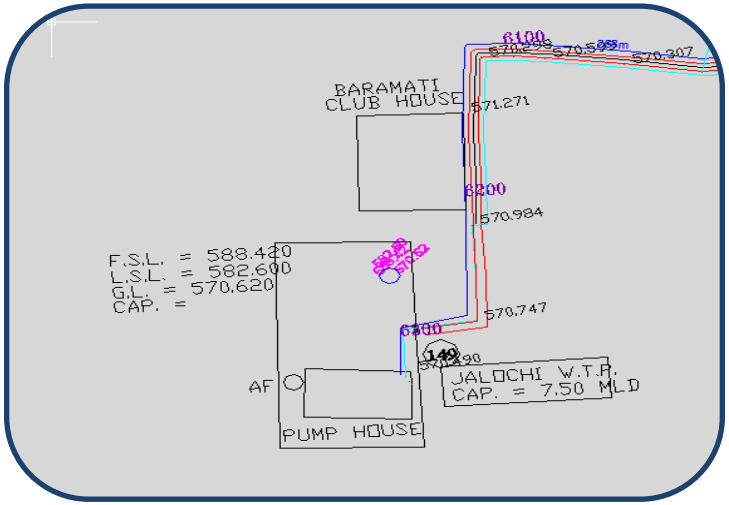
After

- Information: location, number was not available
- Stand-posts were converted to group connection on paper only
- There was no change in ground reality,
- Many stand-posts were without tap.

- Stand-posts: Physically surveyed and mapped on GIS
- Exact information is available
- Helps in policy decision making for conversion of stand-posts to group connection

Impact of MSNA

Proposed Network



Before

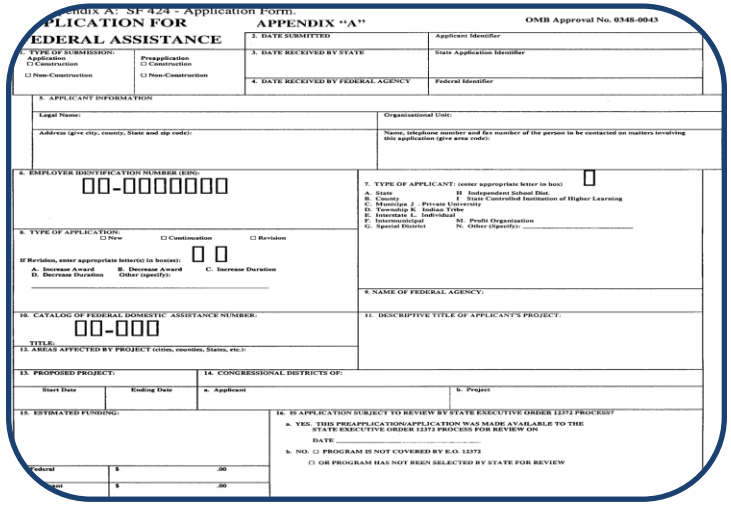
After

- Proposed Network: not mapped on GIS
- Not Connected to the Existing Network in a proper manner
- Proposed Network was not studied along with Existing Network

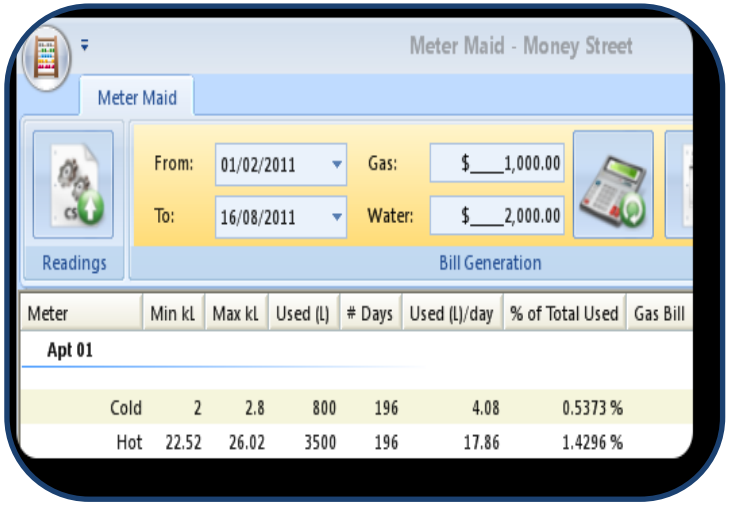
- Proposed Network along with Existing Network were mapped on GIS
- Proposed and Existing Network were studied in an integrated manner
- Physical Survey and Field verification of Proposed Network was done

Impact of MSNA

Billing Data (used for CS)



Before



After

- Available in hard copy format
- Data: old and outdated - redundant
- Differences between ground reality and billing data was observed
- Data was not streamlined properly
- Billing data was not standardize wrt consumer details and connection details

- Billing data in soft copy format (both english and marathi) is prepared
- Billing data is updated
- Billing data is streamlined and standardize wrt name and connection
- Each and every customer is uniquely identified

Impact of MSNA

Consumers Mapping

Before

Date: 06/01/2011

हजाराहून अधिक अवैध नळ

पाथरी नगरपालिका प्रशासनाकडून २१ जणांवर पोलिस कारवाई

कर्मचाऱ्यांच्या तंगनमतानेच अवैध जोडणी

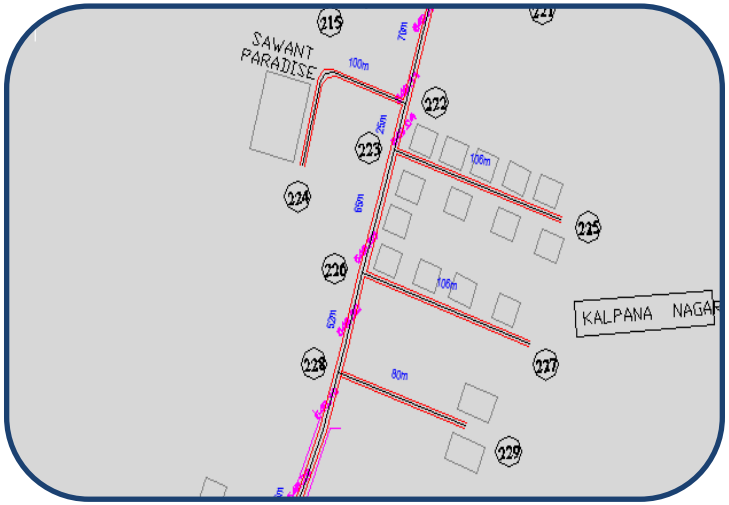
After

- Information : number of connections, temporarily disconnected, permanently disconnected etc was not available
- Information related to the location of consumer was not available

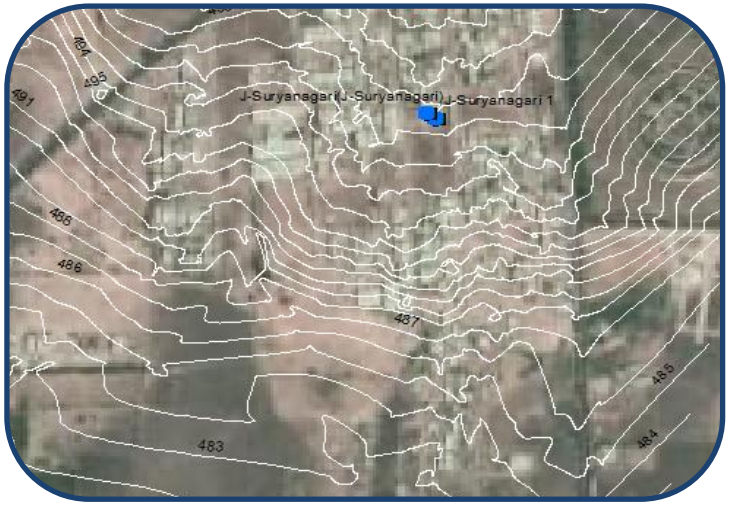
- Consumers are mapped on GIS
- All the connections with details are mapped on GIS
- Consumers with outstanding amount can also be shown on GIS
- Grouped wardwise, zonewise for better revenue collection

Impact of MSNA

Elevation Map



Before



After

- Contour map was not available
- Elevations were derived from old toposheets

- Physical survey was conducted to identify the location and elevation of a point
- 3D Stereo paired images used to generate contours

Impact of MSNA

Leakages

Before

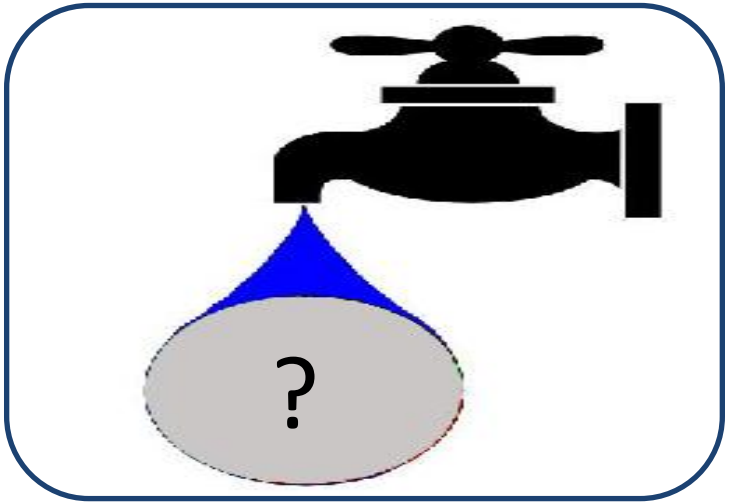
After

- No information about leakages was available
- Locations were not known

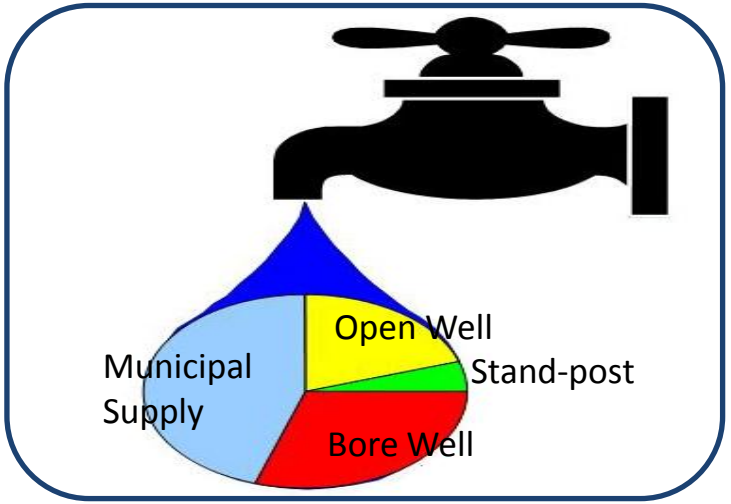
- After physical survey, leakages are mapped on GIS along with photograph and location details

Impact of MSNA

Water Consumption (Municipal Supply, Open Well, Bore Well etc)



Before



After

- No information was available for water consumption by different beneficiaries
- HH and population dependent on municipal supply, open well, bore well, SP etc. is available on GIS system

Impact of MSNA

Consumer Feedback

Before

After

- No information was available about the perception of the consumer
- Information: water quality, quantity and pressure not available with consumer

- Consumer feedback about the service of water supply is available in terms of quality, quantity, supply hours, pressure and satisfaction
- Consumer perception about water supply is known along with statistical data

Impact of MSNA

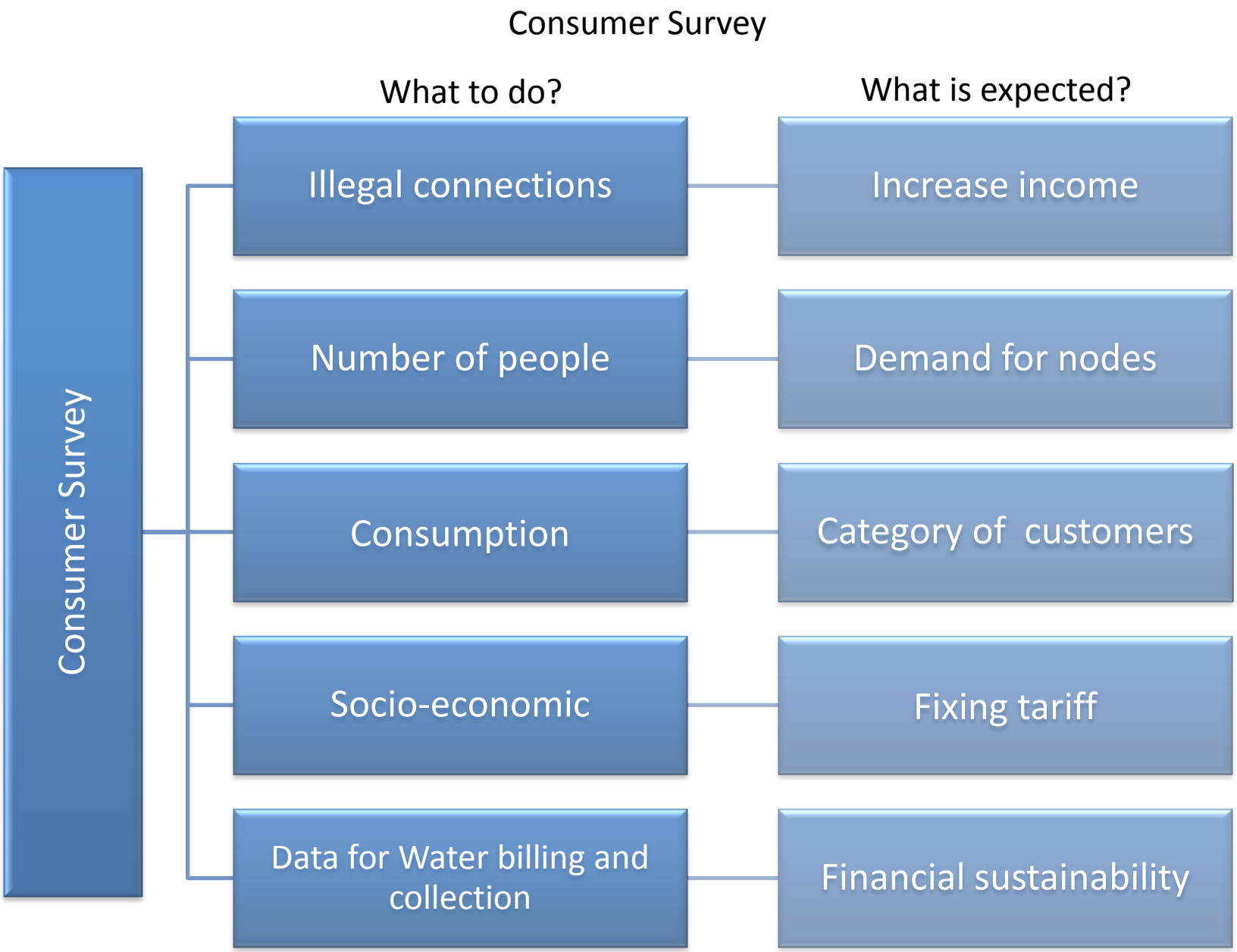
Meters

Non working meters were replaced by MJP

Before

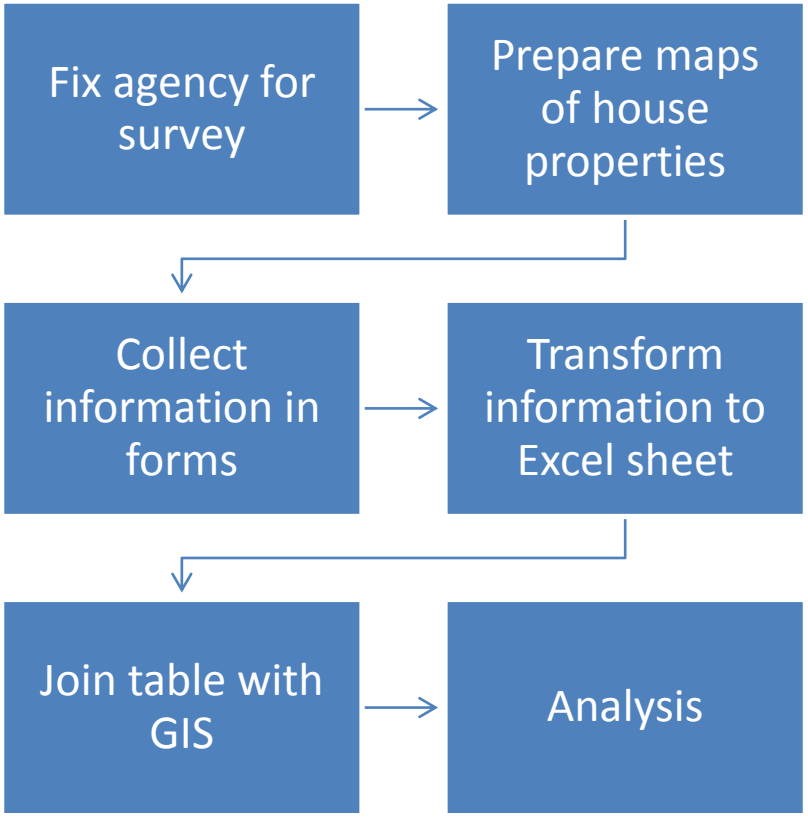
After

Difficulties in MSNA



Difficulties in MSNA

Consumer Survey



Illegal connections not properly found by consultants,

Difficulties in MSNA

Consumer Survey

SN	City	Properties	House-Holds	Total Connections	Illegal Connections	Ill_Conn_Regularized	Rs Lakhs Saved/Y
1	Amravati	132525	NA	73721	4000	2200	30
2	Ahmadpur	12152	10676	3789	3733	0	0
3	Udgir	12683.0	19580	8390	2304	0	0
4	Yavatmal	53480	NA	26537	1681	1131	12
5	Sillod	7762	9940	3839	1194	412	4.94
6	Nilanga	6391	7819	2575	1165	350	13.98
7	Deulgaon-Raja	6320.0	4963.0	3327	654	0	0
8	Manmad	13882	17606	8389	496	0	0
9	Pachgani	2052	3960	1421	436	0	0
10	Badlapur	58020	50640	15488	400	0	0
11	Basmat	10041	8781	4524	241	0	0
12	Ambarnath	12779	49430	20186	231	0	0
13	Gondia	28595	NA	10189	135	0	0
14	Manwat	5093.0	4582.0	4561	121	0	0
15	Ballarpur	17962.0	17899.0	7126	118	0	0
16	Khamgaon	15887.0	20834.0	7870	116	0	0
17	Hingoli	11056.0	14664.0	5119	114	0	0

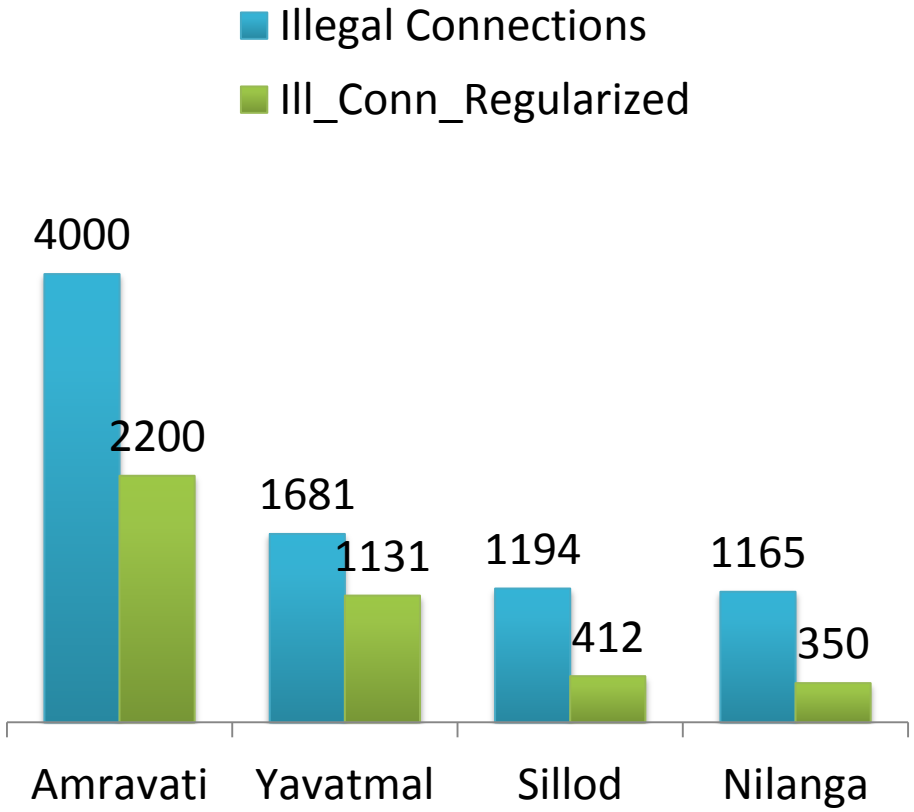
Difficulties in MSNA

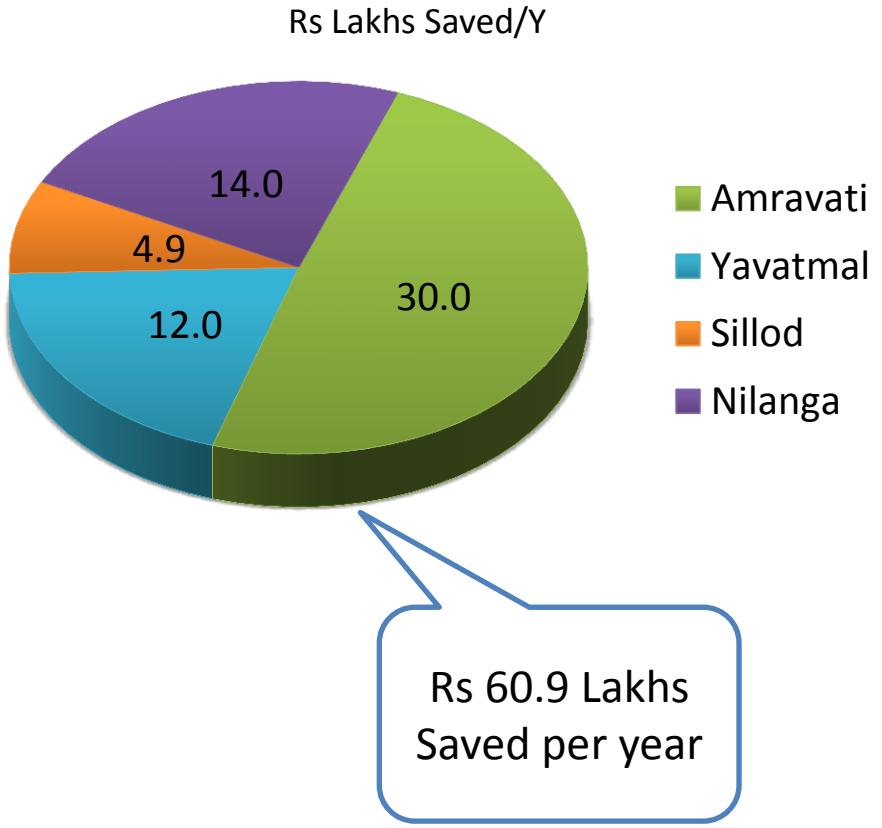
Consumer Survey

	City	Properties	House-Holds	Total Connections	Illegal Connections	Ill_Conn_Regularized	Rs Lakhs Saved/Y
18	Umarkhed	8846.0	7952.0	4546	52	0	0
19	Akot	22033.0	22033.0	7154	25	0	0
20	Deoli	4420.0	4033.0	1918	23	0	0
21	Narkhed	6015.0	5919.0	2694	6	0	0
22	Ramtek	3971	4953	2442	4	0	0
23	Kalmeshwar	3194	4114	3028	1	0	0
24	Anjangaon	9539	10749	7762	0	0	0
25	Chikhaldara	666	549	609	0	0	0
26	Jalgaon Jamod	6415	7452	1922	0	0	0
27	Karanja	11362.0	13303.0	6798	0	0	0
28	Mohapa	1239	1474	1082	0	0	0
29	Mowad	1676	1859	1208	0	0	0
30	Panhala	758	903	631	0	0	0
31	Patur	4156.0	4920.0	1659	0	0	0
32	Tiroda	4796	4500	1789	0	0	0

Difficulties in MSNA

Consumer Survey





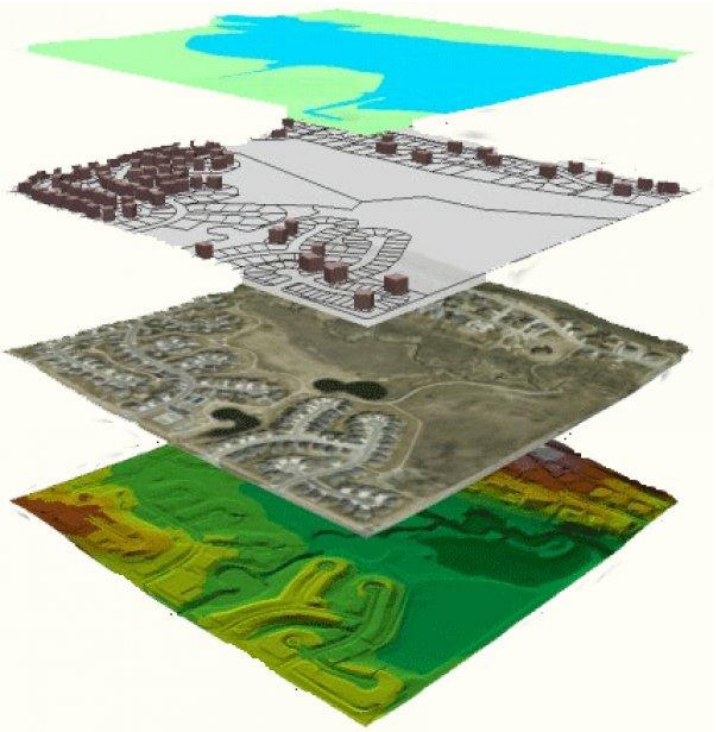
Difficulties in MSNA

Consumer Survey

- Resistance from religious section
- Difficulty in defining area of
- Non co-operation from the consumers
- Frequent visits to houses that are locked
- Unavailability of the bills for verification
- No accessibility to visual verification of connection
- Surveyors abused and threatened
- Identify legal and unauthorized connections
- Large number of stand-posts with unaccounted water
- Illegal connections not properly found by consultants,

Difficulties in MSNA

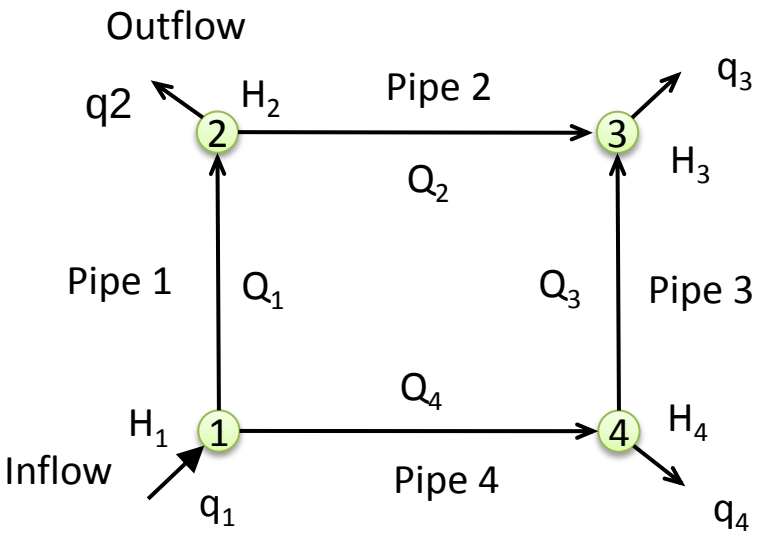
GIS



- Unavailability of satellite image,
- Prolonged time for procurement from NRSA,
- Improper and incomplete base data availability
- DP maps/ward boundaries are obsolete
- Hand drawn and inaccurate water network
- Poor asset management - with incomplete information on location, and geography
- Scheme related information: old and not updated,
- Variations observed on ground

Difficulties in MSNA

Hydraulic Modelling



What is required?

- Soft-wares are costly,
- EPANET-2 is free,
- Network on EPANET should be made compulsory

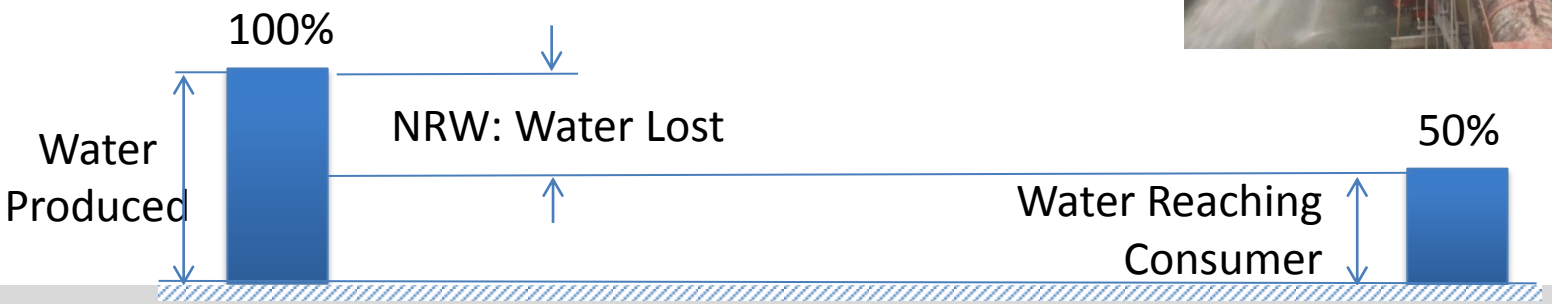
- Drawings manually sketched
- AutoCAD drawings: are non spatial
- No engineer in ULB for taking care of Hyd. M.
- Actual pipelines different from the information available
- Restriction of no. of nodes (population/40) is not correct,
- Engineers: Training and capacity building
- Consultants know only sketching and feeding the data
- Simulation scenarios are not made
- Demand allocation is wrong in many cases
- Operational zones are not created in HM

Difficulties in MSNA

Definition: Non Revenue Water

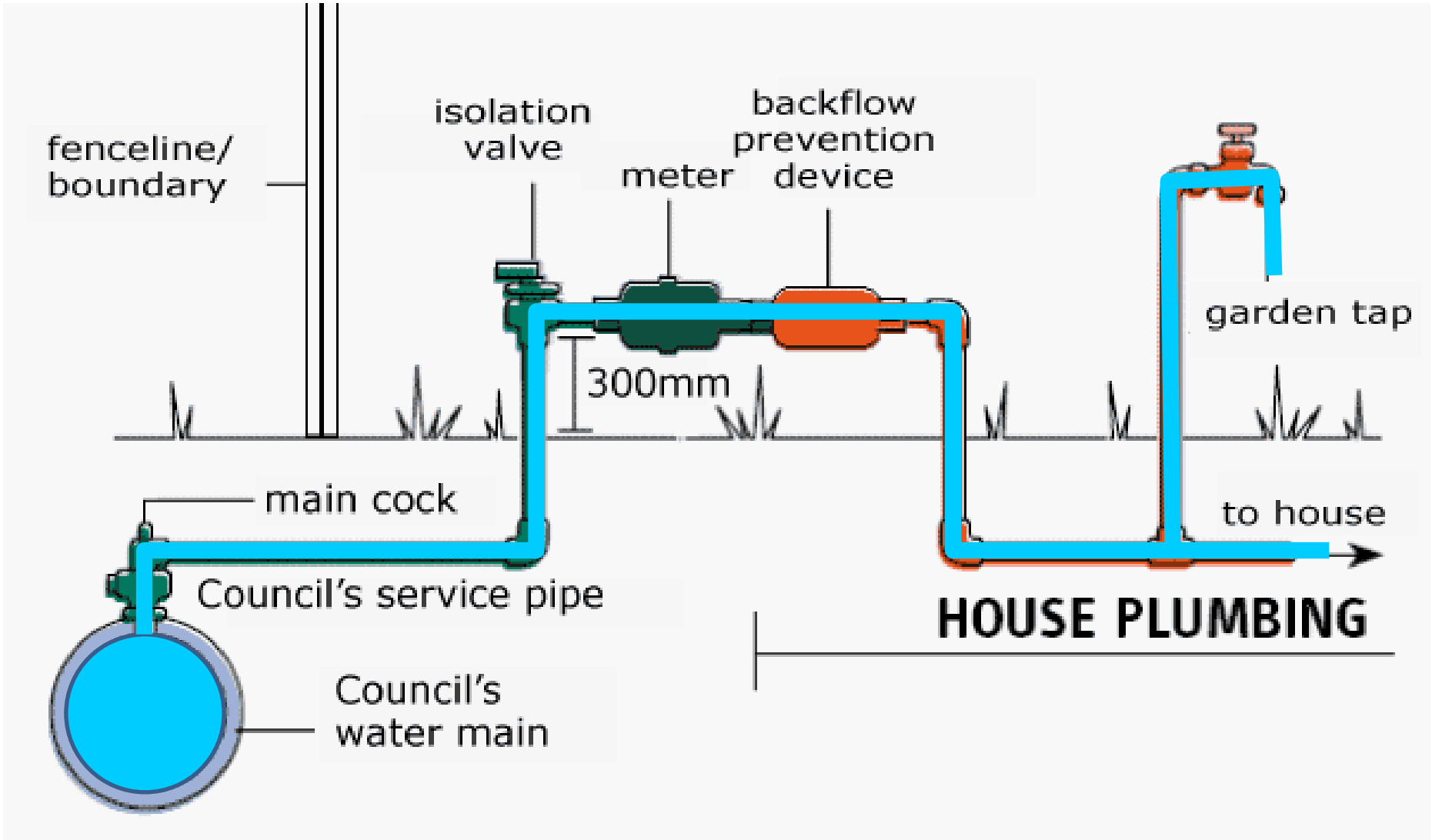
- NRW - is water that has been produced and is “lost” before it reaches the customer

$$NRW = \frac{\text{Total water produced - Total water sold x 100}}{\text{Total water produced}}$$

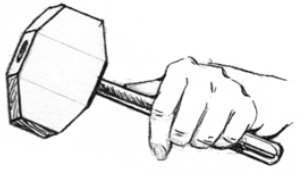


Source: www.waterloss-reduction.com

How is House Service Connection?

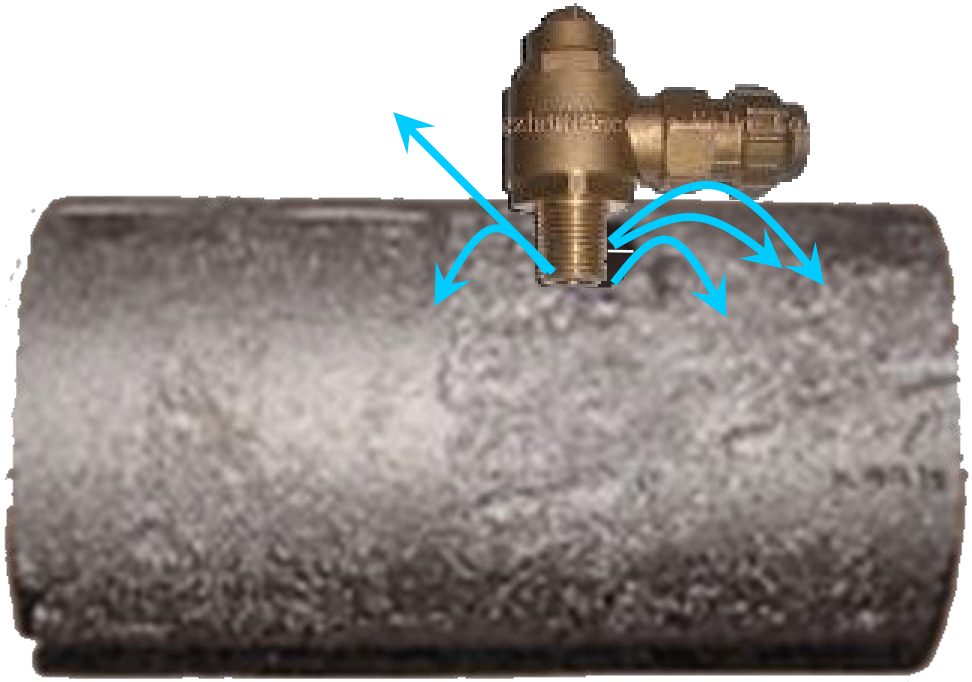


Difficulties in MSNA

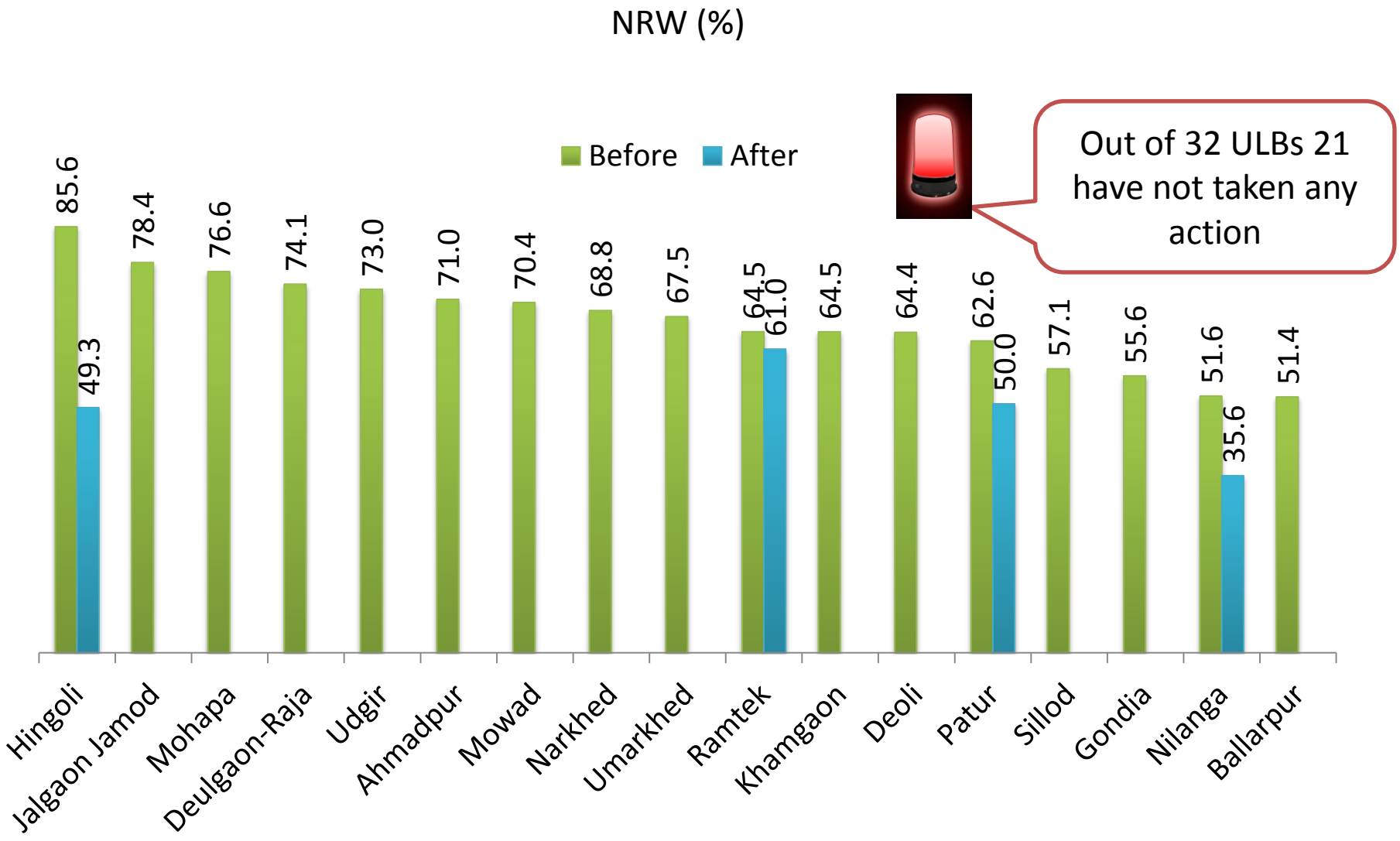


- CI pipeline is brittle
- Unskilled Non-Plumber makes irregular shaped hole in CI pipeline,

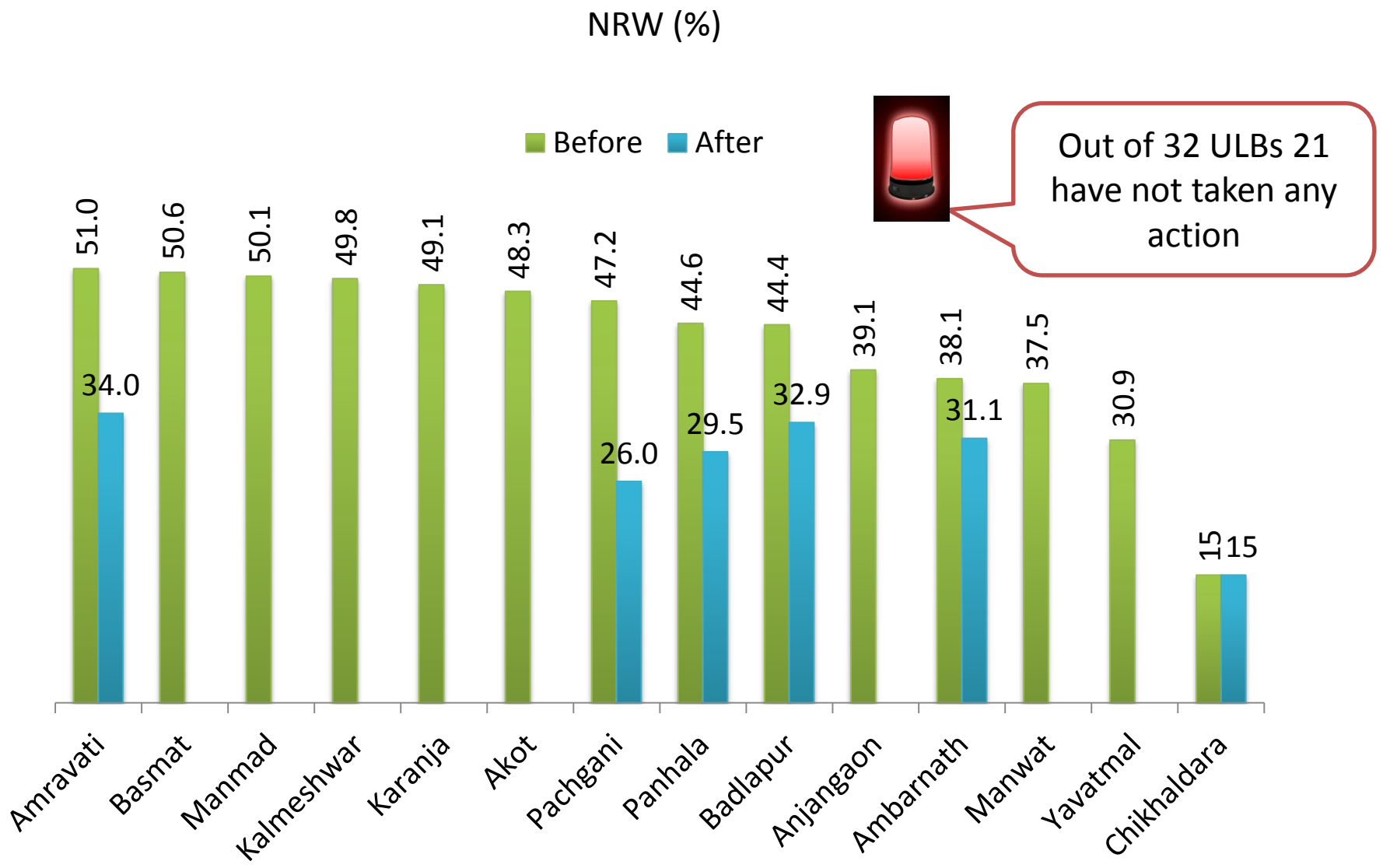
Difficulties in MSNA



NRW- Actual Performance



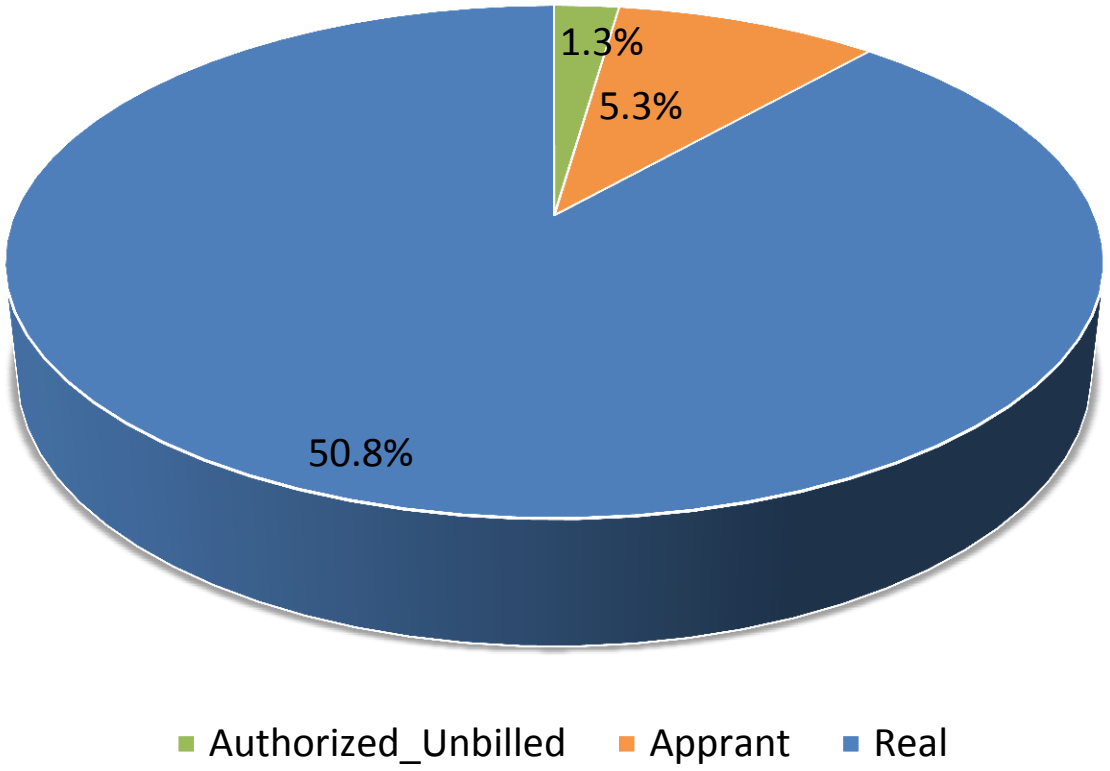
NRW- Actual Performance



NRW- Actual Performance

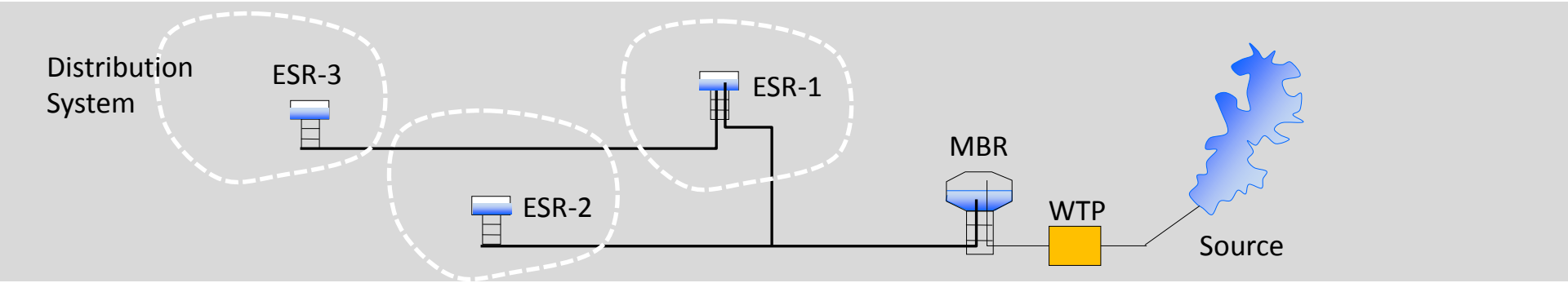
Average of NRW = 57.4%

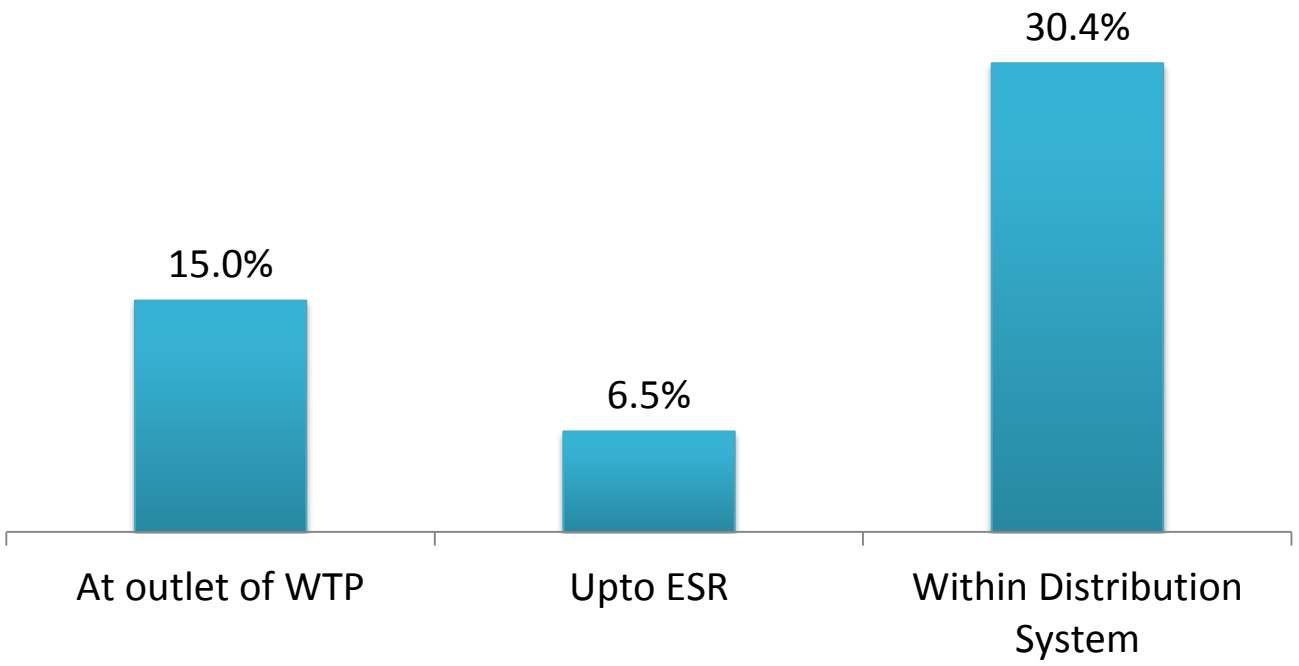
Did you know?
Other surveys shows low value, between 25 to 30%



NRW- Actual Performance

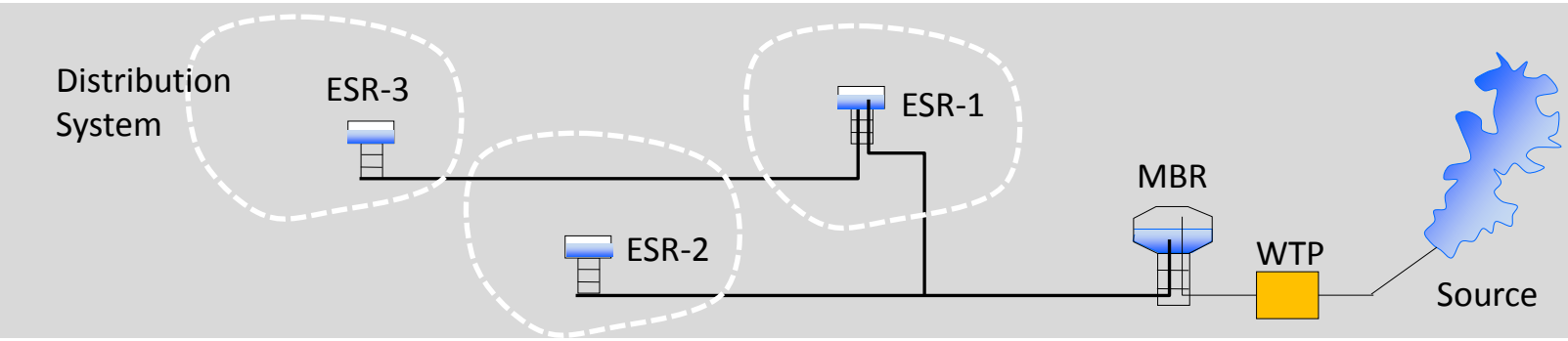
Average NRW (%) of 31 Cities





NRW- Actual Performance

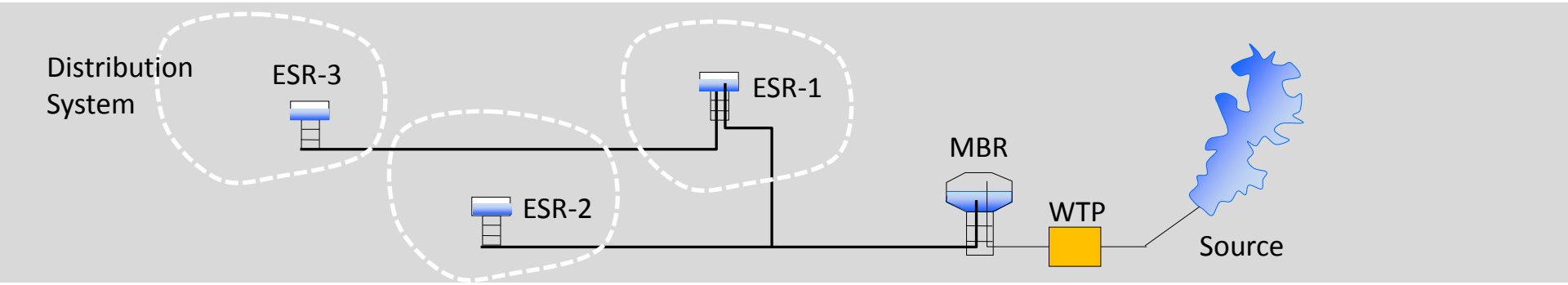
NRW (%)



SN	City	NRW	Apparent	Authorized Unbilled Consumption	Real		
					At outlet of WTP	Up to ESR	Within Distribution System
1	Ahmadpur	71.0	26.2	2.7	25.1	0.8	15.6
2	Akot	48.3	0.2	0.0	0.0	5.9	42.3
3	Ambarnath	38.07	2		3.5	1.5	31.06
4	Amravati	51.0	NA	NA	12.0	3.0	36.0
5	Anjangaon	39.1	0.0	0.0		0.2	39.0
6	Badlapur	44.4	2.0		3.5	1.5	37.4
7	Ballarpur	56.0	0.9	0.0	4.7	7.1	43.4
8	Basmat	50.6	2.6	10.0	11.7	0.5	24.8
9	Chikhaldara	15	2	2			11
10	Deoli	64.4	6.2	2.7	25.4	11.7	18.4

NRW- Actual Performance

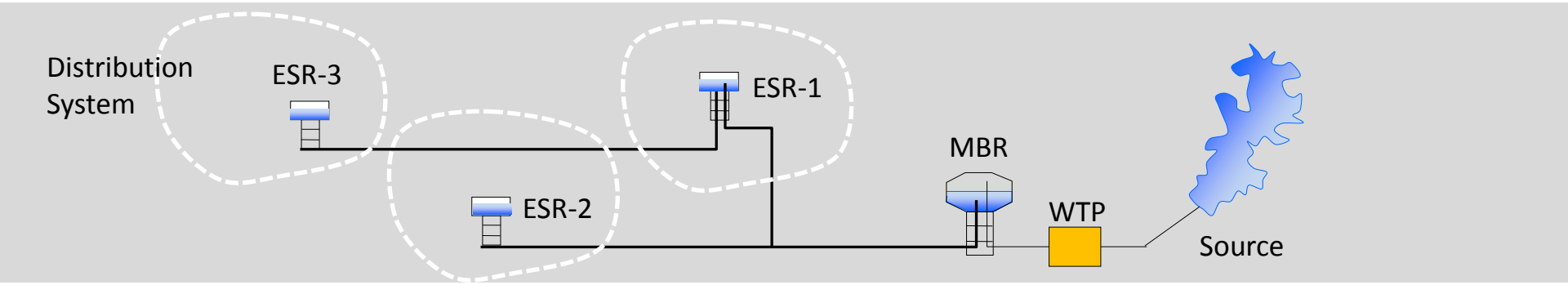
NRW (%)



SN	City	NRW	Apparent	Authorized Unbilled Consumption	Real		
					At outlet of WTP	Up to ESR	Within Distribution
12	Gondia	55.6	0.6	0.4	16.0	3.3	35.8
13	Hingoli	85.6	0.3	0.1	41.3	5.5	38.3
14	Jalgaon Jamod	78.4	0.0	0.4	0.0	37.3	40.6
15	Kalmeshwar	49.8	1.4	2.0	11.2	0.2	35.1
16	Karanja	49.1	8.0	0.0	10.4	11.3	19.4
17	Khamgaon	64.5	1.0	1.6	13.6	1.3	47.0
18	Manmad	50.1	0.7	1.7	11.9	2.3	33.5
19	Manwat	37.5	9.7	1.4	13.0	0.3	12.9
20	Mohapa	76.6	0.0	1.8	41.7	5.7	27.4

NRW- Actual Performance

NRW (%)

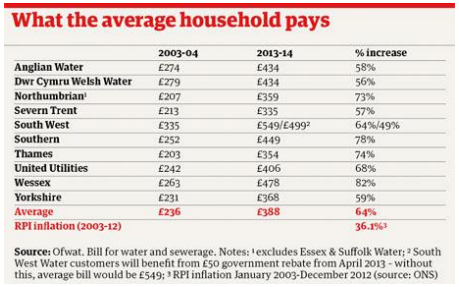


SN	City	NRW	Apparent	Authorized Unbilled Consumption	Real		
					At outlet of WTP	Up to ESR	Within Distribution
22	Narkhed	68.8					
23	Nilanga	51.6	14.5	1.6	25.1	0.0	10.4
24	Pachgani	47.2	16.6	0.0	14.0	4.8	11.8
25	Panhala	54.9	8.8	0.0	20.7	13.6	11.8
26	Patur	62.6	3.3	0.0	12.4	3.4	43.5
27	Ramtek	80.1	6.0	3.2	15.6	16.4	38.9
28	Sillod	57.1	4.6	1.1	29.6	2.1	19.7
29	Udgir	73.0	2.9	0.3	7.3	2.8	59.7
30	Umarkhed	67.5	21.6	0.6	0.9	3.4	40.7
31	Yavatmal	30.9				6.8	24.1

Difficulties in MSNA

False Value of Non- Revenue Water

- Gap: actual and on paper
- Therefore, meters are required.
- No taps. No consumer meter, hence can't work out NRW in scientific way



What the average household pays

	2003-04	2013-14	% increase
Anglian Water	£274	£434	58%
Dwr Cymru Welsh Water	£279	£434	56%
Northumbrian[1]	£207	£359	73%
Severn Trent	£213	£335	57%
South West	£335	£549/£499[2]	64%/49%
Southern	£252	£449	78%
Thames	£203	£354	74%
United Utilities	£242	£406	68%
Wessex	£263	£478	82%
Yorkshire	£231	£368	59%
Average	£236	£388	64%
RPI inflation (2003-12)			36.1%[3]

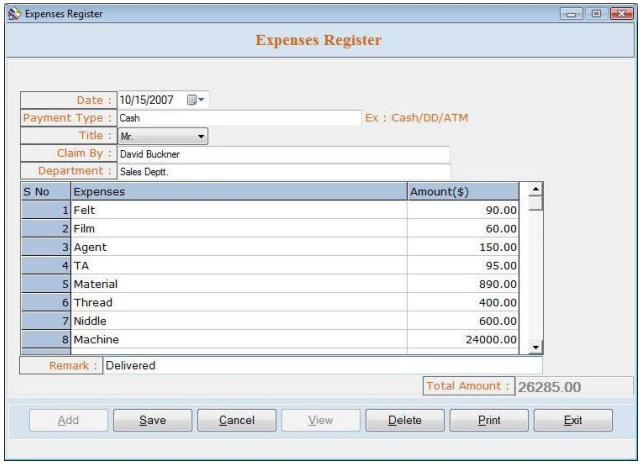
Source: Ofwat. Bill for water and sewerage. Notes: [1] excludes Essex & Suffolk Water; [2] South West Water customers will benefit from £50 government rebate from April 2013 - without this, average bill would be £549; [3] RPI inflation January 2003-December 2012 (source: ONS)

Case	Quantity (m^3)	Rate (rs/m^3)	Total (Rs)
Regular	10.5	12	126
House Lock			300
Difference	14.5		174

- Tariff for house lock is Rs 300/m,
- Family of 5 consumes 10.5 m^3/m, bill is Rs 126 /m,
- MJP works out difference in quantity of water consumed in reverse way,
- Water used seems less, gives false NRW, hiding quantity lost due to physical leakages

Difficulties in MSNA

Computerized Billing



- No defined consumption pattern
- Most of the data is old
- Discrepancy in the billing data
- Billing data having many redundant records (e.g., Temporarily disconnected, permanent)
- Poor awareness regarding water conservation in people

Difficulties in MSNA

Water Audit

<table>
<tr><td rowspan="6">System Input Volume
10.89 MLD</td><td rowspan="3">Authorized Consumption (Billed Authorized Consumption + Unbilled Authorized Consumption)
1.585 MLD
(14.56%)</td><td rowspan="2">Billed Authorized consumption
1.57 MLD
(14.42%)</td><td>Billed Metered Consumption (Including water exported)
1.57 MLD
(14.42%)</td><td rowspan="2">Revenue Water (Total billed quantity)
1.57 MLD
(14.42%)</td></tr>
<tr><td>Billed Un-metered Consumption
NIL</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption
0.015 MLD
(0.14%)</td><td>Unbilled Metered Consumption
Nil</td><td rowspan="5">Non-Revenue Water (System Input volume – Revenue Water)
9.32 MLD
(85.58%)</td></tr>
<tr><td>Unbilled Un-metered Consumption
0.015 MLD
(0.14%)</td></tr>
<tr><td rowspan="4">Water Losses (System Input Volume – Authorized Consumption)
9.305
(85.44%)</td><td rowspan="2">Apparent Losses
0.03 MLD
(0.28%)</td><td>Un-Authorized Consumption
0.03 MLD
(0.28%)</td></tr>
<tr><td>Metering Inaccuracies
NIL</td></tr>
<tr><td rowspan="4">Real Losses (Water Losses– Apparent Losses)
9.275
(85.16%)</td><td>Raw water Transmission
4.25 MLD
(39.03%)</td></tr>
<tr><td>WTP losses
0.25MLD
(2.30%)</td></tr>
<tr><td>Pure water transmission losses
0.46 MLD
(4.22%)</td></tr>
<tr><td>ESR LOSSES
0.14 MLD
(1.29%)</td></tr>
<tr><td></td><td></td><td>Distribution Losses
4.175 MLD
(38.32%)</td></tr>
</table>

- Resistance to the installation of Water Meter
- Tampering and theft of meters
- No Support from consumers
- No support from Council staff
- Un-authorized boosting problems
- Political Interference
- Only 5% of each DMA is metered and then water audited, this does not truly represent NRW in full DMA

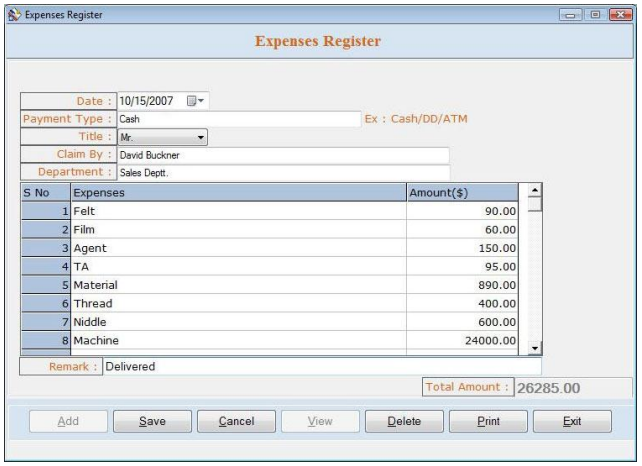
Difficulties in MSNA

Energy Audit

- Electricity billing data not available for analysis,
- No previous records registered in log books about the condition of motors, pumps, panels as well as for maintenance and break down,
- Energy audit is made for pumping machinery only, and not holistically- If there is any system fault, it is undetected,
- Energy audit recommendations are not followed

Difficulties in MSNA

Computerized Billing



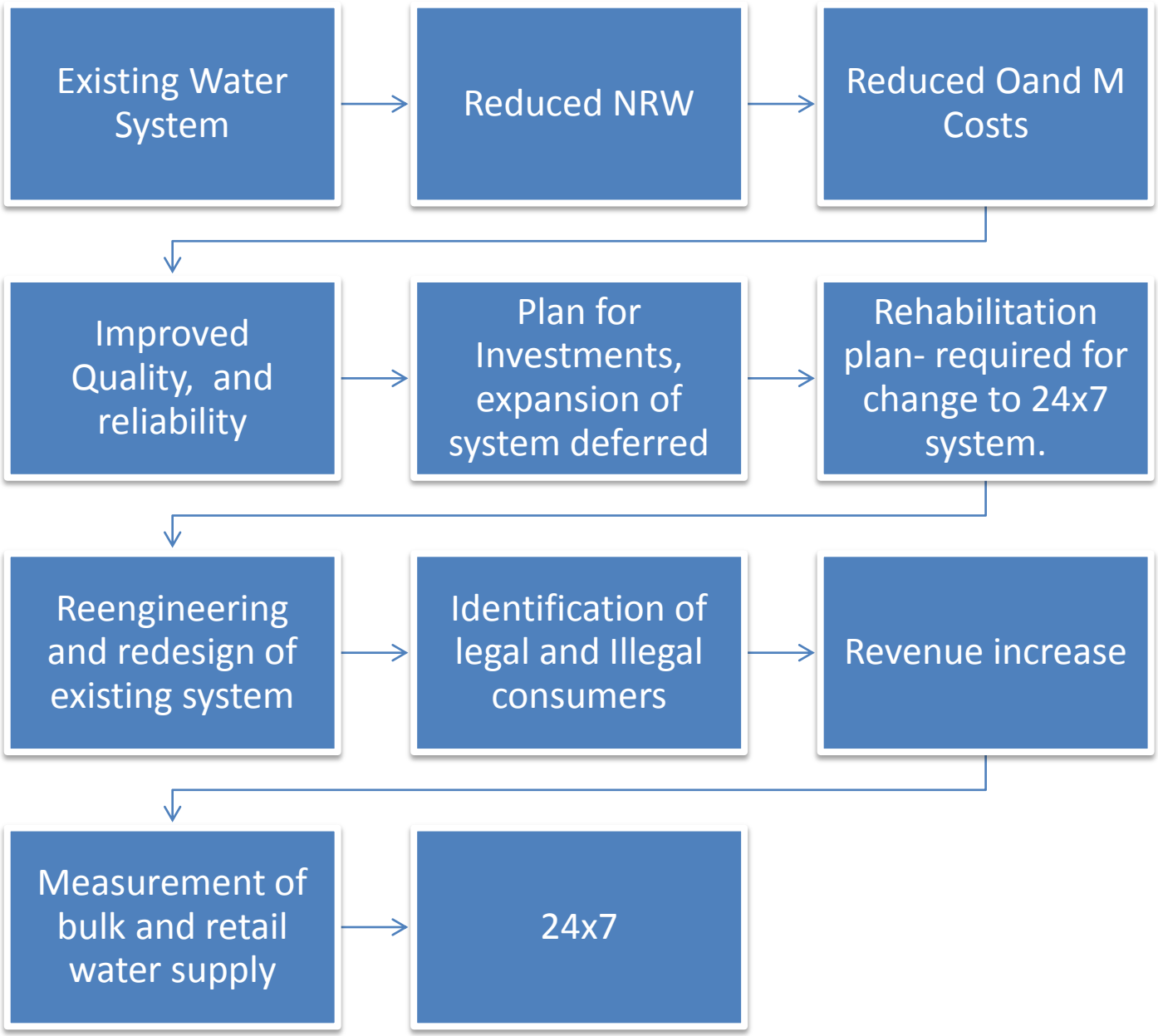
- Improper and incomplete billing data,
- Available data is available in hard copy only,
- Property tax data and water connection data are maintained in same register,
- No provision for deletion / updation of any record - only addition is possible,
- Exact no. Of properties are unknown,
- Category of connections- legal, illegal, working, disconnected are unknown
- Most of connections are unmetered or flat rate,

Difficulties in MSNA

Meters

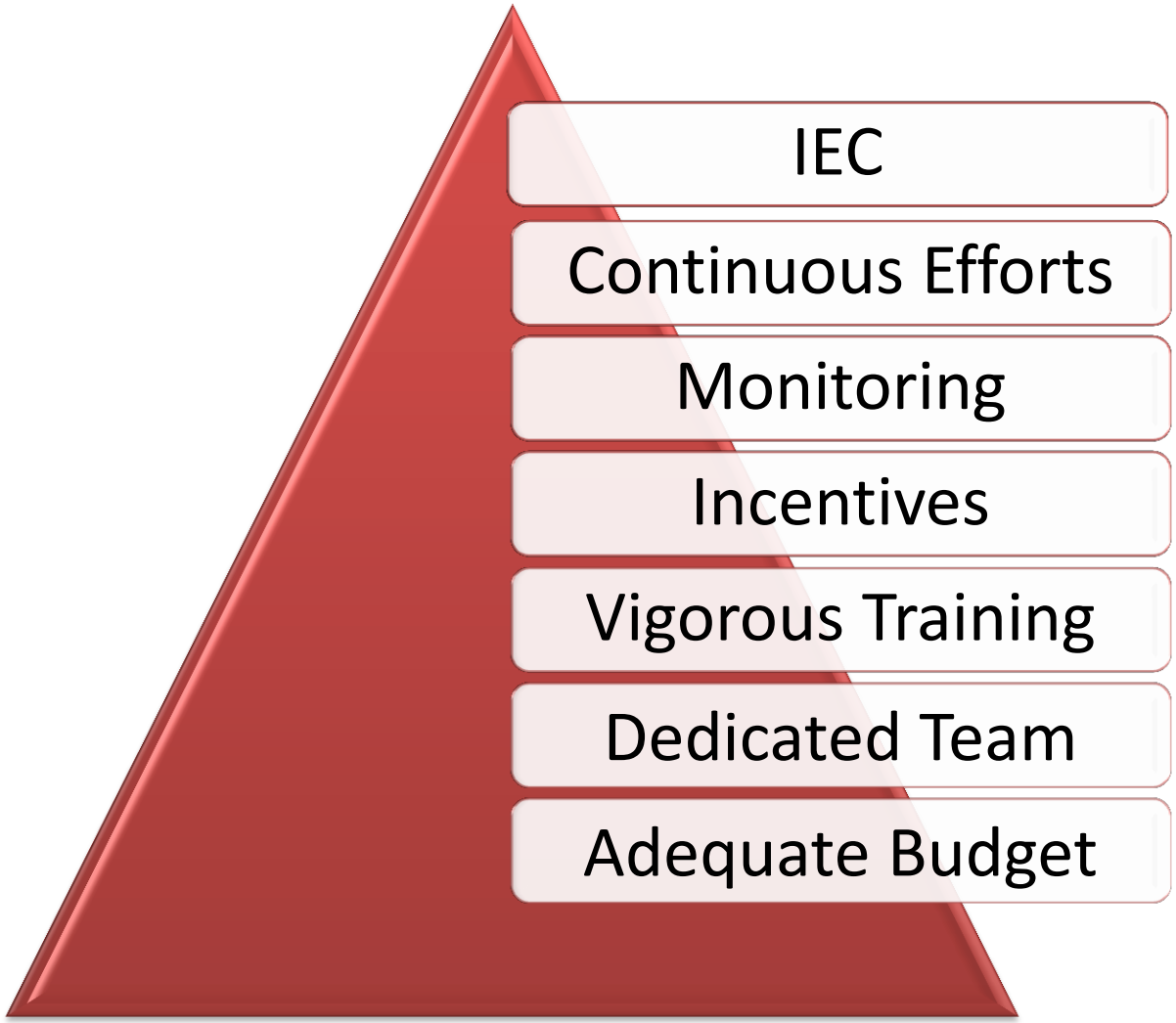
- Meters are installed by MJP but not maintained by ULB,
- Meters malfunction

Conclusions



Conclusions

What is Required?



Thank You

Mobile: 9987030080
Email: drsvd14@gmail.com
Web: dws24x7water.com