

# WATER LOSSES AND NON-REVENUE WATER

Using O&M to reduce waste and improve efficiency

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Calcutta, India: Mother bathing child



Dubai: 2.6 million gallons of desalinated water in Wild Wadi Water Park

## A typical network



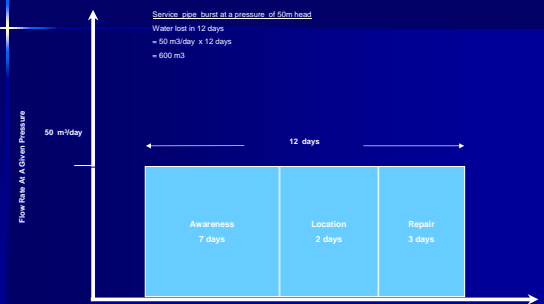
## Some Questions

- How much water is being lost?
- Where is it being lost from?
- Why is it being lost?
- How can we improve the situation?
- How can we sustain improvements made?

## How much?



## The time factor



## Where from?



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## Visible or underground?



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## Are losses real (leakage) or apparent (commercial) ?



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## Water Balance (how much and where from?)

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
		Unbilled Authorized Consumption	Billed Unmetered Consumption	
Water Losses	Real Losses	Apparent Losses	Unauthorized Consumption	Non Revenue Water
		Real Losses	Customer Meter Inaccuracies and Data Handling Errors	
			Leakage on Transmission and Distribution Mains	
			Leakage and Overflows at Storage Tanks	
		Leakage on Service Connections up to point of Customer Meter		

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## Why is water being lost?

### Review of network operating practices

- Management policy
- Network characteristics
- Operational practices
- Technology and skills
- Social and cultural influences



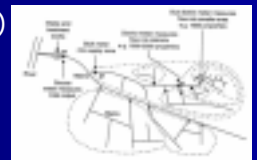
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## How to improve?

### Upgrading the network

- Zoning (sectorization)
- Monitoring points
- District Meter Areas (DMAs)
- Pressure management
- Network records
- Pilot areas



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## Network records and recording systems

- Update network plans and records
- Pipe location survey
- GIS



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## Improving O&M

An O&M program underpins the strategy

- Repairs to pipework and fittings
- Stocks of spare parts
- Meter testing, maintenance and repair
- Good housekeeping



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## Active leakage control (ALC)

- Leakage monitoring (DMAs)
- Analysis of data
- Leak detection programs:
  - leak localising (noise loggers)
  - survey (correlator/sounding)
  - leak location

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## District Metering Area

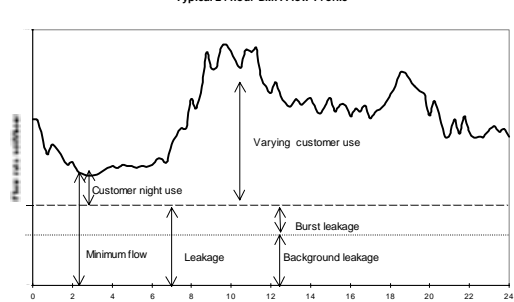


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## DMA flow profile

Typical 24 hour DMA Flow Profile

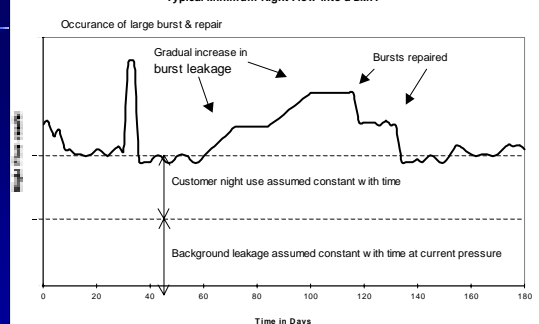


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## DMA night flow data

Typical Minimum Night Flow into a DMA



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## Leak Localising (noise loggers)



## Leak Location



## Leak Location



## Pressure management

- 'One-off' reduction in leakage
- Pressure Management Area (PMA)
- Design within DMA
- Cost beneficial
- Fast payback



## Infrastructure management and repairs



## Illegal connections, pilferage and fraud



## Customer meter under-registration

### Customer metering policy:

- Measurement accuracy
- Meter type
- Installation procedure
- In situ or workshop testing
- Customer use pattern and plumbing (tanks filling, 'trickles and drips' etc.)



## Billing and revenue collection

- **Tariff structure and charging policy**
  - political/social factors
  - encourages demand management
  - low income concerns (health/hygiene)
  - can encourage damage and bypass
- **Meter reading and revenue collection**
  - integral part of strategy
  - supervision and checks

## Maintaining and sustaining improvements

### Training and skills transfer

- O&M policy
- Workshops
- Technology transfer
- Field training



## Conclusions

- After addressing **HOW MUCH?** and **WHERE FROM?** a water loss reduction strategy can be designed to address priorities for real losses (leakage) and apparent (commercial) losses
- A review of network characteristics and management practices tells us **WHY?**
- **HOW TO IMPROVE?** and **HOW TO SUSTAIN?** can be addressed by education, training, and skills transfer, and by good O&M practices

## Further reading

