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IWA SPECIALIST GROUP ON INTERMITTENT WATER SUPPLY

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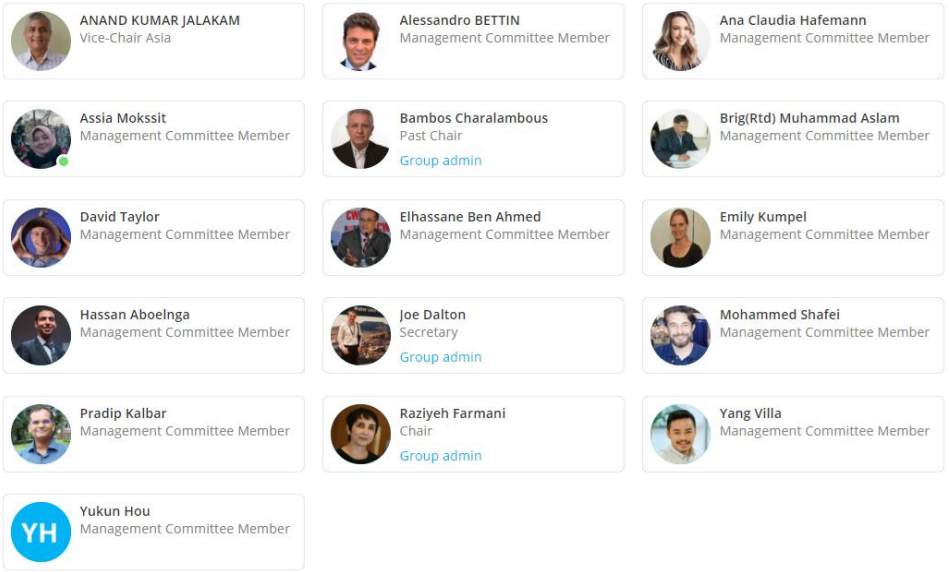
The specialist group focuses on **developing knowledge** on the current global IWS situation, the challenges entailed under such conditions and the possible solutions that could be applied, through **varied activities** and a **well-structured working program**.

INTERMITTENT WATER SUPPLY



Management Committee of IWA IWS SG

https://iwa-connect.org/group/intermittent-water-supply-iws/timeline

Join **209 water professionals** working across a great variety of different sectors!

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Emily Kumpel

University of Massachusetts Amherst
USA

Pradip Kalbar

Indian Institute of Technology Bombay
India

Upali Gunenayake

CMEC
Sri Lanka

Jamie Paterson

RPS Europe
UK

Raziyeh Farmani

University of Exeter
UK

Joe Dalton

HydrOptimise
Ireland

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AGENDA

- **Introduction**
  Raziyeh Farmani | *Joe Dalton*
- **Water Quality in Intermittent Water Supplies**
  Emily Kumpel
- **Low-cost interventions for Improving Water Supply in India**
  Pradip Kalbar
- **Sri Lanka: The Challenges of Transitioning to 24x7 Supply**
  Gunenayake Upali | *Jamie Paterson*
- **Q&A Panel Discussion**

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Water Quality in Intermittent Water Supplies

EMILY KUMPEL
UNIVERSITY OF MASSACHUSETTS
AMHERST, USA

University of Massachusetts Amherst

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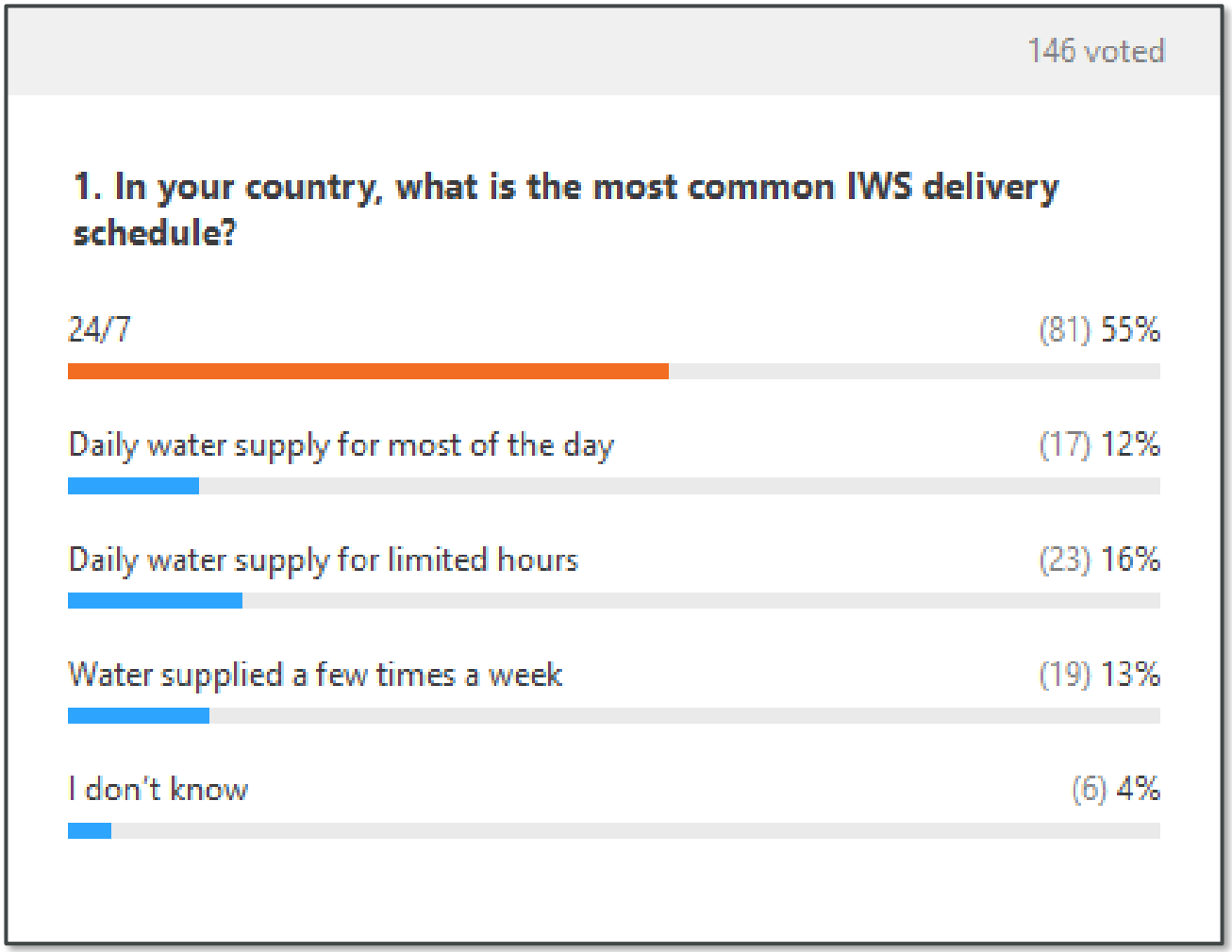
POLL 1: IWS DELIVERY

Single choice

1. In your country, what is the most common IWS delivery schedule?

- 24/7
- Daily water supply for most of the day
- Daily water supply for limited hours
- Water supplied a few times a week
- I don’t know

POLL 1: IWS DELIVERY



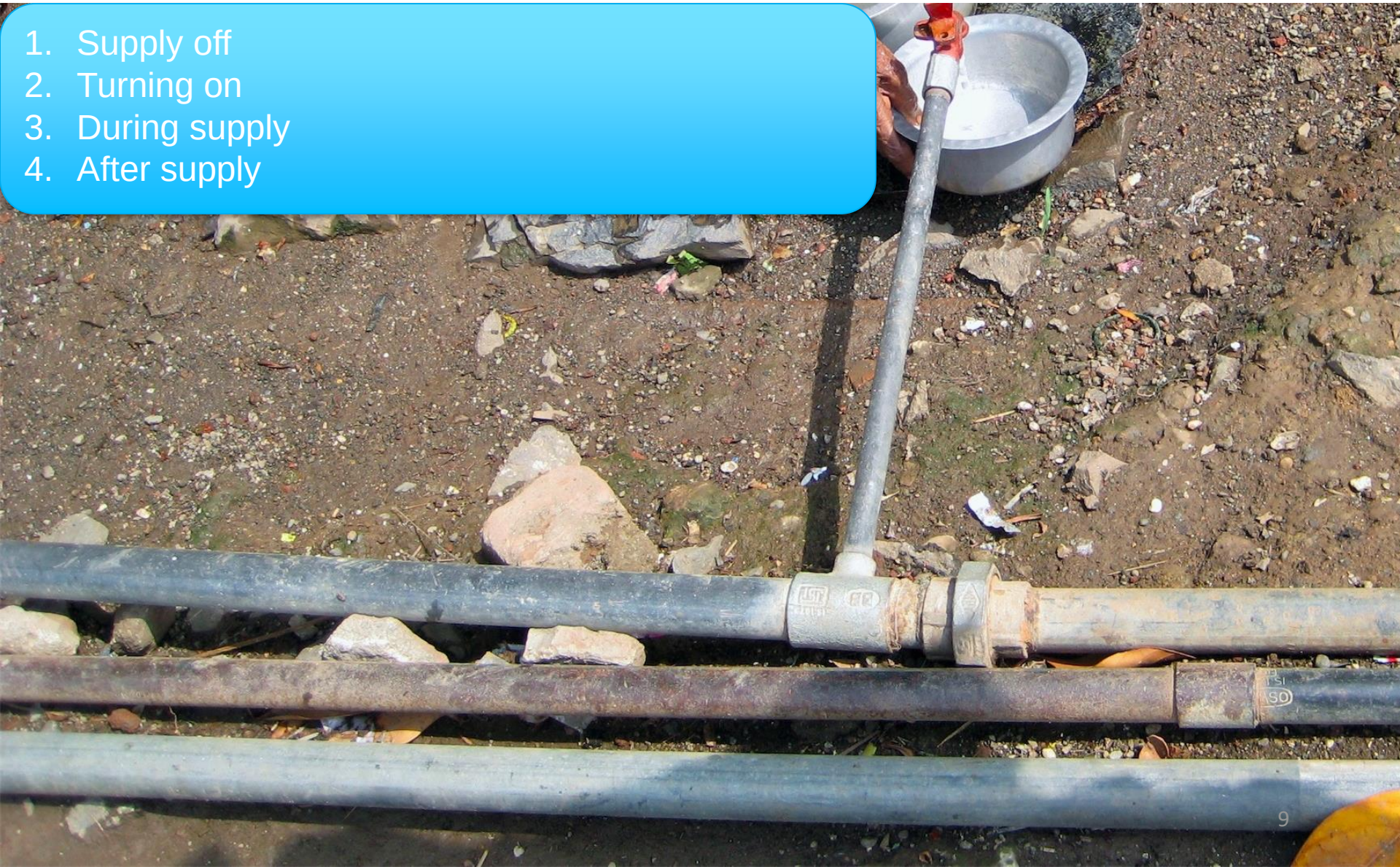
INTERMITTENT SUPPLY TAKES MANY FORMS

	Predictable	Unreliable
Mostly continuous (demand-driven)	Turned off to the whole town for 4 hours every night	Frequent outages for several hours at a time at higher elevations or during peak flow
Mostly intermittent (supply-driven)	Entire network supplied with 2 hours daily Rotational delivery for 8 hours every 2 days to each of 6 network zones	Rotational delivery for 5 hours every 3-5 days; often early, late, or skipped

Kumpel et al, in prep

HOW DOES IWS AFFECT WATER QUALITY?

1. Supply off
2. Turning on
3. During supply
4. After supply



HOW DOES IWS AFFECT WATER QUALITY?

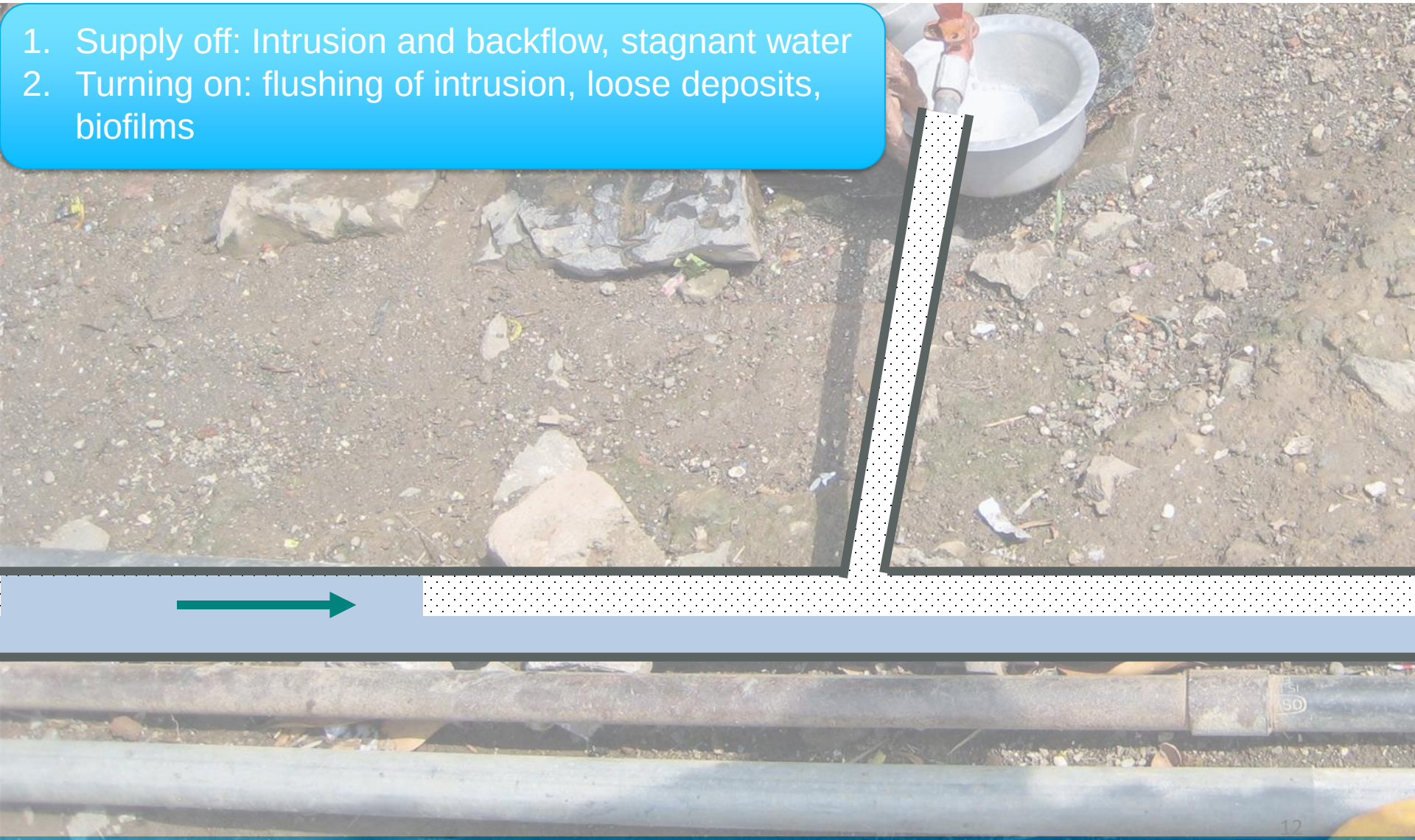
1. Supply off: Intrusion and backflow, stagnant water

HOW DOES IWS AFFECT WATER QUALITY?

1. Supply off: Intrusion and backflow, stagnant water

HOW DOES IWS AFFECT WATER QUALITY?

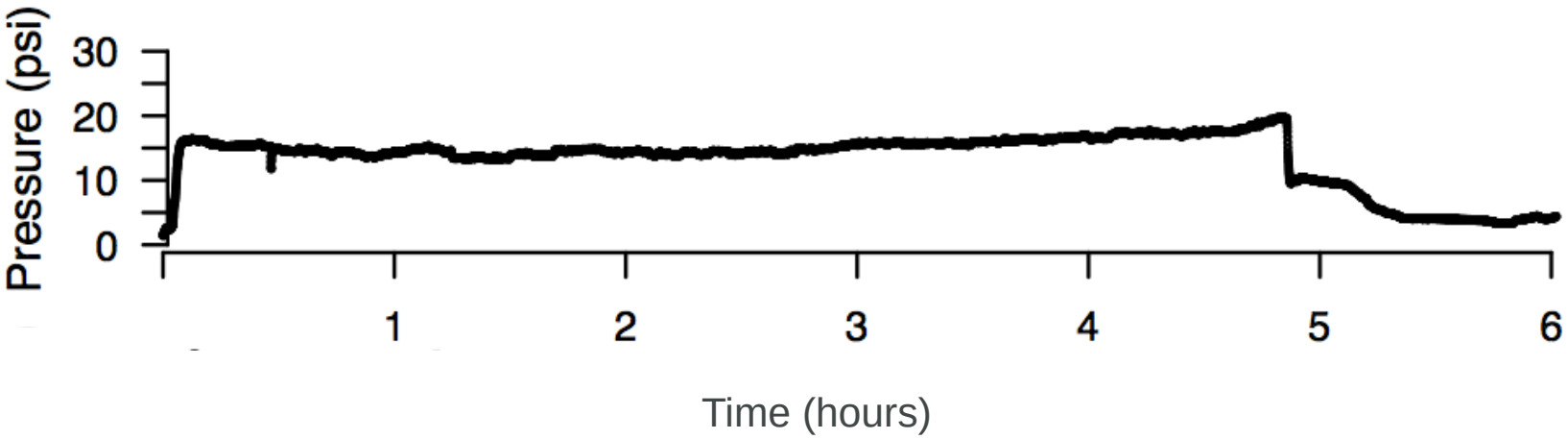
1. Supply off: Intrusion and backflow, stagnant water
2. Turning on: flushing of intrusion, loose deposits, biofilms



HOW DOES IWS AFFECT WATER QUALITY?

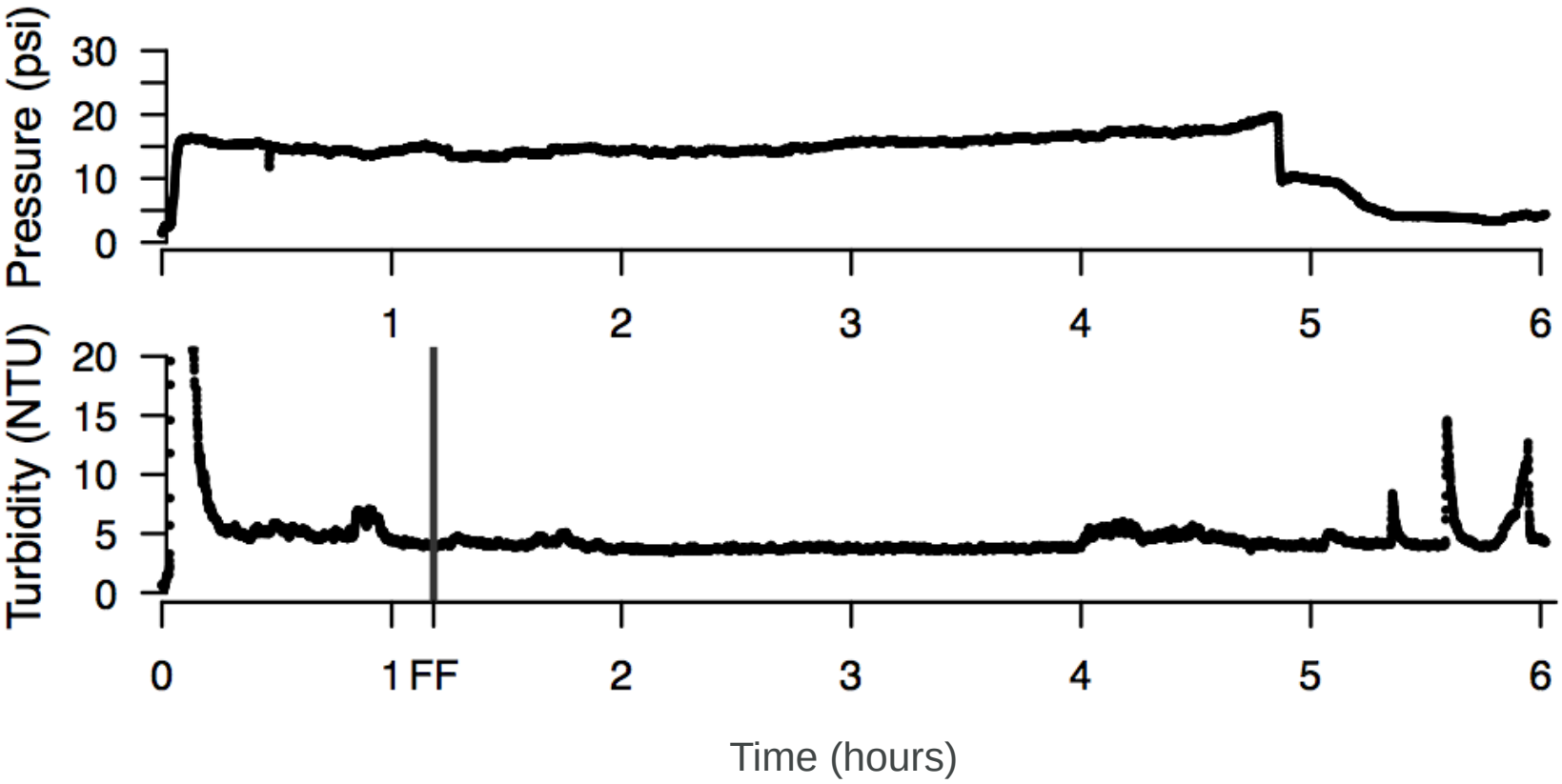
1. Supply off: Intrusion and backflow, stagnant water
2. Turning on: flushing of intrusion, loose deposits, biofilms
3. During supply: Low or variable pressure; difficult to maintain stable disinfectant residual

PRESSURE DURING SUPPLY CYCLE



Kumpel, E., Nelson, K.L., 2014. Mechanisms affecting water quality in an intermittent piped water supply. *Environmental Science & Technology* 48(5), 2766–2775.

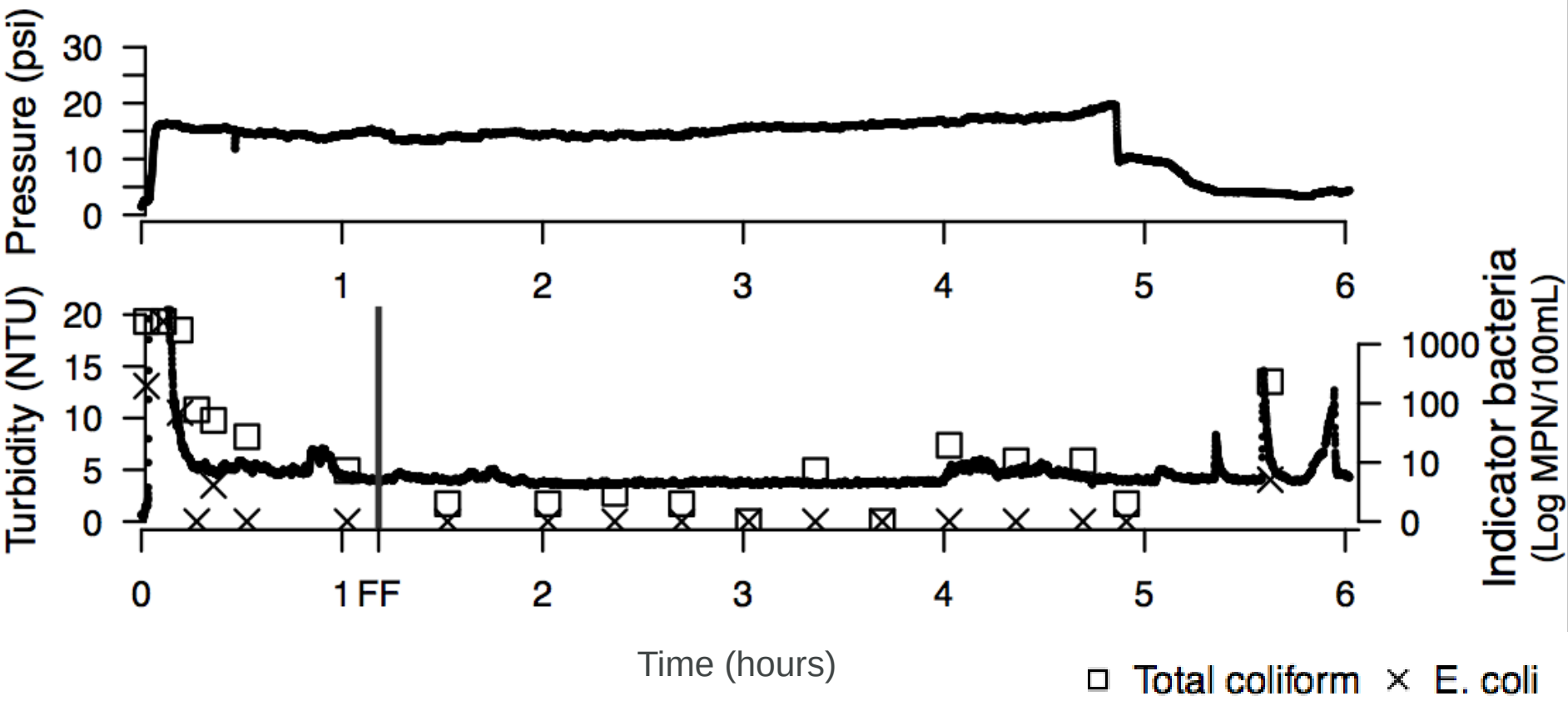
TURBIDITY DURING A SUPPLY CYCLE



Mean first flush time: 31 min (Range 1-71 minutes)

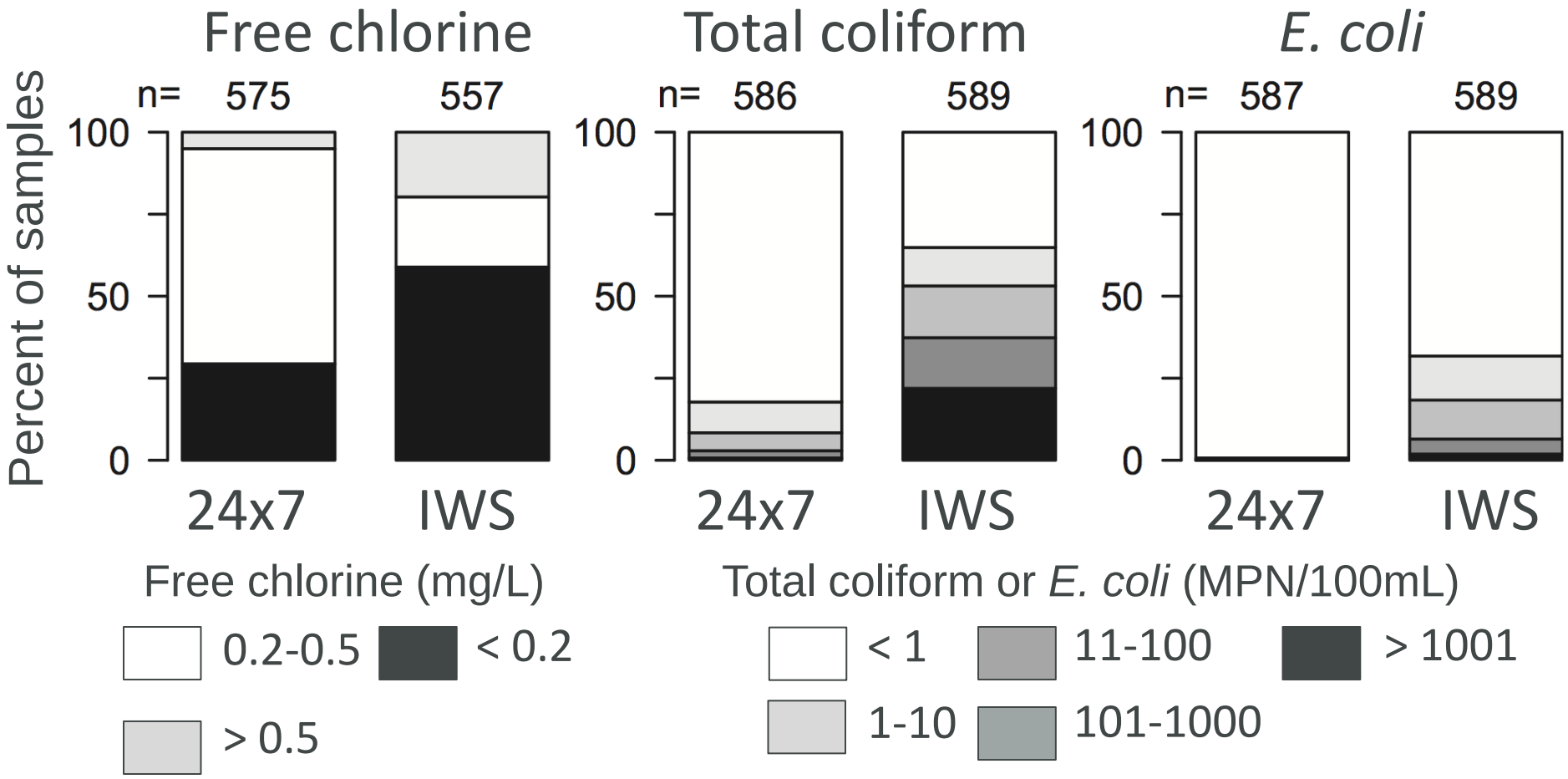
Kumpel, E., Nelson, K.L., 2014. Mechanisms affecting water quality in an intermittent piped water supply. *Environmental Science & Technology* 48(5), 2766–2775.

TOTAL COLIFORM AND *E. COLI* DURING A SUPPLY CYCLE



Kumpel, E., Nelson, K.L., 2014. Mechanisms affecting water quality in an intermittent piped water supply. *Environmental Science & Technology* 48(5), 2766–2775.

WATER QUALITY AT IWS TAPS WAS WORSE THAN AT 24X7 TAPS



Kumpel, E., Nelson, K.L., 2013. Comparing Microbial Water Quality in an Intermittent and Continuous Piped Water Supply. *Water Research* 47 (14), 5176–5188.

WATER QUALITY IS IWS-CONTEXT SPECIFIC (WITHIN AND BETWEEN NETWORKS)

	Hubli-Dharwad, India	Arraiján, Panama
Total Coliform >1 MPN/100 mL	65% (n= 589)	1% (n= 423)
E. coli >1 MPN/100 mL	32% (n= 589)	<1% (n=423)
Chlorine residual <0.2 mg/L	60% (n= 557)	0% (n=496)
Turbidity >1 NTU	56% (n= 586)	2% (n=496)

- Why the differences?
  - shorter supply outages?
  - higher supply pressures?
  - more consistent/higher disinfectant residual?
  - fewer contaminant sources near infrastructure or fewer ingresses?

Kumpel, E., Nelson, K.L., 2013. Comparing Microbial Water Quality in an Intermittent and Continuous Piped Water Supply. *Water Research* 47 (14), 5176–5188.
Erickson, J.J., Smith, C.D., Goodridge, A., Nelson, K.L., 2017. Water quality effects of intermittent water supply in Arraiján, Panama. Water Research 114, 338–350. https://doi.org/10.1016/j.watres.2017.02.009

HOW DOES IWS AFFECT WATER QUALITY?

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1. Supply off: Intrusion and backflow, stagnant water
2. Turning on: flushing of intrusion, loose deposits, biofilms
3. During supply: Low or variable pressure; difficult to maintain stable disinfectant residual
4. After supply: Household storage of water

CONCLUDING THOUGHTS ON WATER QUALITY IN IWS

- 24x7 is more protective of water quality than IWS
- It may be possible to improve water quality in IWS:
  - Manage first flush water
  - Maintain high pressure and disinfectant residual during supply
  - Reduce contamination outside of pipes and ingress pathways
  - Address household water collection and storage as a part of the system (also note: households switching to 24x7 may continued to store water)
- We don't yet know the effect of:
  - Supply duration
  - Presence of pathogens in absence of indicator bacteria
  - Within-network differences

Special thank you: Kara Nelson, Zach Burt, Ayse Ercumen, Isha Ray, Jack Colford, John Erickson, Sharada Prasad, Madhu Reddy, V.S. Hegde, Eng. Jayaram & the North Karnataka Urban Water Supply & Drainage Board, Narayan Billava, Nayanatara Nayak, CMDR enumerator team

Contact me at: ekumpel@umass.edu

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Low-cost interventions for Improving Water Supply in India

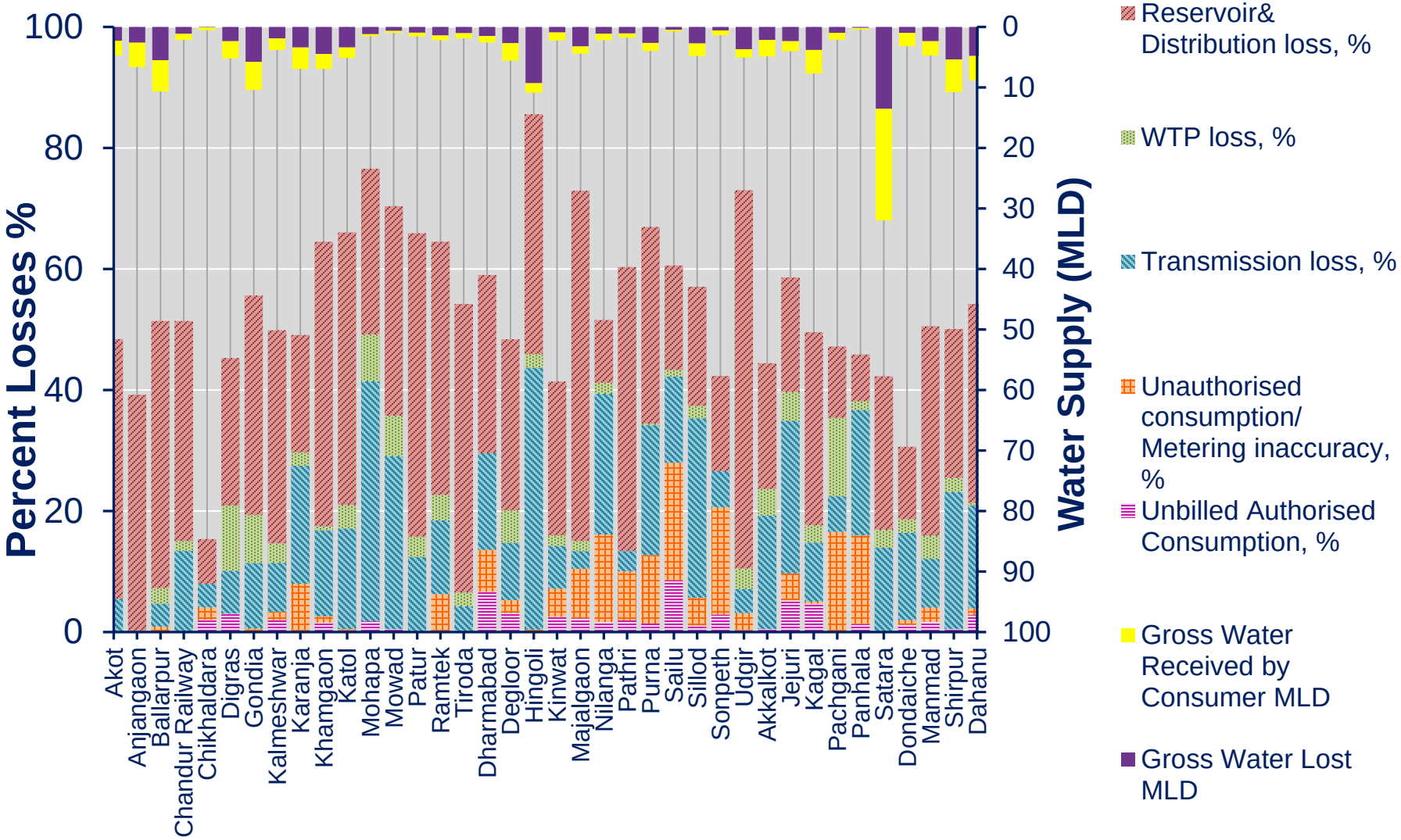
PRADIP KALBAR
INDIAN INSTITUTE OF TECHNOLOGY
BOMBAY, INDIA

inspiring change

THE CURRENT REALITY OF WATER SUPPLY IN INDIA

- Water supply in India is intermittent, ranging from 30 minutes to 12 hours per day
- Alternate day supply to once in a fortnight
- Inequitable distribution
- 82% of households in rural and 40% in urban areas are not having tapped water connection.
- Situation is same irrespective of water availability
- The root cause of miserably low supply hours/frequency is high percentage NRW

RESULTS OF WATER AUDIT



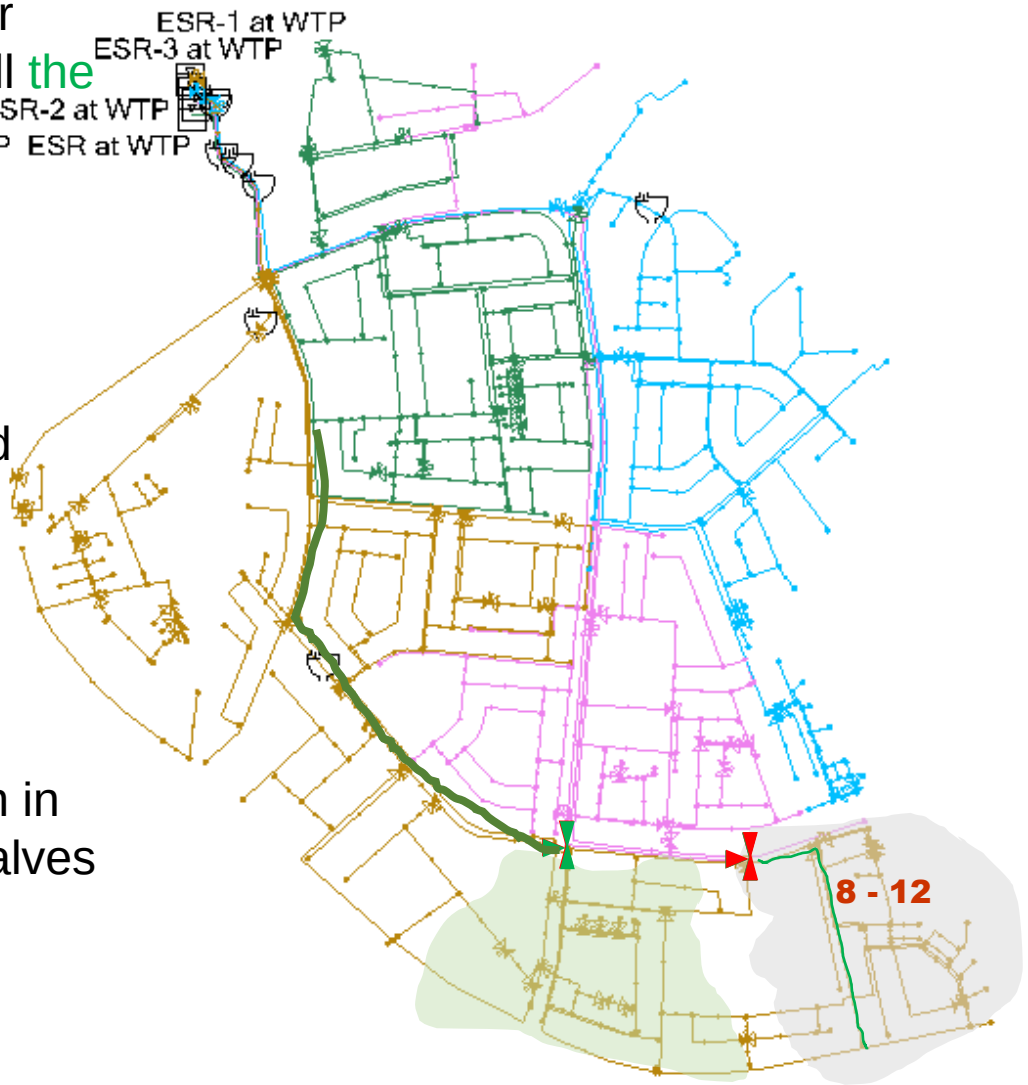
Source: Kulkarni et al. (2014)

ACTUAL DESIGN AND FIELD OPERATION

There are no DMAs formed and water distribution systems emerging from all the tanks are interconnected.

No control on withdrawal – assuming 10 LPM flow at tap demand can be served in one hour

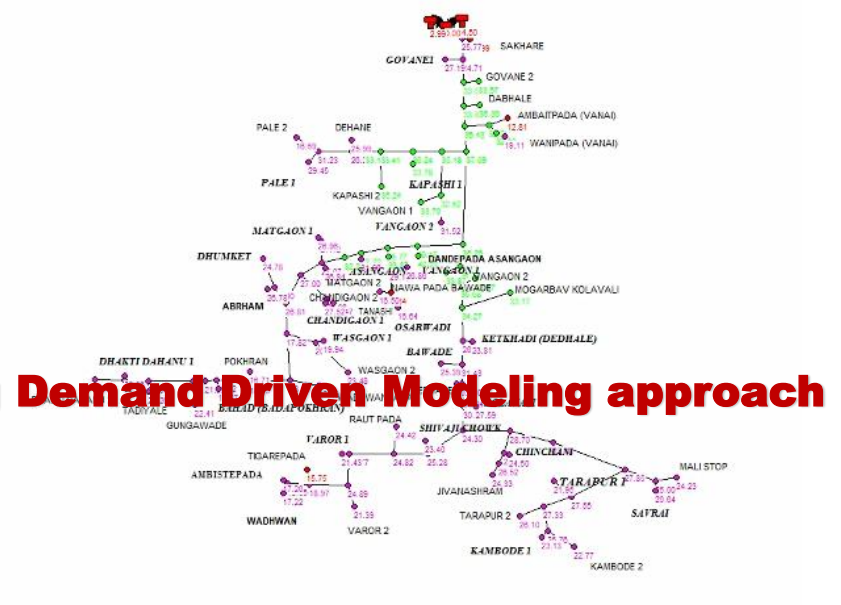
It is practiced to divide city distribution in different zones by providing control valves and bifurcating supply timings



THE CURRENT NARRATION OF 24X7 WATER SUPPLY

- Ignoring the current reality, many programs/missions promise a 24x7 water supply.
- Funds are indiscriminately used towards the **expansion of the network without an assured source of water supply**
- Given the current reality, **how the 24x7 water supply will be achieved and sustained is impossible to imagine**!
- Many cities in India have attempted **a direct conversion to 24x7 water by appointing operators/service providers – No success**!
- No thought is given to consumer psychology, their current consumption, mode of the draw, and overall network behavior
- Major thrust of the projects are **new high-quality infrastructure and irrelevant automation**, which comes with high costs – replication and sustainability!

WHETHER THE CURRENT HYDRAULIC MODELLING IS REALISTIC?



Prevailing Demand Driven Modeling approach

Input

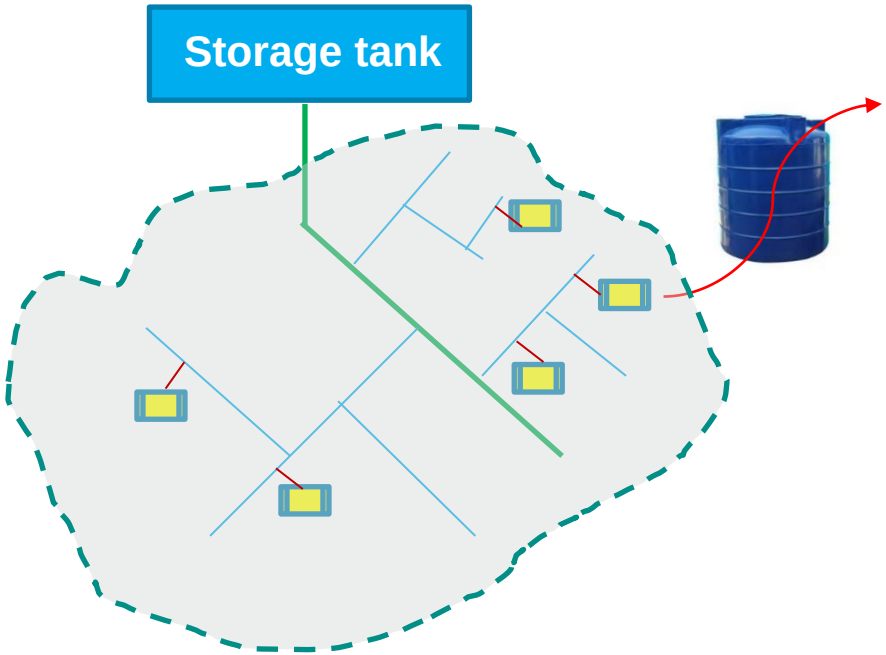
- Junction details
- Pipe details
- Tank details
- Pump details
- Demand Allocation- Different methods, demand is allocated as per available inputs

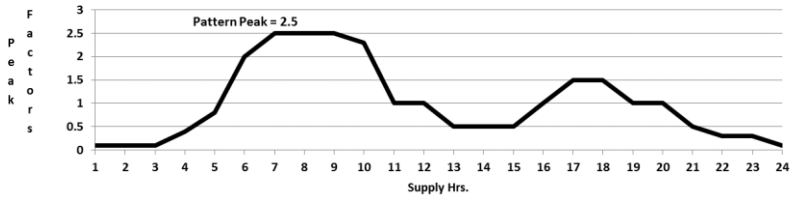
Output

- Pressure at demand junction
- Flow through pipes
- Pressure variation at junction with respect to time

- CWS regime, without household storage
- Ground reality, IWS regime with operational issues, household storage, leakage etc.

SHOULD WE CONSIDER HH STORAGE CAPACITY AND ITS EFFECT IN HYDRAULIC MODELLING/DESIGN?

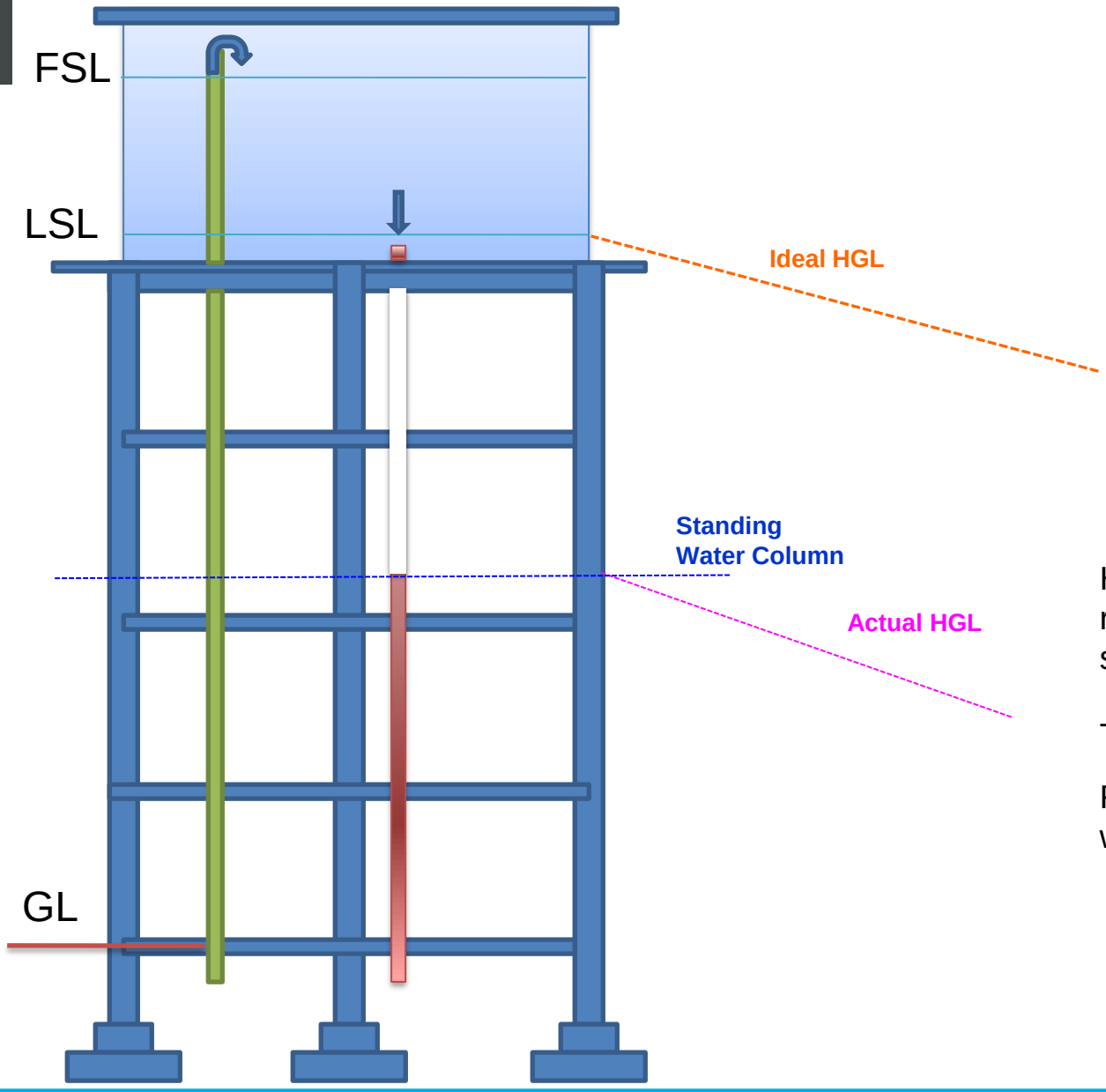




Consumers have periodically invested in household storages and in household modular water filters

Hydraulic designs/models have many data gaps and uncertainties (population forecasting, network details, HW, demand allocation, DDA/PDA, etc.) and cannot be solely used for design and improving current operations!

STANDING WATER COLUMN?



For the purpose of flow control, head dissipating devices such as orifice, flow control valves were advocated by Bhave and Gupta (2000), and recently, low-cost interventions such as Manifold and Master-piece are recommended by Kalbar and Gokhale (2019)

However, if there are no controls on receiving side withdrawal capacity > supply

Tanks gets empty

Further, the HGL drops to standing water column

WHAT ACTION IS NEEDED?

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Our research group at IIT Bombay focus at developing low-cost tools and interventions which are open to all

Research Funded by
Department of Science and Technology (DST)
under
Water Technology Initiative (WTI-2017-19) for
Demand Driven Convergent Water Solutions in Mission mode

Journal of Water Supply: Research and Technology
AQUA

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Volume 68, Issue 4
1 June 2019

Previous Article
Article Contents

Abstract

INTRODUCTION

LARGE-SCALE CENTRALIZED INFRASTRUCTURE – CAUSE OF FAILURE OF WSS

OPTIMUM SCALE OF OPERATION

MULTI-OUTLET TANKS TO ACHIEVE BETTER HYDRAULIC EFFICIENCY AND EASE OF OPERATION

SHAFTS FOR HANDLING FIELD PROBLEMS

MANIFOLDS FOR ACHIEVING CONTROLLED

RESEARCH ARTICLE | APRIL 16 2019

Decentralized infrastructure approach for successful water supply systems in India: use of multi-outlet tanks, shafts and manifolds FREE

Pradip Kalbar; Pradeep Gokhale

Journal of Water Supply: Research and Technology-Aqua (2019) 68 (4): 295–301.
https://doi.org/10.2166/aqua.2019.158 **Article history**

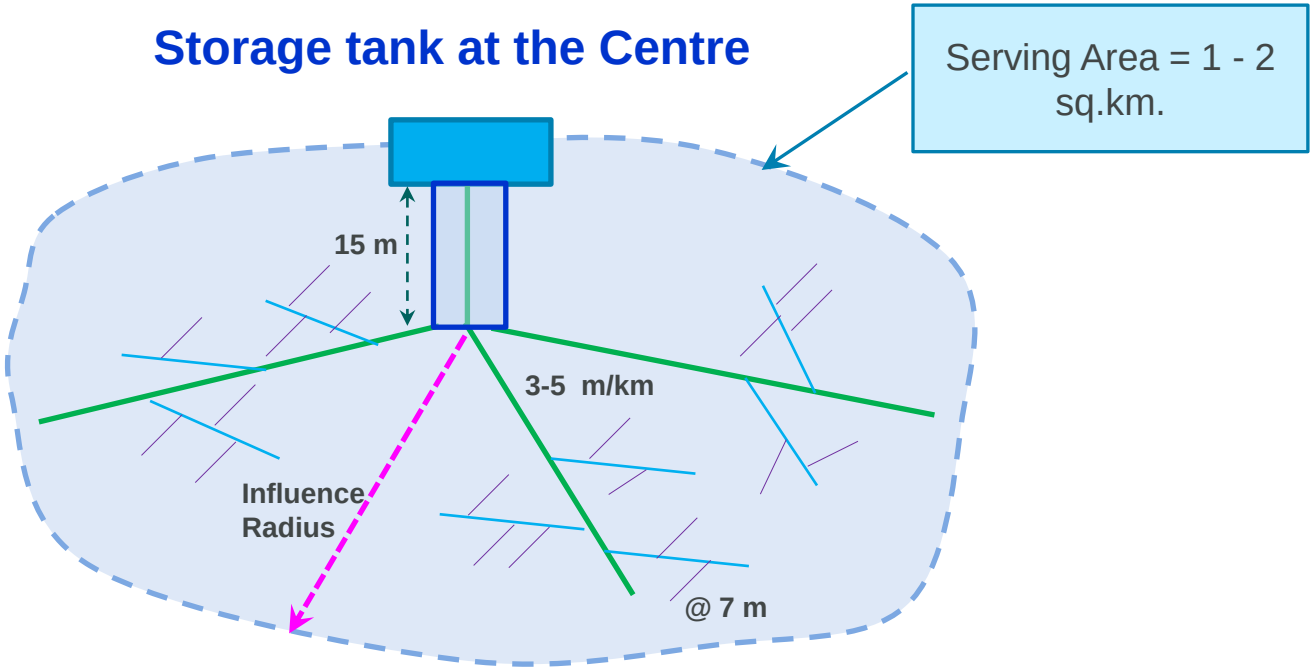
Abstract

Listen

The design and operational practice of water supply schemes (WSSs) in India is discussed in the context of the prevailing performance of the systems. Issues such as the tremendous gap in design and operation, unskilled manpower, and unmanageably large operation zones are identified as the main causes of the failure of WSSs in India. The failure of large-scale infrastructure creation in meeting service requirements is also discussed. The optimum scale of operation is estimated based on the ideal design and prevailing population densities in India. This work proposes a decentralized infrastructure approach through the use of multi-outlet tanks, shafts and manifolds. Each of these components is described in detail, and the manner in which these will help improve the current operation of WSSs in India is documented. Specifically, multi-outlet tanks will help achieve a design that enables the establishment of district metering areas for water distribution, shafts will serve as hydraulic separators between subzones, and manifolds will achieve a controlled water supply at various stages of the WSSs. These simple low-cost components will help to achieve water supply operations with minimal need for human intervention and automation.

https://iwaponline.com/aqua/article/68/4/295/66922/decentralized-infrastructure-approach-for

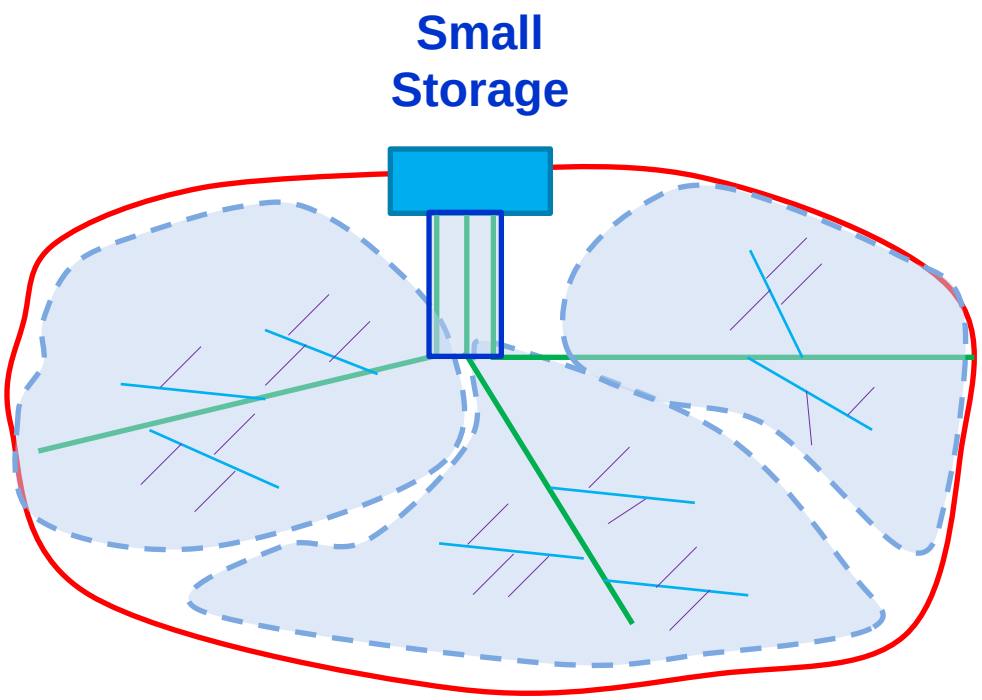
WHAT IS THE INFLUENCE ZONE OF THE RESERVOIR?



Kalbar P. P. and Gokhale P. N. (2019) Decentralized infrastructure approach for successful water supply systems in India: use of multi-outlet tanks, shafts and manifolds ***Journal of Water Supply: Research and Technology-Aqua***. https://doi.org/10.2166/aqua.2019.158

SMALL SCALE DECENTRALIZED INFRASTRUCTURES FOR WATER PROVISION

- Present design practice is bigger size of storage reservoirs (e.g. 1 to 5 ML storage



- **Have small storage tanks in the system**
- **This will help maintaining influence zone of the tank**
- **This will mimic the situation of having the storage at the roof of the consumer – reaching the consumer is key**
- **This will help in dampening of the peak demand on distribution and help in achieve better pressure management**

RESULTS – OPERATIONAL BENEFITS

- Design enable zoning
- Improved operation in mixed land use setting
- Varying ground elevation

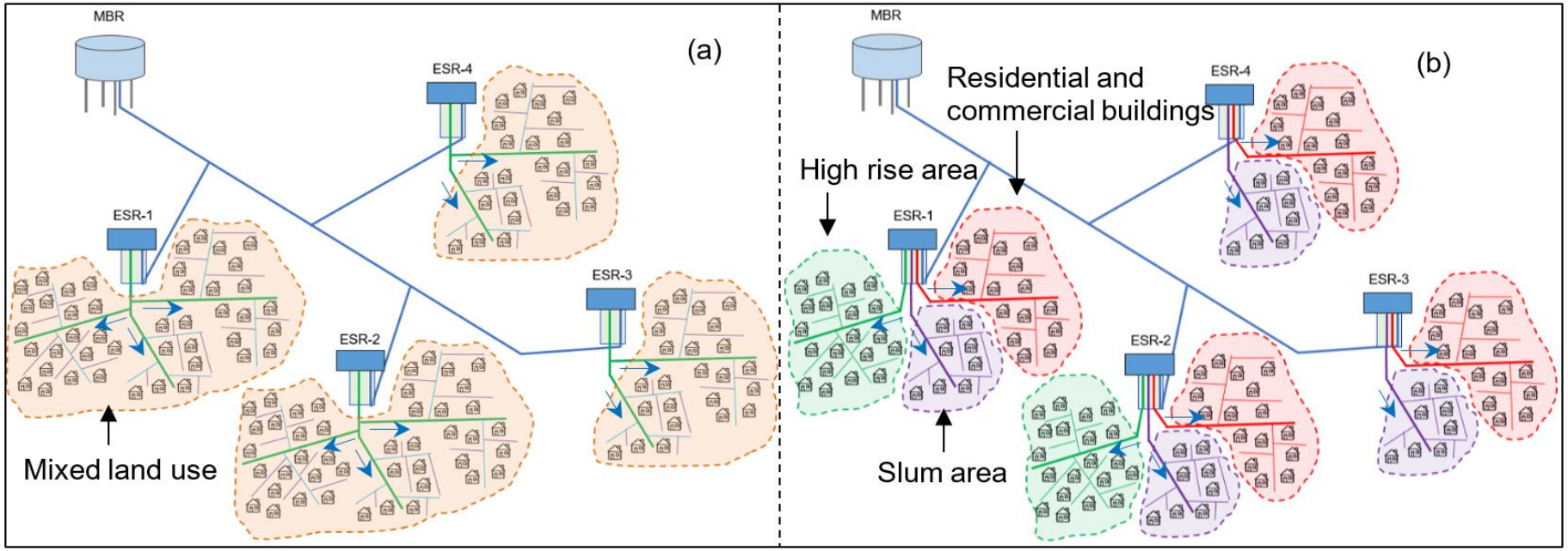
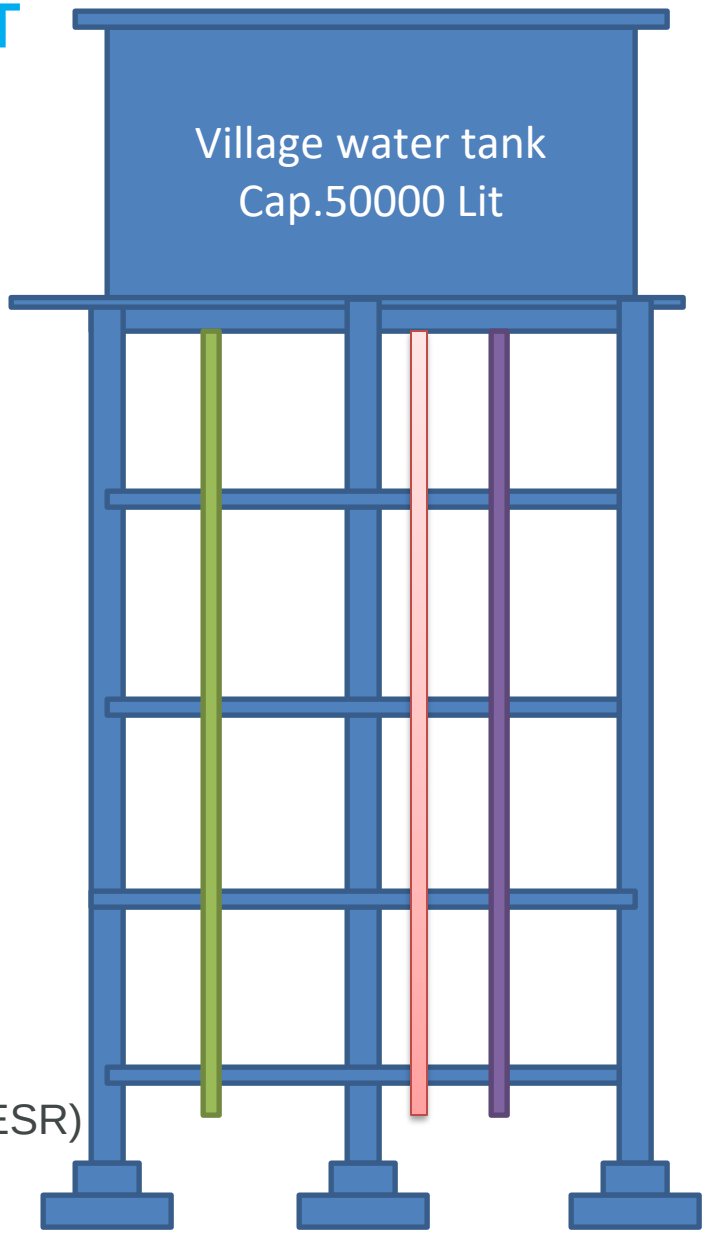


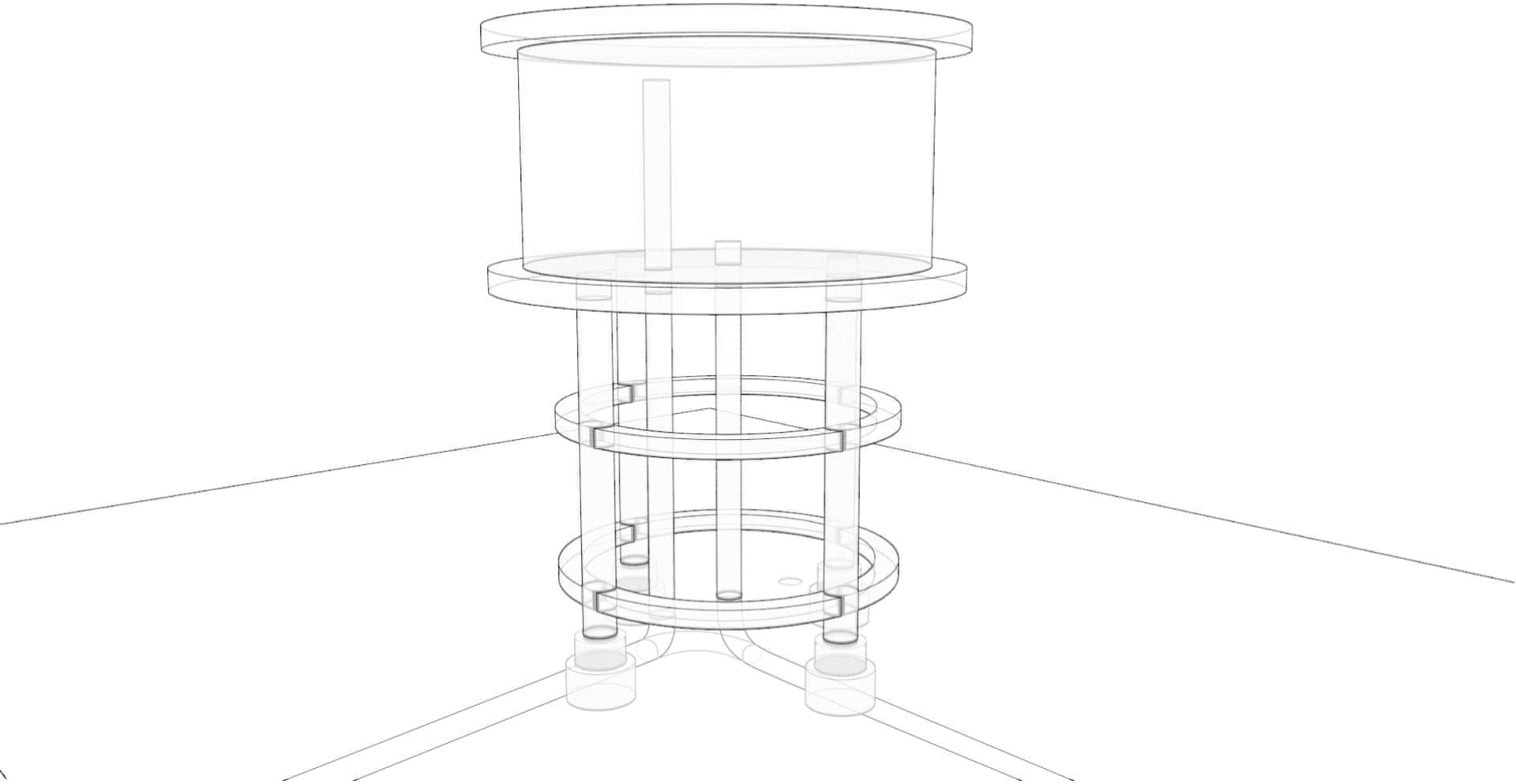
Figure: (a) Single outlet and (b) Multi-outlet storage tank arrangement. MBR- Master Balancing Reservoir, ESR-Elevated Storage Reservoir.

(Ghorpade, Sinha, Kalbar, 2021, Under Review)

ESR TO SHAFT

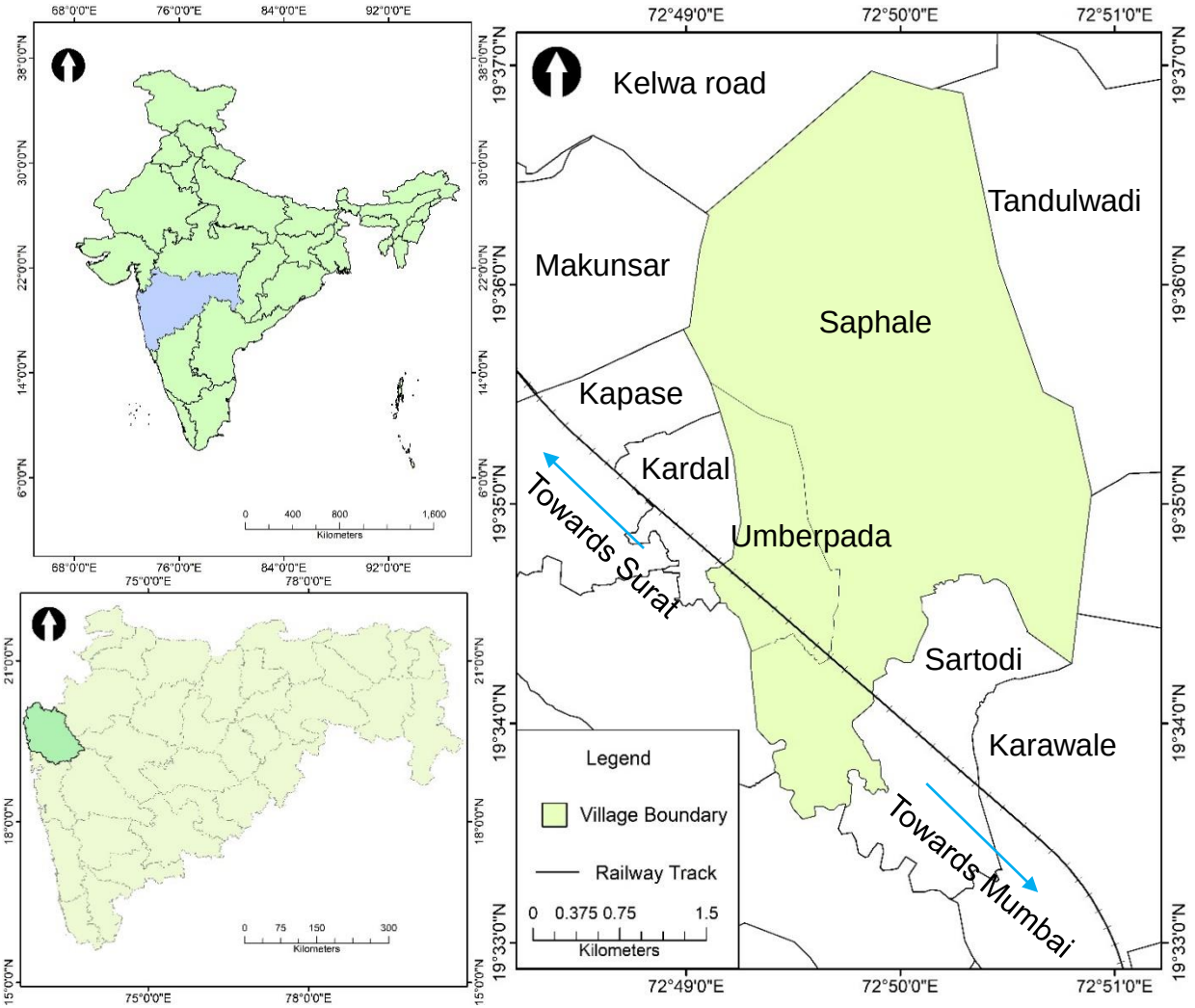


Elevated Storage Reservoir (ESR)

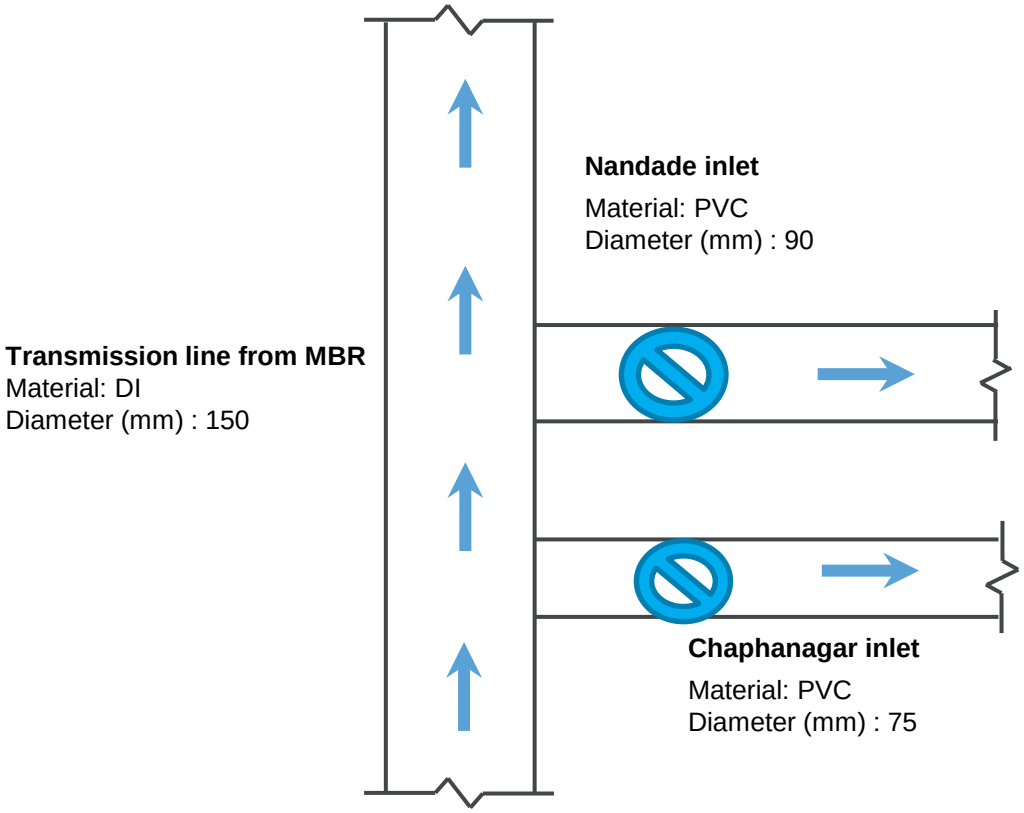


STUDY AREA

- Umberpada-Saphale is in Palghar district of Maharashtra
- Present population about 20000
- Water supply scheme is part of Umberpada-Nandade and 17 village Rural Regional water supply scheme
- Karawale dam is the source for the scheme



CURRENT OPERATION IN THE PROJECT AREA



(Figure not to scale)

SHAFT AT SAPHALE, PALGHAR, MAHARASHTRA, INDIA

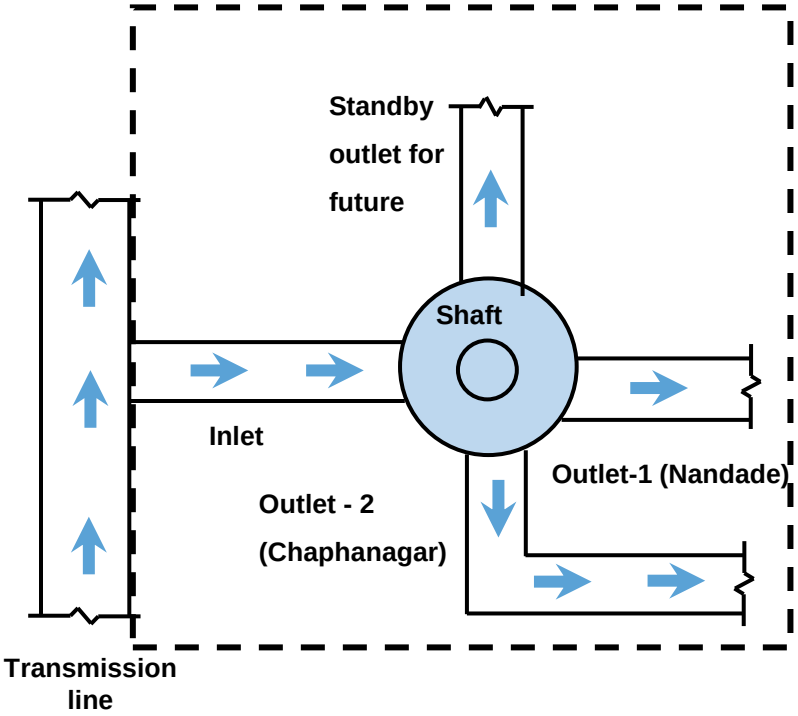


Figure: New inlet arrangement to Nandade and Chaphanagar area

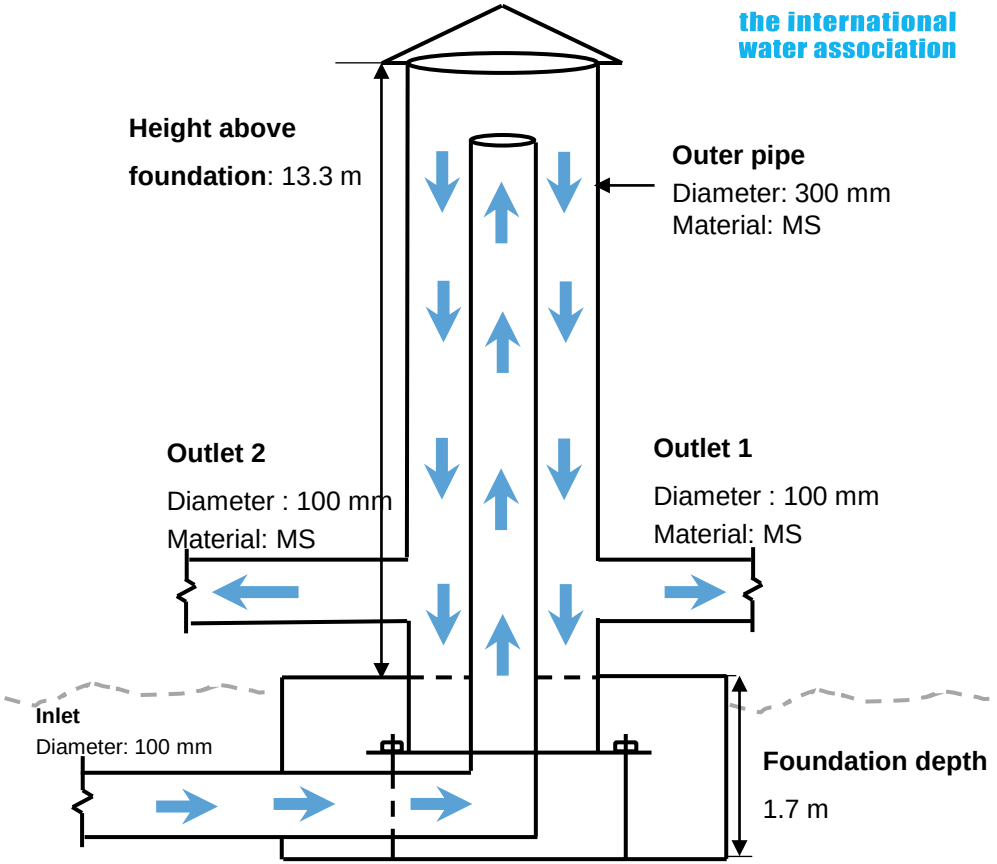


Figure: Shaft at upstream of Nandade and Chaphanagar area

(Figures not to scale)


2020/11/9 16:33

Research Funded by

Department of Science and Technology (DST), MoST, GoI under

Water Technology Initiative (WTI-2017-19) for

Demand Driven Convergent Water Solutions in Mission mode


2020/12/29 18:12

IIT BOMBAY TEAM @WORK

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W-11015/4/2020-JJM-IV-DDWS
Government of India
Ministry of Jal Shakti
Department of Drinking Water and Sanitation
(National Jal Jeevan Mission)
****

12th Floor, Pt. Deendayal Antyodaya Bhawan,
CGO Complex, Lodhi Road,
New Delhi-110003
Date:27April, 2020

To,
The Principal Secretary / Secretary
In-Charge of Rural Drinking Water Supply,
All State & UTs

Subject: - Low-cost interventions useful for the Har Ghar Jal Programme, under the Jal Jeevan Mission

Sir,

This is to draw your kind attention towards the field relevant Research & Development (R&D) of interventions in the water supply and liquid waste management conducted by Dr. Pradip Kalbar, Assistant Professor, Centre for Urban Science and Engineering, IIT Bombay in collaborating with Urban Local Bodies (ULBs) and Government Departments. The summary of the above mentioned intervention is enclosed for ready reference

The above mentioned R&D seems to be quite innovative and useful for the State Government to follow. Therefore, the brief comments of this Department on the interventions of Dr. Pradip Kalbar, are enclosed at **Annexure.I** for kind perusal. The states are requested to examine the innovations further and share any practical application that they might implement in field, with the ministry.

Encl.: As above

Yours sincerely,

27/4/2020

(Pradeep Singh)
Director
Email.: pradeep.singh78@gov.in

Copy to (for information) :

Dr. Pradip Kalbar, Assistant Professor, Centre for Urban Science and Engineering, IIT Bombay.

The low cost interventions of interventions in the water supply and liquid waste management conducted by IIT-Bombay have been examined and the observations are as below:-

1. Small scale tanks

Need: The current practice is to create huge storage tanks at one location which provides an opportunity to the Operator to extend the distribution network infinitely. This makes it impossible to track the network and attribute to the respective storage tank. Typically the OHSR/ESR tank is kept at a height of 12-15m so as to provide a pressure head of at least 7m at the ferrule point. Capacity of storage tanks vary from 0.1 to 2.5 ML.

Utility: In rural areas, it does not have much application as tanks are already small. However, in the prei-urban areas, there is possibility of implementing small storage tanks.

2. Multi-outlet tanks

Need: Present practice follow providing only one outlet. This creates uneven and unequal distribution of water where there is mixed land use and differently elevated areas. In some part of the network, water will not reach.

Utility: Multi-outlet tanks in rural and peri-urban areas can help in tackling differently elevated areas and plan for future expansion which is the need to address the urbanization effects. Multi-outlet tanks dampen the peak demand and hence optimizing investment.

3. Manifolds

Need: Manifolds are basically a pipe-valve arrangement. The inlet and outlet diameter are the same. The inlet diameter is distributed into 3 pipe-valve systems, typically the 1/3rd area of the pipe. There are two ends for the drum systems. The system is initially closed by valves, so that pressure exists on the incoming side. Once the valves are opened, the pressure will be reduced till the pipeline is filled. Such a stabilized manifold system has tendency to auto-balance in the optimal range of diurnal and seasonal variations of flows. The water supply schemes are typically designed for 30 years for peak flow conditions and hence there needs to be some control on the withdrawal in the initial period. However, in practice, due to poor O&M practice, there is no control on withdrawal and hence the design flows do not exist in the field and unequal distribution at both transmission level and distribution level occurs.

Utility: Manifold will be useful in multi-village schemes and for peri-urban area schemes for transmission side (bulk water supply). This will avoid the partial flowing of water in the pipeline and maintain the designed velocity.

4. Shafts

Need: Shafts are basically a vertical pipeline structure with the top of the pipe open to sky. The height of the shaft will be dependent on the inlet velocity of water and the characteristics of the outlet. Shafts basically act as directed storage near the consumer and help in matching the demand pattern resulting in peak dampening. Typically, in water supply systems, there is excess

pressure in some parts of the network. There is also need for a hydraulic barrier between the supply side and demand side. The big storage tanks provided usually are not fully utilized in intermittent water supply regime. Additionally due to paucity of space or lack of funds, storage tanks are not possible to construct at every location.

Utility: In rural and peri-urban areas, shafts can serve as an alternative to storage tanks, which is a low cost solution. Shaft can also be used for tackling water hammer effect in transmission side.

5. Non-mechanized water treatment plants

Need: Majority of conventional mechanized water treatment plants in rural and remote areas fail due to poor O&M, lack of skilled labour and/or lack of funds for O&M.

Utility: The non-mechanized water treatment plants will be a better alternative in rural and peri-urban areas. The use of vortex (instead of flash mixer and flocculation) and plain sedimentation (instead of clarifier) will avoid mechanization and use of energy during the operation. One such plant is under operation at Dhamangaon in Maharashtra.

6. Jal Tantra

Need: The water supply schemes need to be designed optimally due to heavy investments. There are many commercial tools for optimization of water supply network. However, either they are very costly or very complex. Hence there is a need for low cost and Indian conditions specific tool.

Utility: IIT-Bombay has developed JalTantra tool, which is a free for all open source tool for optimization of water supply schemes. Current version of this tool is very useful for designing rural water supply schemes and Government bodies in Maharashtra State are already using it.

7. Pipe in pipe (master piece)

Need: The water supply network require pressure management as there can be undulations in the ground. There is need to dissipate the excess head at some locations to manage the pressure in the network.

Utility: A simple Pipe in pipe (master piece) can be a very effective long term solution for reducing the pressure in the transmission and distribution networks. In this intervention, a small diameter pipe is inserted into a large diameter pipe for a short length of 1-5m. The void between the piped is filled with concrete. The smaller diameter pipe induce head loss in the pipeline and acts as spring (more the discharge, more is the head loss and vice versa).

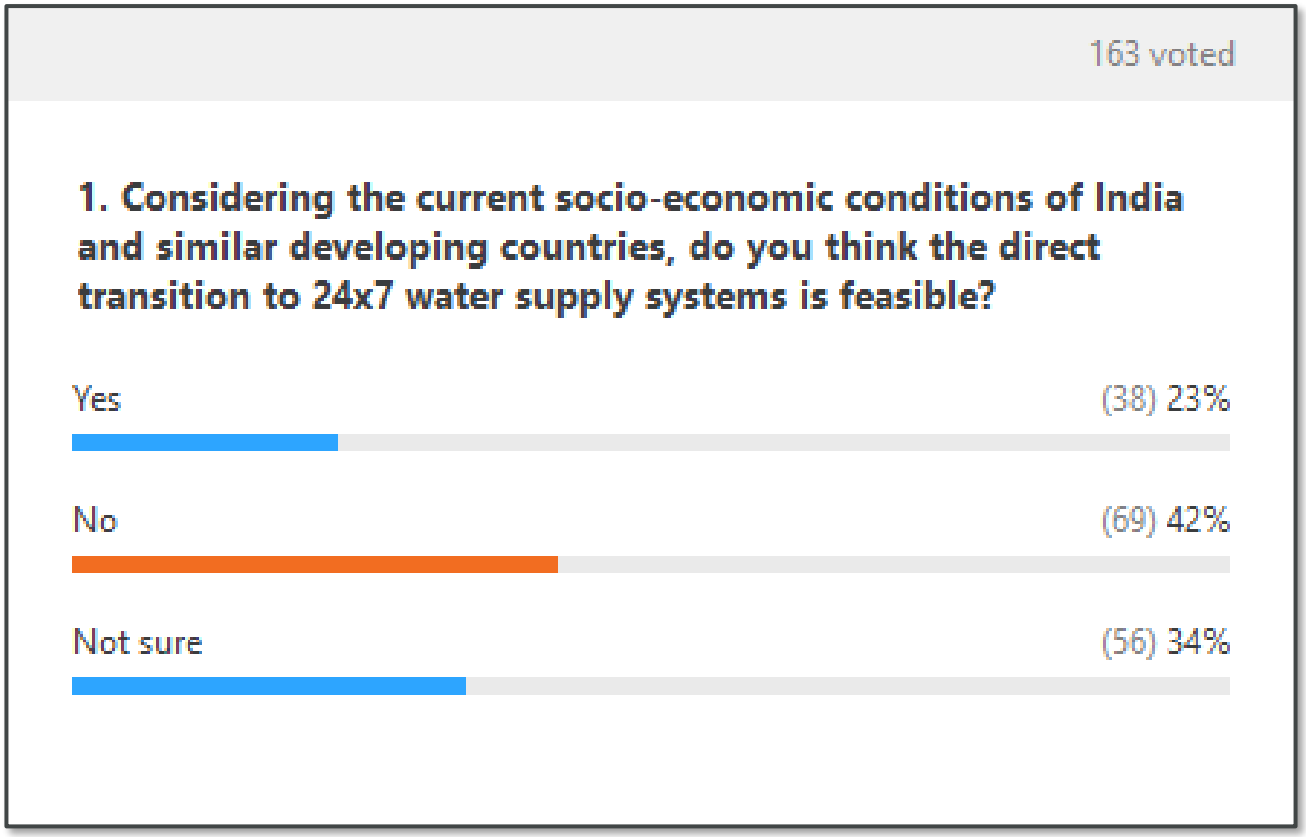
POLL 2: FEASIBILITY OF 24X7 TRANSITION

Single choice

1. Considering the current socio-economic conditions of India and similar developing countries, do you think the direct transition to 24x7 water supply systems is feasible?

- Yes
- No
- Not sure

POLL 2: FEASIBILITY OF 24X7 TRANSITION



Download related papers and documents using this link:
https://tinyurl.com/IITBWater1

Looking forward to collaborate to make more replications!

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Sri Lanka: The Challenges of Transitioning to 24x7 Supply

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NWSDB Project Manager
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(2008-2012)

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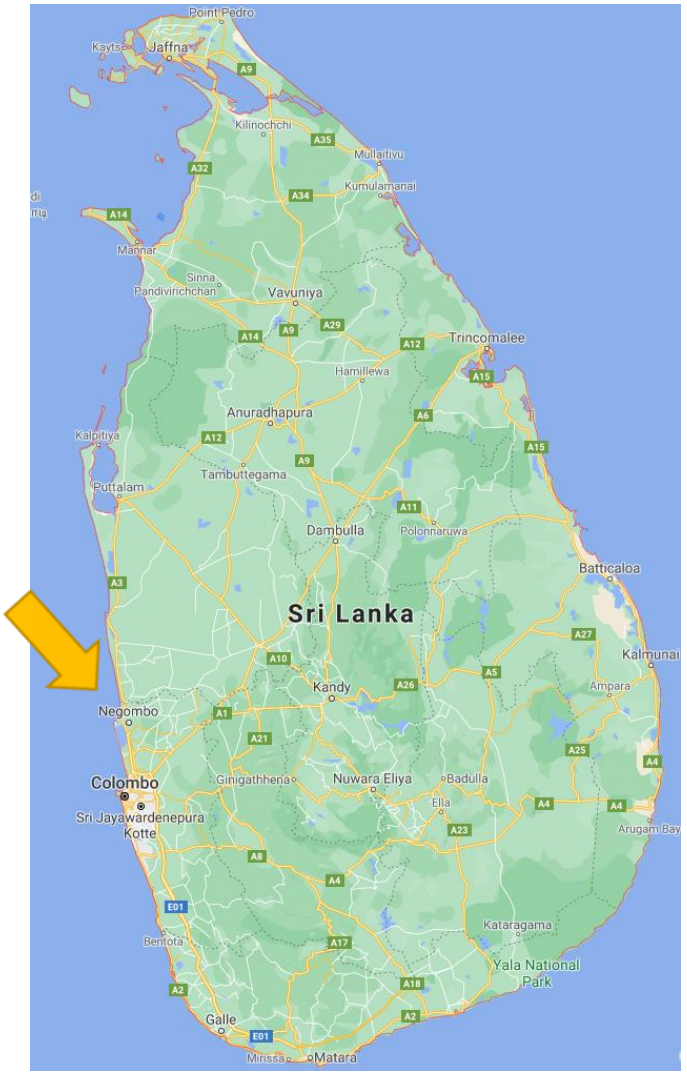
Distribution Engineer
Negombo Water Supply Project
(2008-2012)

NEGOMBO WATER SUPPLY– SRI LANKA

- National Water Supply and Drainage Board (NWSDB)– National Supplier

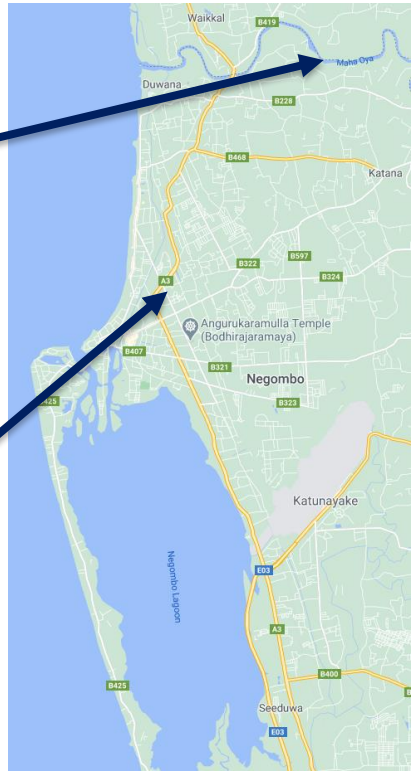
- Negombo, Western Province, 40km north of commercial capital Colombo

- Approx. 148,000 population in Negombo Municipal County Council (MCC) Area



NEGOMBO WATER SUPPLY – PRIOR TO 2011

- 24 MLD WTP at Bambukuliya on Maha Oya River
- WTP not operating at full capacity due to issues with transmission mains (Approx. 20 MLD being transmitted)
- Water supplied to Pumping Station via dual 18” CI and 450 DI transmission mains
- Onward supply to 4 Elevated Water Towers and Katunayake Ground Reservoir (Airport/Free Trade Zone)



NEGOMBO WATER SUPPLY – PRIOR TO 2011

- 8 hours supply time each day per Tank fed Zone
- Around 18k connections [Nov 2009]
- Around 59%* of Negombo MCC area connected to mains supply
- Unconnected customers used private borehole supplies, public standpipes [52 in operation] and water sharing between consumers

* Addition of Kochichikade Town to Negombo WSS not included in this figure

NEGOMBO WATER SUPPLY – PRIOR TO 2011

- ‘New connections’ stopped until WSS augmentation occurred
- Low Residual Pressures
- Water Quality – biofilm and loose deposits mobilised regularly
- Poor quality of repairs
- Badly tuberculated mains in some areas
- Customer complaints due to meters reading ‘air’
- ‘Reactive’ leakage repairs

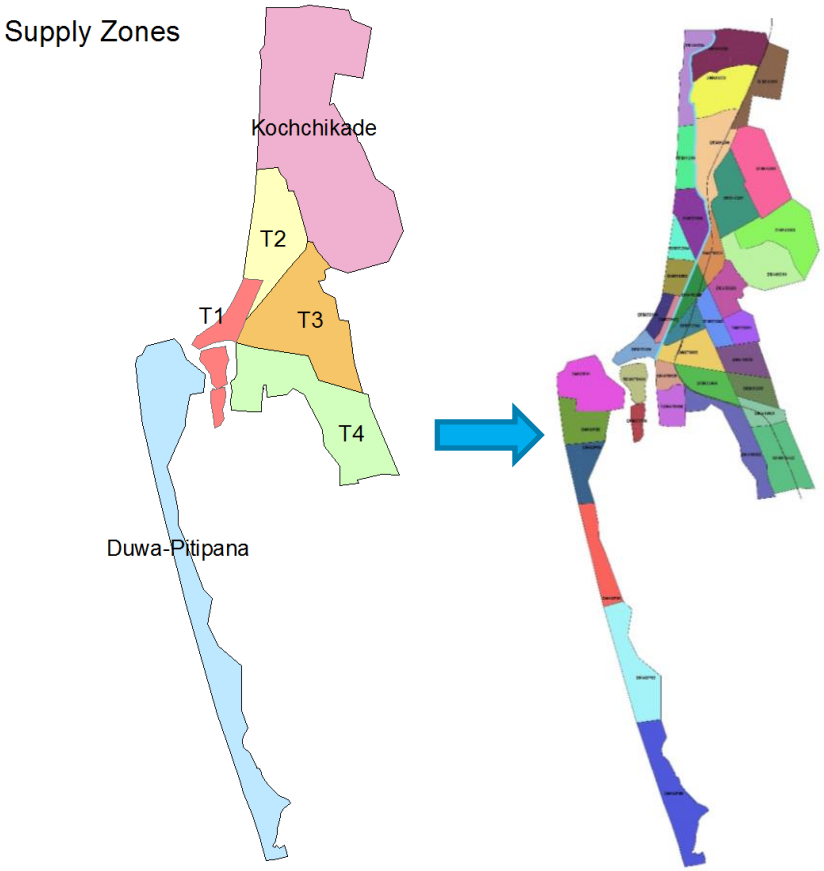
- Issue of ‘Economic Scarcity’ [Totsuka et al, 2004]

NEGOMBO WS PROJECT (2008-2012)

- US$53 Million “Negombo Water Supply Project”
  - Funded by FMO and ORET, Netherlands
  - Loan (54%) / Grant (46%)
  - Executed by Biwater
- Expand WTP (to 36 MLD)
- New High Level Inlet Pumps / Distribution Pumps
- Expand catchment area
- Additional supply connection from Kelani Right Bank WTW (Colombo North)
- Existing network replacement and expansion (200km)
- Intermittent water supply to 24/7
- Adoption of Asset Management ‘best practice’ for management of WSS
- Setup 3 ‘Trial DMAs’ to train NWSDB Team
- Creation of Distribution Management Office to proactively manage network

NEGOMBO WS PROJECT (2008-2012)

- Optimised Hydraulic Structure put in place (6 WSZs)
- Each WSZ sub-zoned into DMAs
- NWSDB Distribution Management Team
  - GIS Basemap and digitisation of assets / customers
  - Modelling of WSS
  - DMA Establishment and Operation (3 Trial DMAs)
  - ‘Active Leak Detection’



NEGOMBO WS PROJECT (2008-2012)

- Transition to 24/7 Supply Network
  - 50% of network - June 2011
  - 75% of network - July 2011
  - 100% of network – August 2011
  - Remaining network extensions to be laid over next few years
- Intermittent to 24/7 Supply in Trial DMAs
  - Significant increase in reported leaks
  - 76 l/conn/day -> 256 l/conn/day increase
  - Customer billing complaint increase
  - WQ - Water discoloration complaint increase

Month	% of Network under Continuous Supply	Leaks Reported	Leaks Repaired
April 2011	0%	145	145
May 2011	0%	268	268
June 2011	50%	468	345
July 2011	75%	428	296

NEGOMBO WS PROJECT (2008-2012)

Project Achievements

- WTP capacity increased to 36 MLD
- New connections now given
- New supply area(s) network being laid
- Transition to 100% 24/7 Water Supply for Negombo Municipal Council area well under way
- NWSDB Distribution Management team fully trained
- Various Challenges in post ‘project’ phase

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New Project facilitates 24hr water supply to Negombo MC area

Like Share Sign Up to see what your friends like. Tweet

Details *Published on Wednesday, 21 September 2011 15:28 Hits: 777*

Basil Rajapaksa, Minister of Economic development declared open the Negombo Water Supply & Optimization Project at Kochchikade, Bambukuliya yesterday.

The project which commenced in 2008 is financed by the Government of Netherlands with an assistance of Euro 36.3 million (Rs. 5775) of which nearly 46% is a grant. Government of Sri Lanka contributed Rs. 1513 million. The total cost of the project is Rs. 7288 million.

Negombo's economy is mainly based on tourism and fishing industry as well as producing cinnamon, ceramics and brassware. The population within the MC area is about 148,000. The present coverage of piped water in the MC area is about 59% and the water supply to most areas is restricted daily from 8.00 am to 3.00 pm due to inadequate water treatment technology and infrastructure.

NEGOMBO WS PROJECT – MARCH 2021

- March 2021
  - Nearly 40k connections in Negombo WSS [Project 2025 demand forecast was circa 41k]
  - 24/7 Supply maintained in system
  - Some customers still using private borehole supplies
  - Additional expansion of Negombo WSS catchment area
  - 75% of Negombo WSS expanded catchment area have water connections with new connections being given
  - Still around 27 standpipes in operation but revenue received
  - Unknown availability of supply from Kelani Right Bank WTW to Negombo
  - NWSDB Revenue increased (>100%)

NEGOMBO WS PROJECT – MARCH 2021

- March 2021
  - DMA Establishment/Operation and Leak Detection
    - Trial DMAs' no long functioning
    - Additional DMAs not established
    - No 'Active Leakage Control' teams
    - Negombo WSS distribution system not 'pro-actively' managed
  - Current NRW Levels in Negombo WSS
    - Currently being reported upon as 20%* of Supply Volume
      - **Unreliable KPI for NRW reporting purposes*
      - *Unable to perform IWA WB Methodology across WSS at this time*

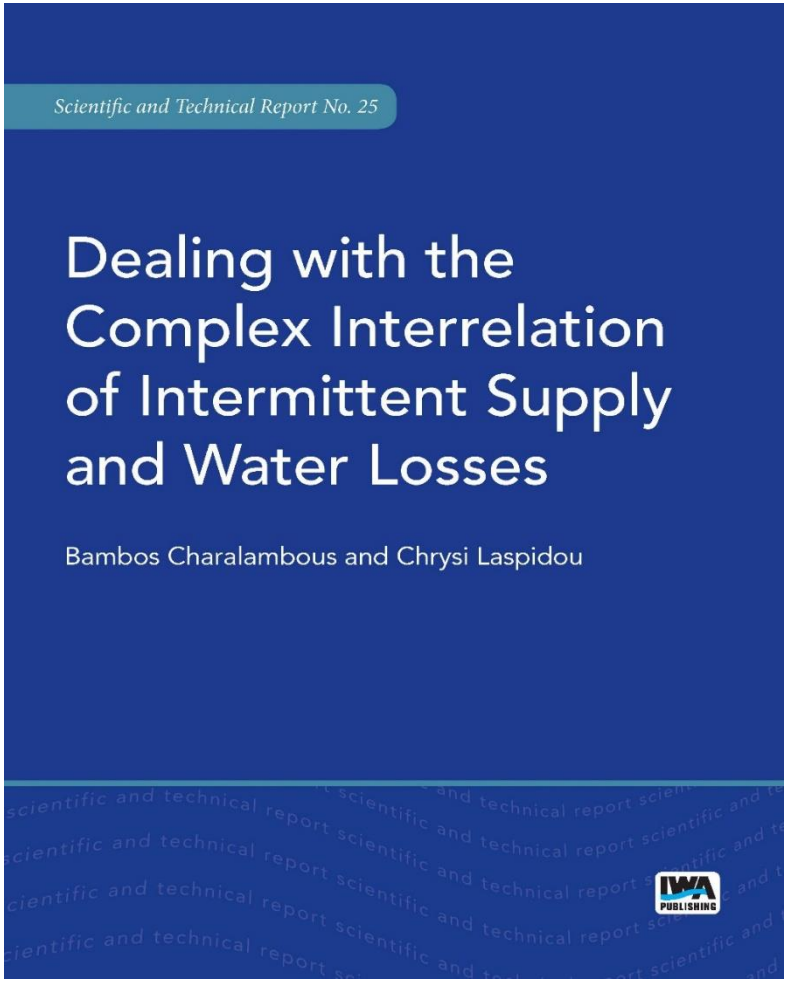
NEGOMBO WS PROJECT – MARCH 2021

- Post Project Review – 10yrs later
  - Experienced staff trained during project phase transferred out without being replaced
  - Some functions of NWSDB Distribution Management Office absorbed into ‘day to day’ billing and maintenance office with others no longer being carried out
  - No additional funding to allow ‘Asset Management’ processes/procedures detailed out in project phase to continue
  - Ongoing conflict between govt agencies over access to lay new mains on newly laid road surfaces has stalled progress in some areas.

- Likely future outcome with no further action
  - If NRW levels and operational practices are not brought under control Intermittent Water Supply may return to Negombo WSS - ‘Technical Scarcity’ [Totsuka et al., 2004]

NEGOMBO WS PROJECT

- "Negombo Water Supply" Case Study is captured in "*Dealing with the Complex Interrelation of Intermittent Supply and Water Losses*" [Charalambous, Laspidou, IWA, 2017]



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General Q&A Discussion

EMILY KUMPEL, PRADIP KALBAR,
UPALI GUNENAYAKE, JAMIE PATERSON
(MODERATED BY RAZIYEH FARMANI & JOE DALTON)

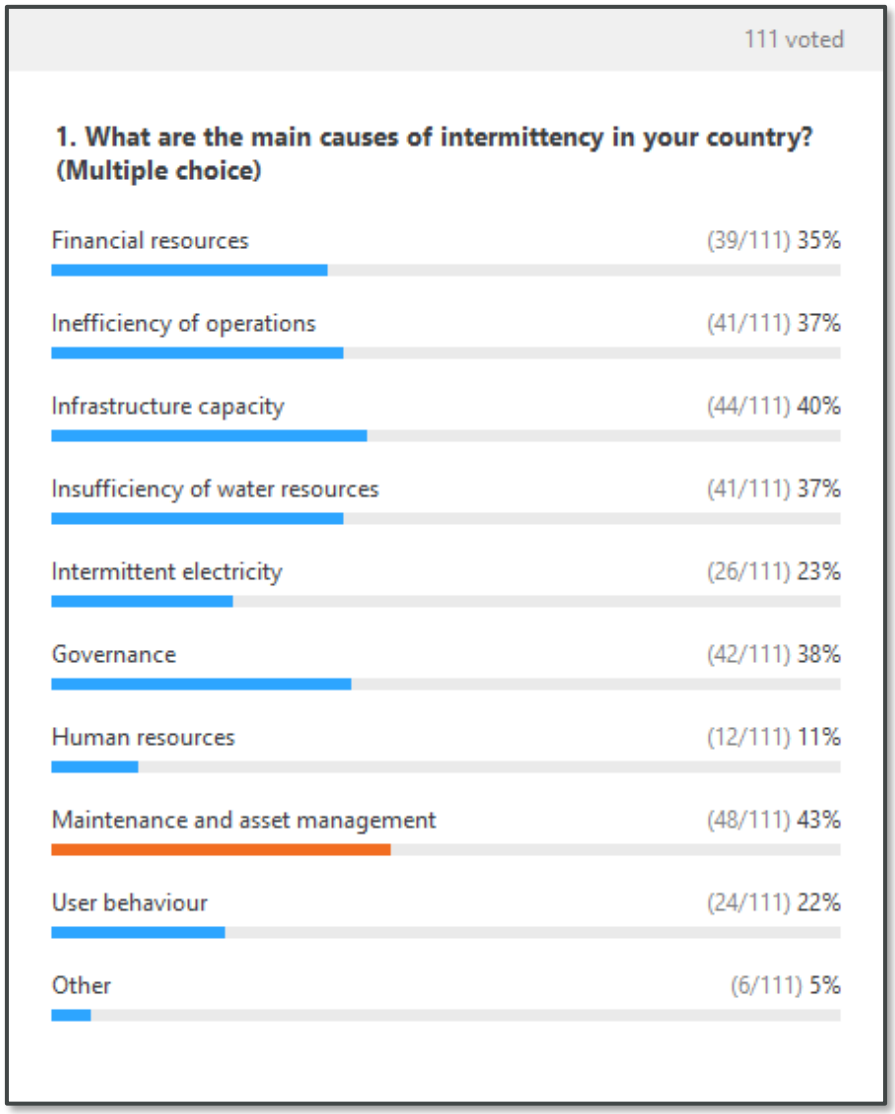
POLL 3: CAUSES OF INTERMITTENCY

Multiple choice

1. What are the main causes of intermittency in your country?

- Financial resources
- Inefficiency of operations
- Infrastructure capacity
- Insufficiency of water resources
- Intermittent electricity
- Governance
- Human resources
- Maintenance and asset management
- User behaviour
- Other

POLL 3: CAUSES OF INTERMITTENCY



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