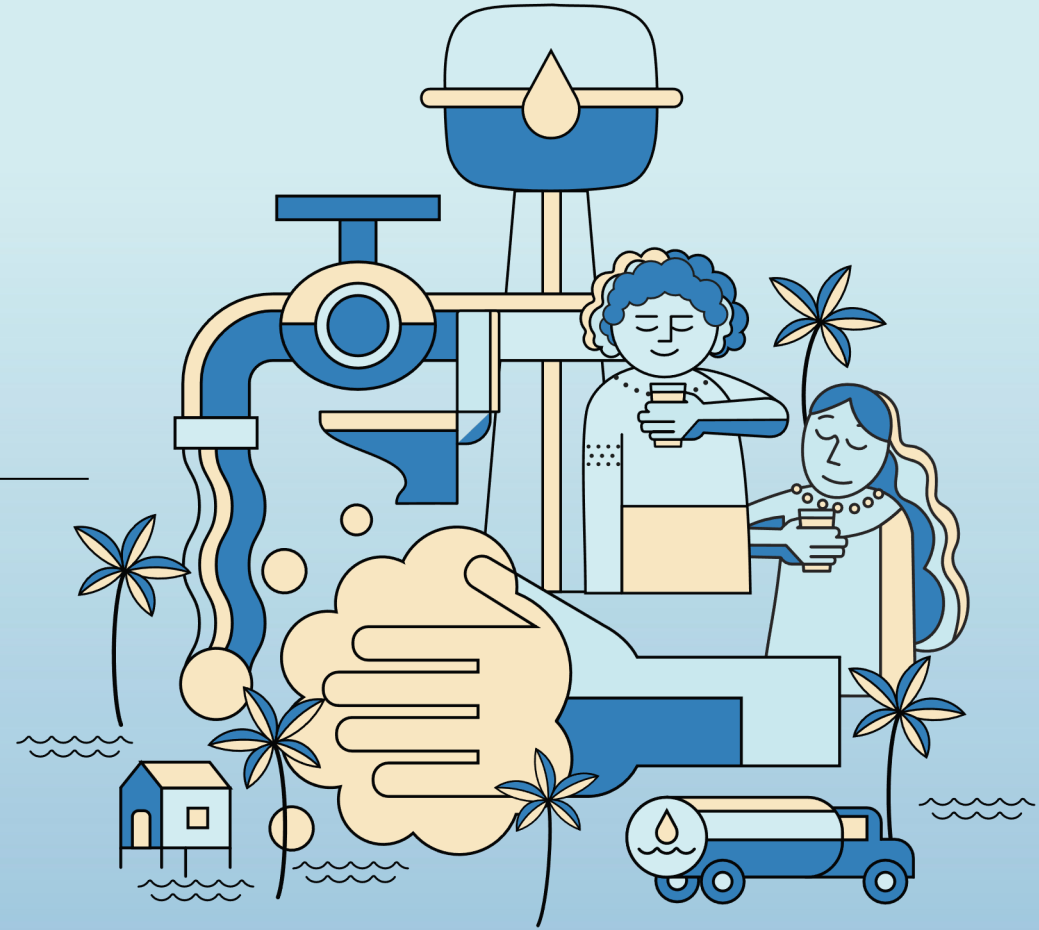


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Pacific WASH

WEBINARS



ADB



We will begin shortly.
Participants, kindly note the following for this seminar

Please rename your Zoom name to:

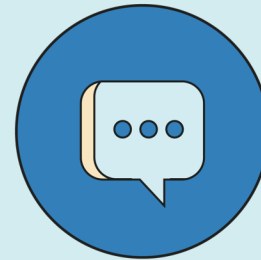
Name, Org or Project
(e.g. Las Fernando, ADB)



**Please turn your mic off
during the presentation**



**Raise hand
when you want to talk**



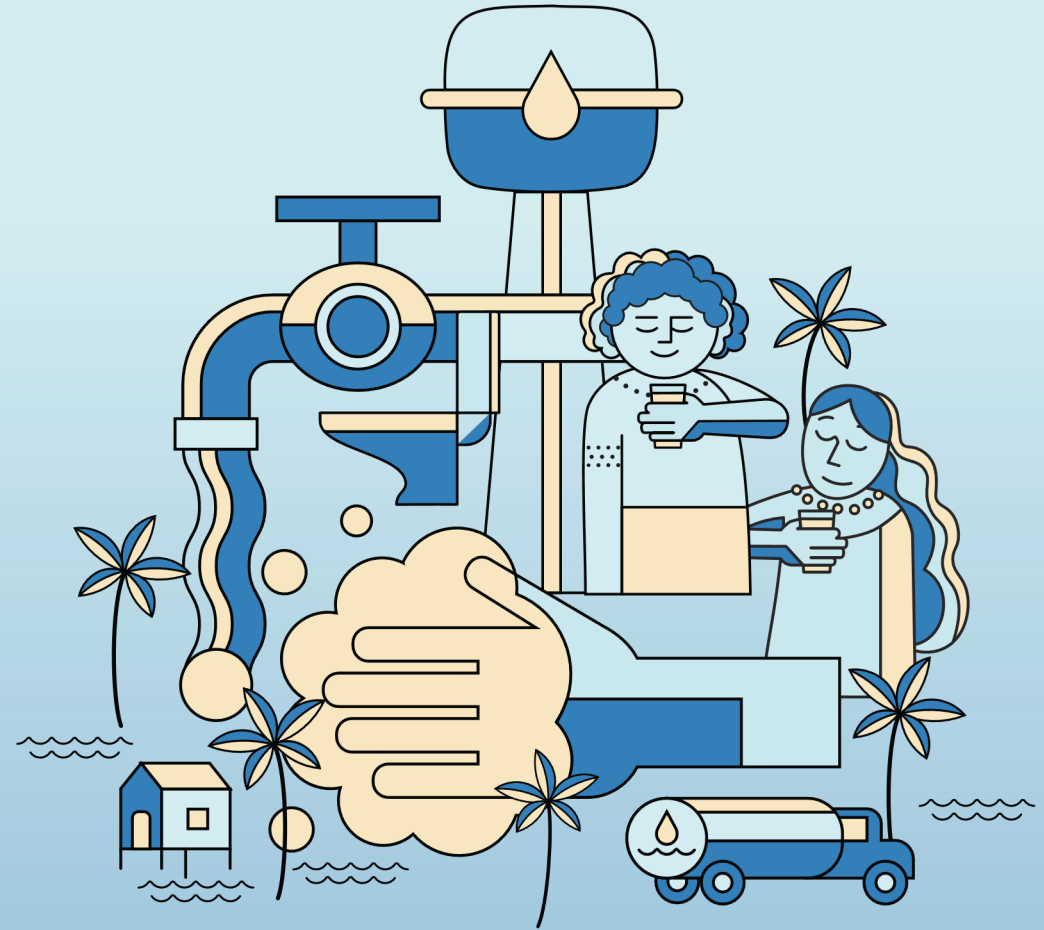
**Use the chat box
for questions/concerns**



**We have a Q&A portion
after the presentation**

Non-Revenue Water

22 March 2023



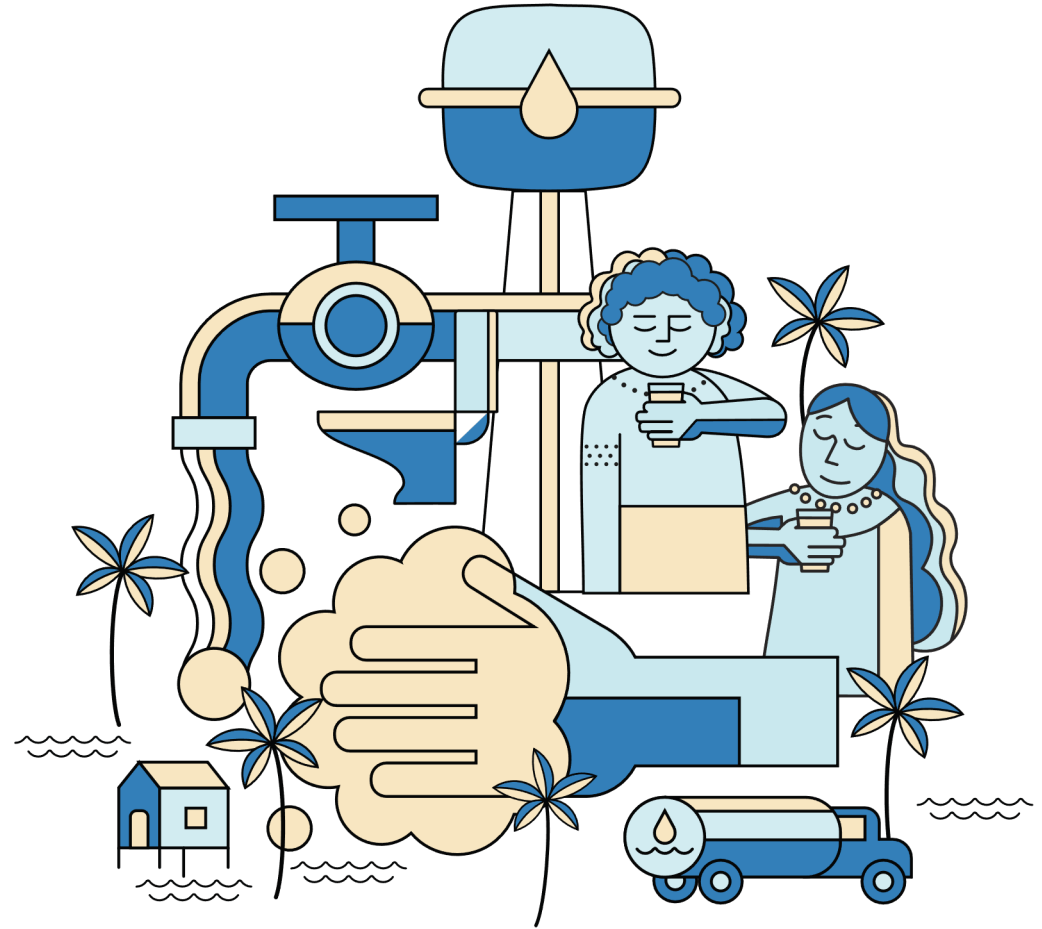
Webinar schedule

Time (ADST)	Speaker
11.00am	Welcome – Maria Tran , Senior Project Officer (Urban Development) ADB
11.05am	Opening Remarks – Leah Gutierrez , DG ADB Pacific Department & Lusia Sefo-Leau , CEO, PWWA
11.15am	Presentations: 1. Dean Taylor – Pacific WASH TA Utility Lead 2. Quddus Fielea – Deputy CEO (Engineering Manager), Tonga Water Board 3. Julius Matthes – Rural Division NRW & Leak Detection Engineer, Samoa Water Authority
12.00pm	Q&A session
12.25pm	Closing and group photo



**Welcome from Asian
Development Bank
Pacific Department
Director General**

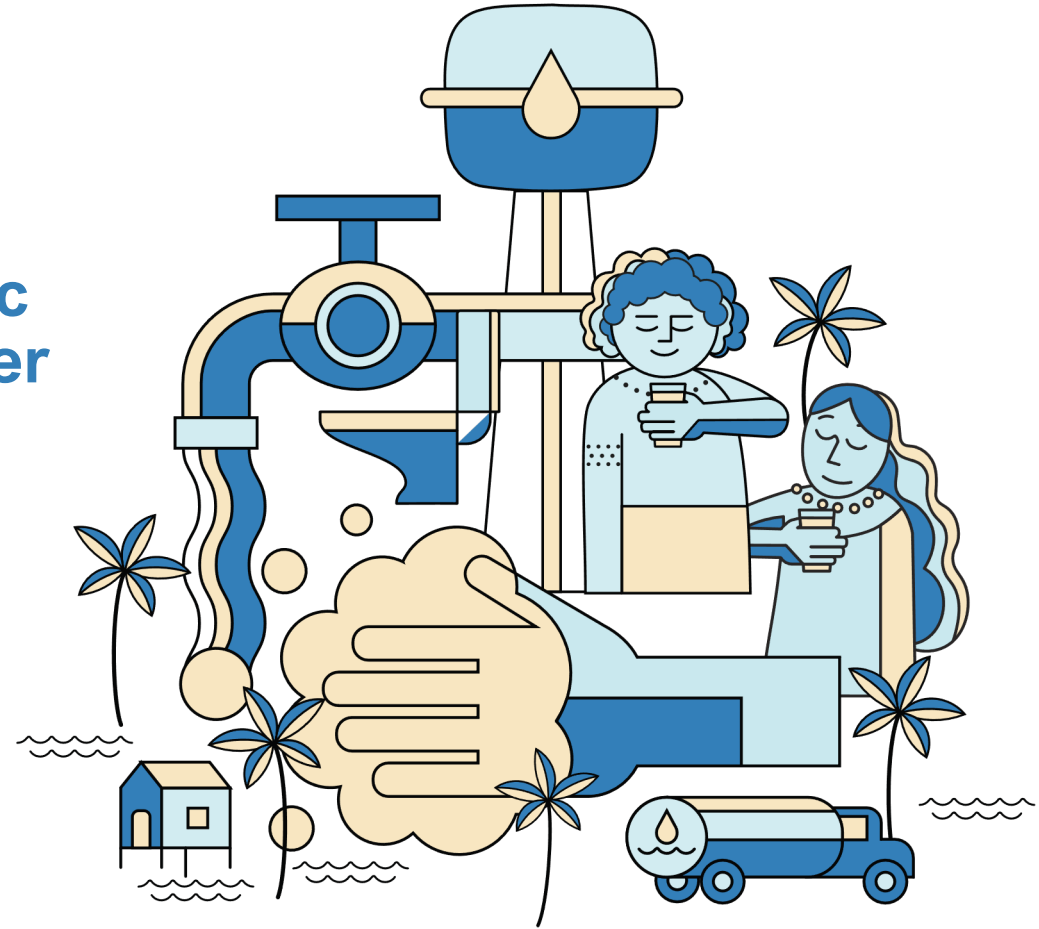
Leah Gutierrez





**Welcome from Pacific
Water and Wastewater
Association
CEO**

Lusía Sefo Leau



Introducing the Speakers



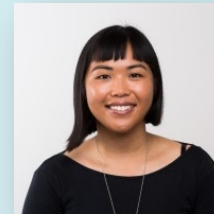
Dean Taylor
Pacific WASH TA Utility Advisor
Asian Development Bank



Quddus Fielea
Deputy CEO (Engineering Manager)
Tonga Water Board



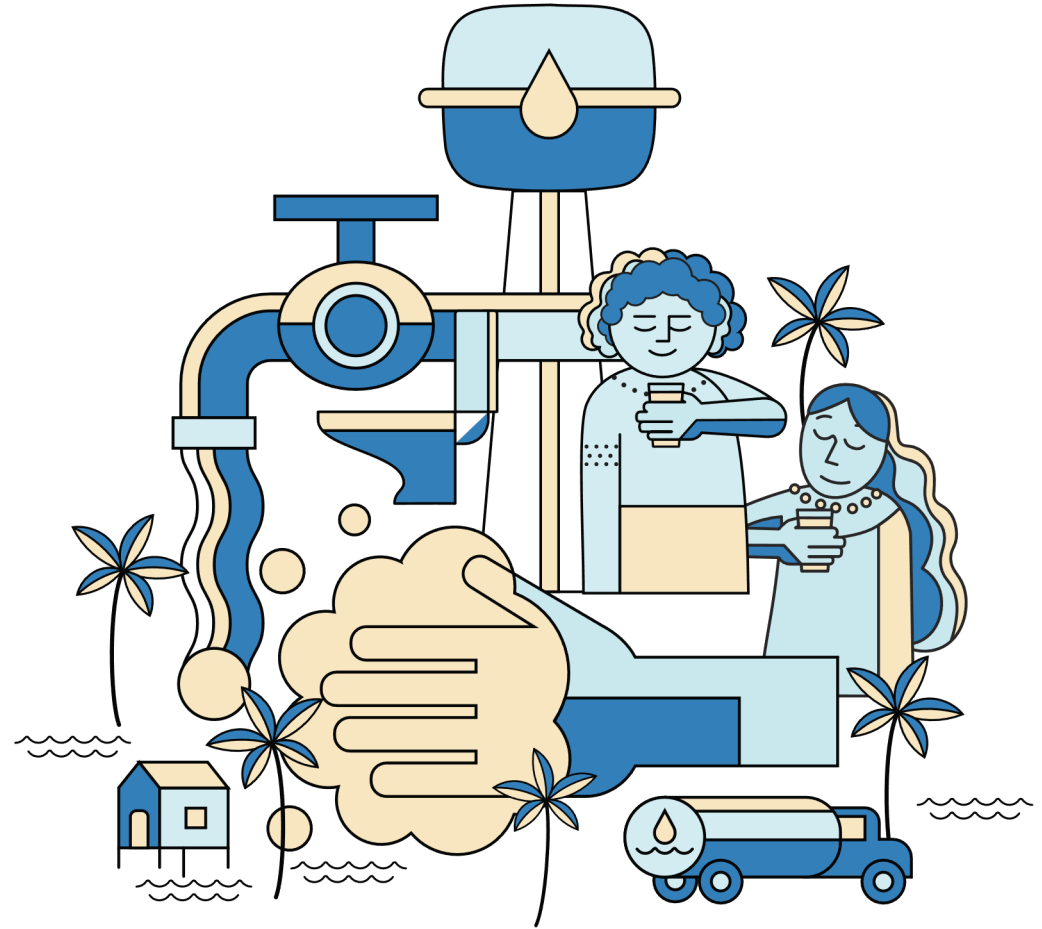
Julius Matthes
Rural Division NRW & Leak Detection
Engineer
Samoa Water Authority



Maria Tran - Facilitator
Senior Project Officer (Urban
Development)
Asian Development Bank

The Fundamentals of Non Revenue Water (NRW) Management

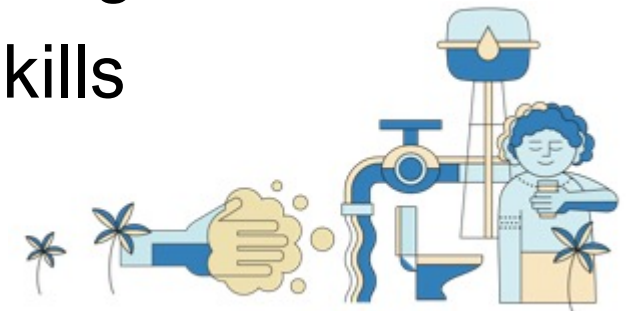
Dean Taylor





Commercial Utility Challenges

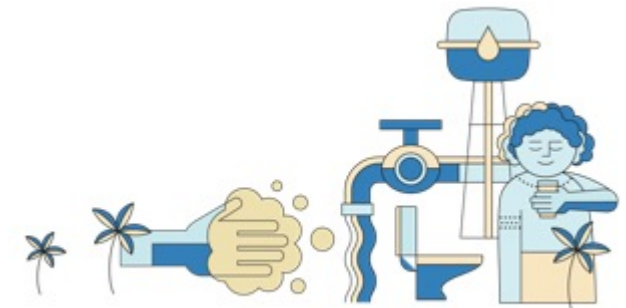
- Social issues
- Political issues
- Poor metering
- Poorly constructed and maintained assets
- Illegal use
- Rapid population growth
- Lack of NRW skills





Commercial Utility Challenges

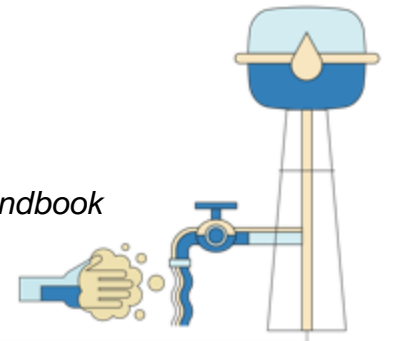
- We have to be commercially viable
- We often need to work with customers to encourage them to use less of our product!
- Some of the solutions are difficult to implement



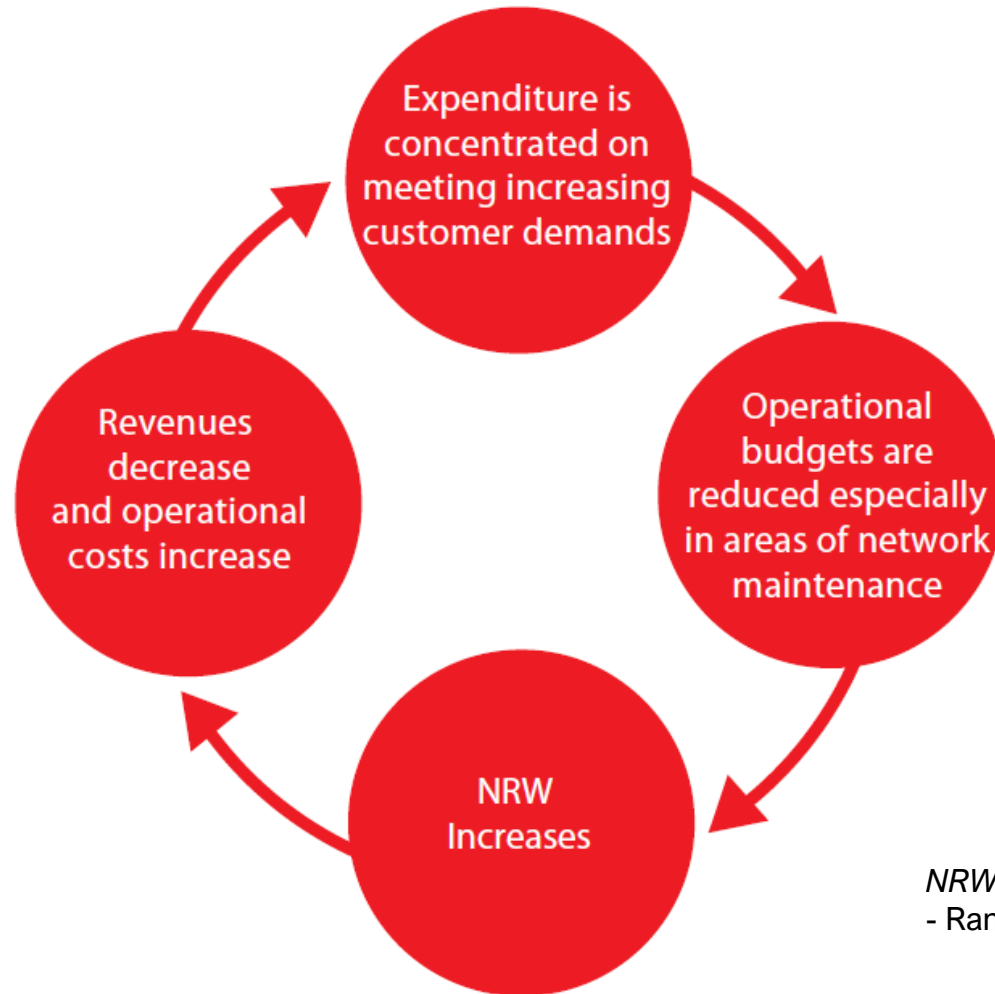
Everyone's Responsibility



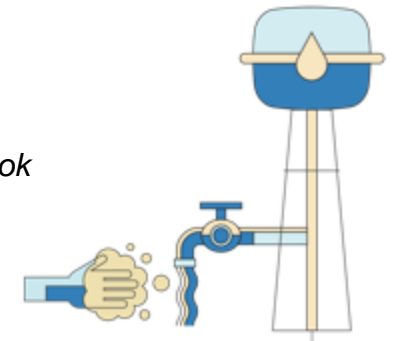
NRW Manager's Handbook
- Ranhill and USAID



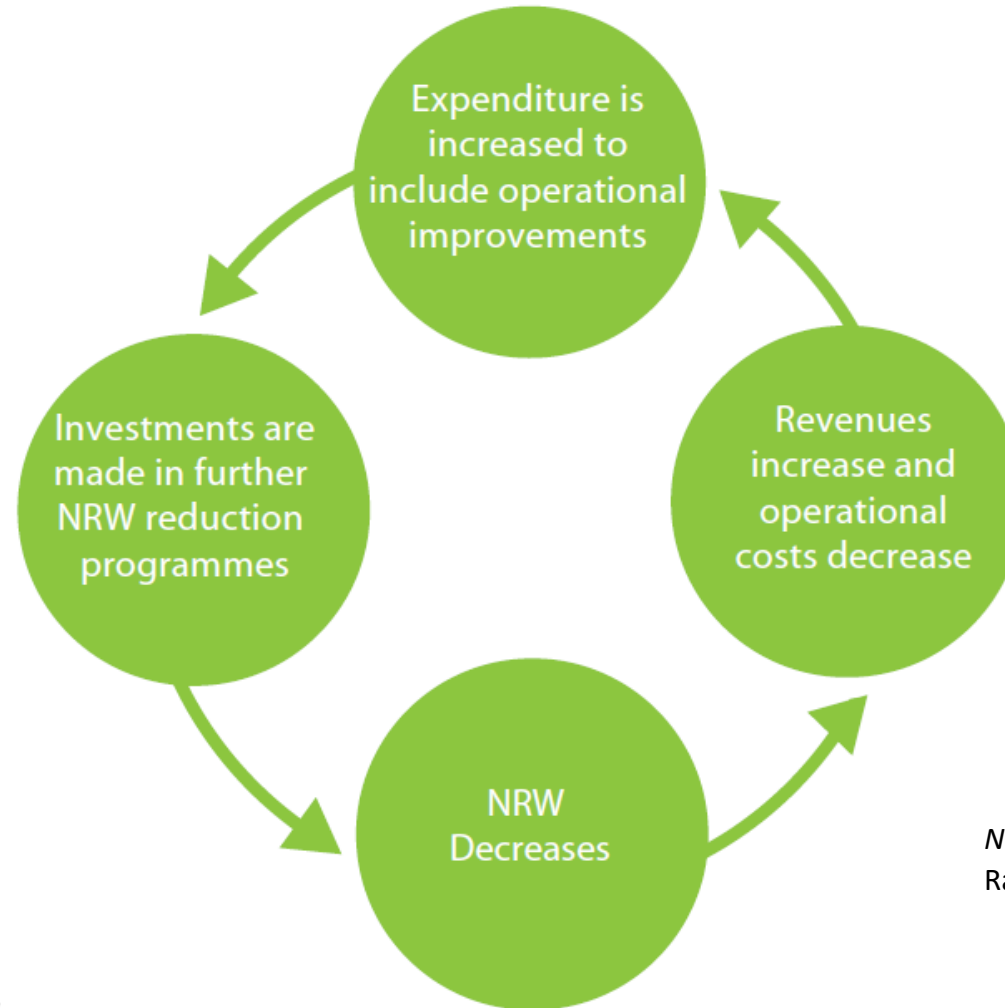
Vicious NRW Circle



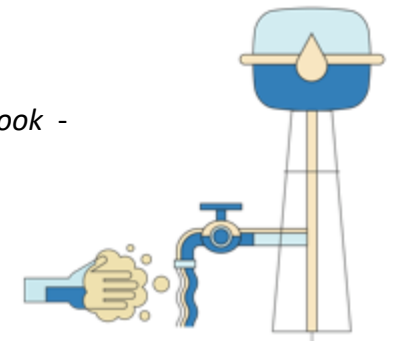
NRW Manager's Handbook
- Ranhill and USAID

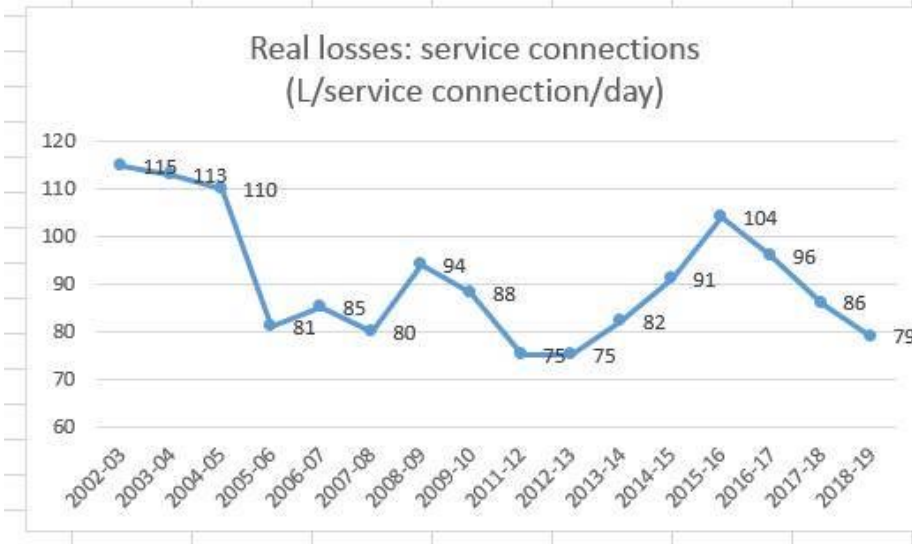
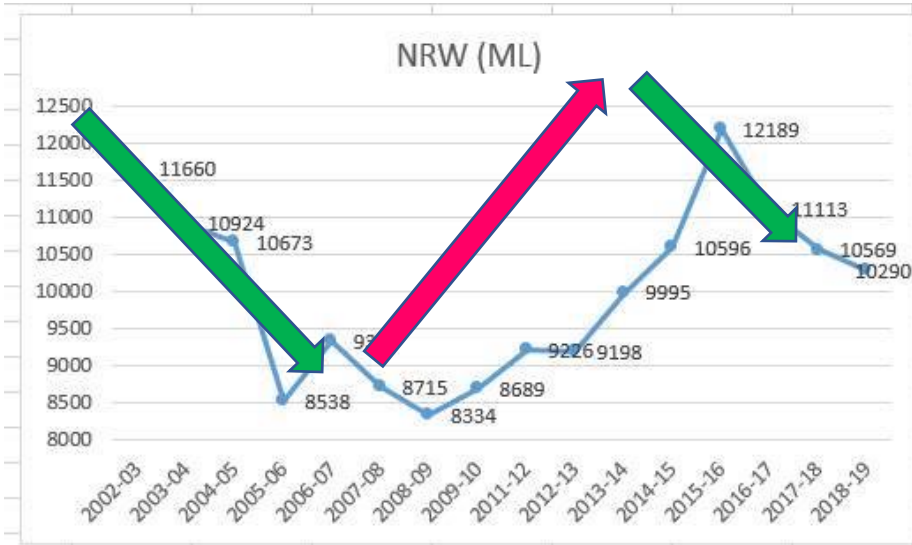


Virtuous NRW Circle

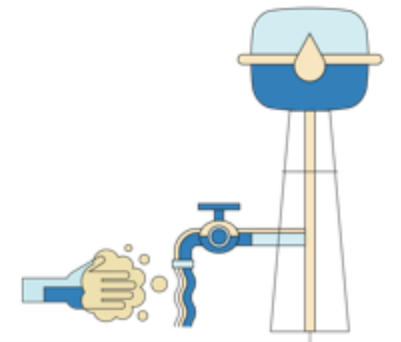


NRW Manager's Handbook -
Ranhill and USAID





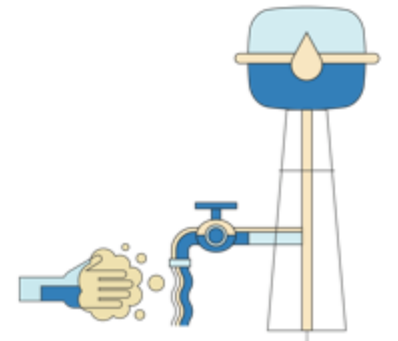
IWA Water Balance



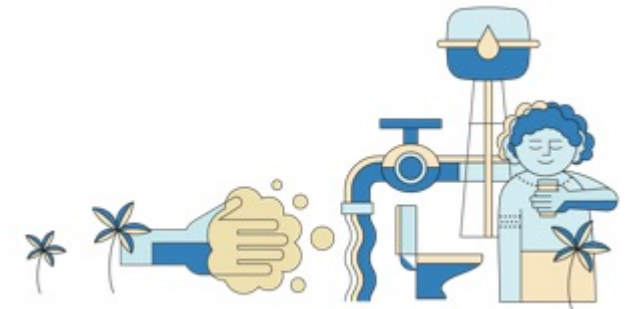
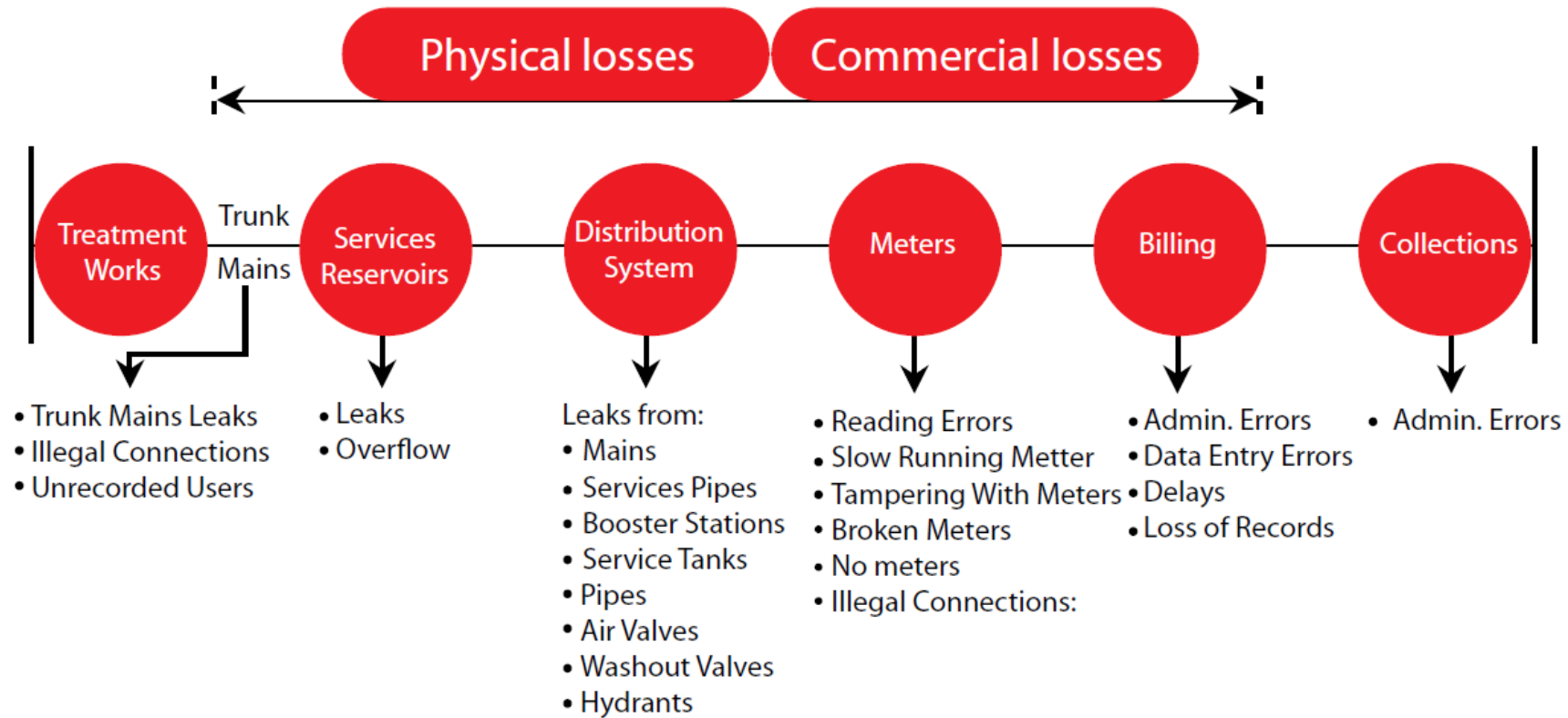
System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses (Commercial)	Unauthorized Consumption	Non- Revenue Water (NRW)
			Customer Metering Inaccuracies	
			Data Handling Errors	
		Real Losses (Physical)	Leakage on Mains Pipes	
			Leakage and Overflows at Reservoirs	
			Leakage on Service Connections	

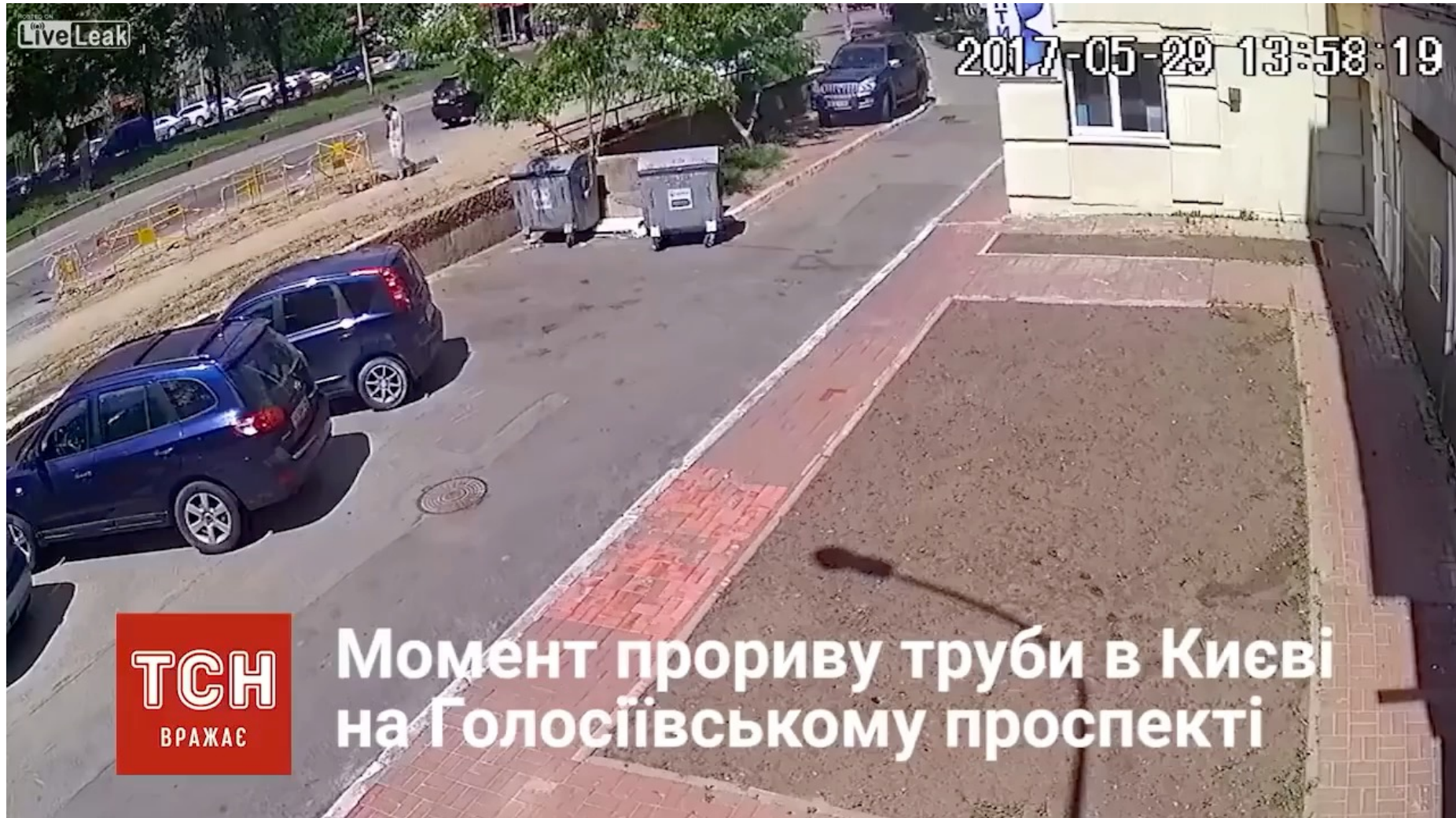
System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
			Billed Unmetered Consumption	
		Unbilled Authorized Consumption	Unbilled Metered Consumption	Non- Revenue Water (NRW)
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			Data Handling Errors	
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			Leakage on Service Connections	

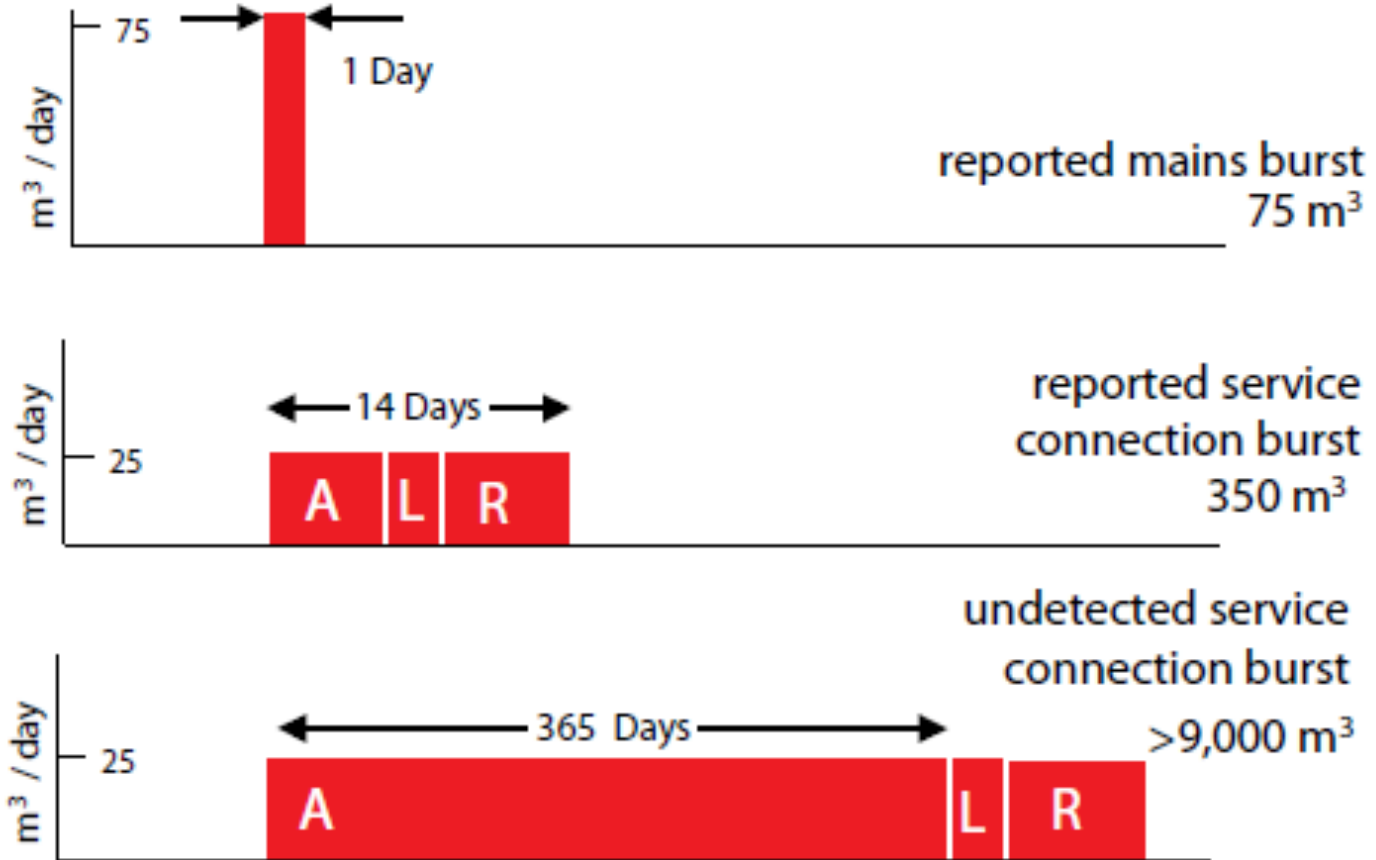
Water Loss Components



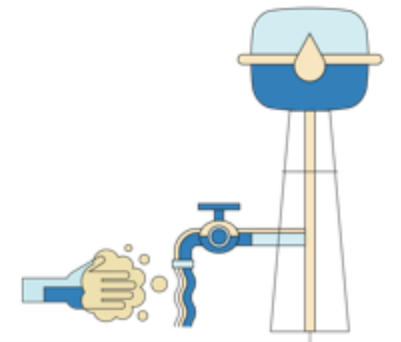
Typical Losses From A Water Supply System



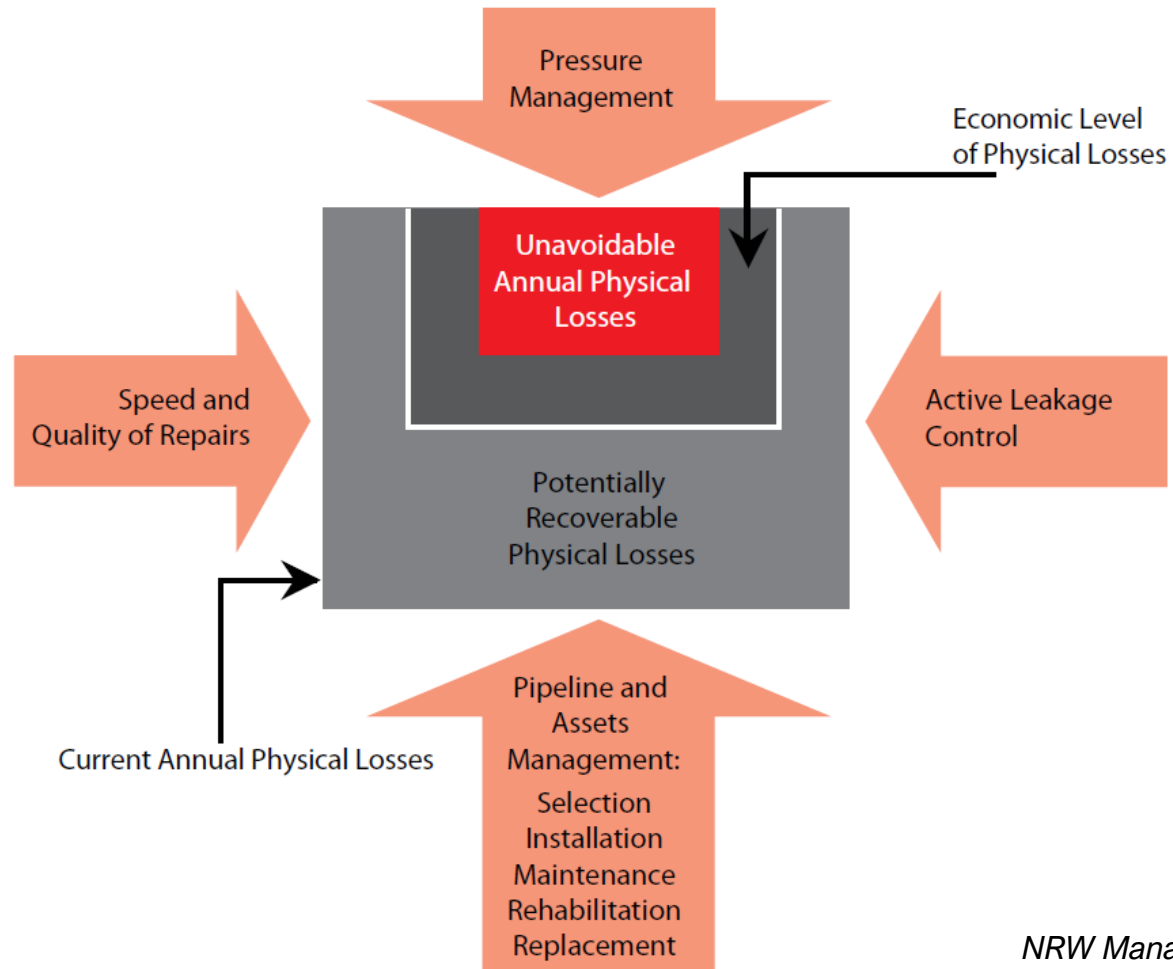




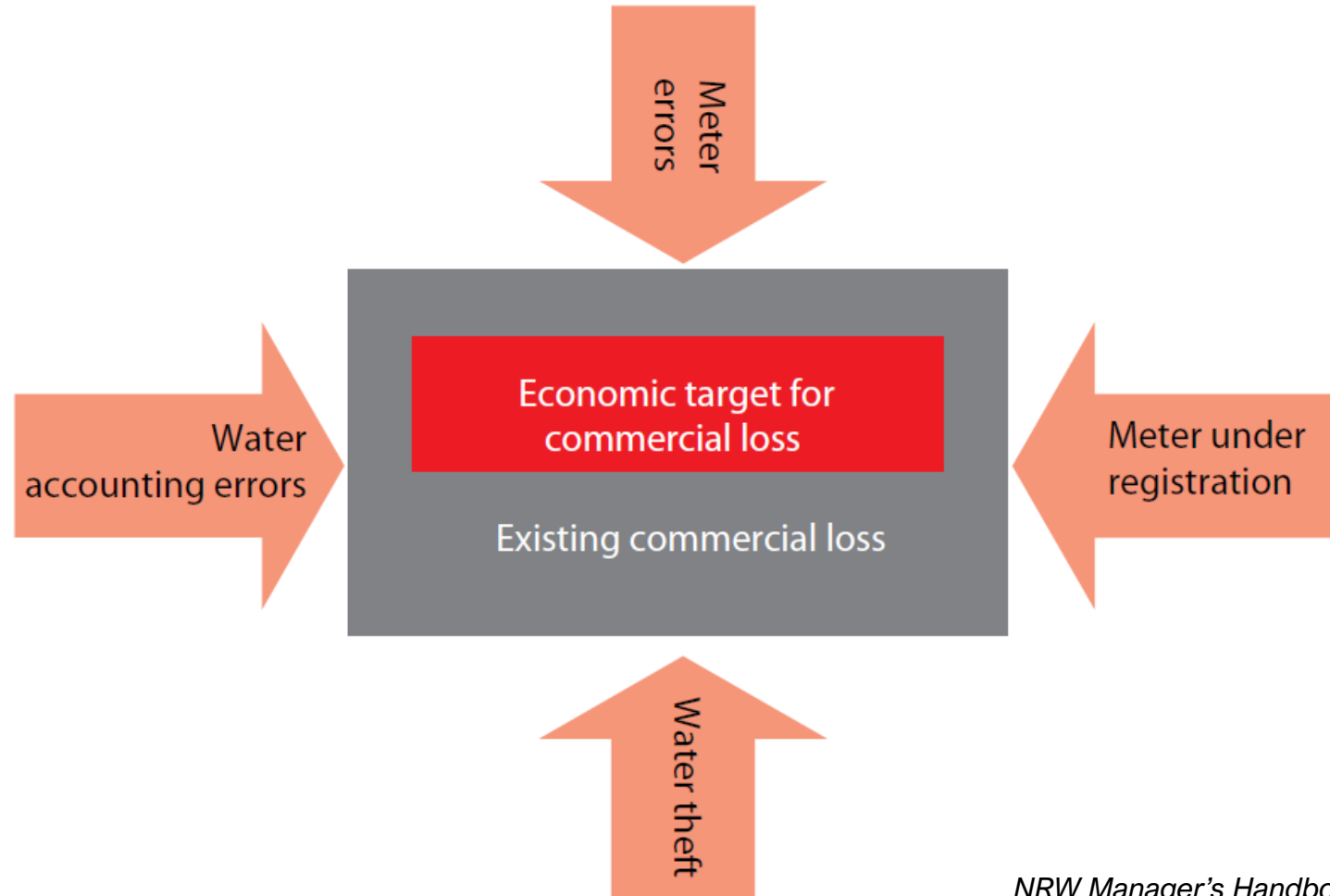
NRW Management Strategies



Real Losses

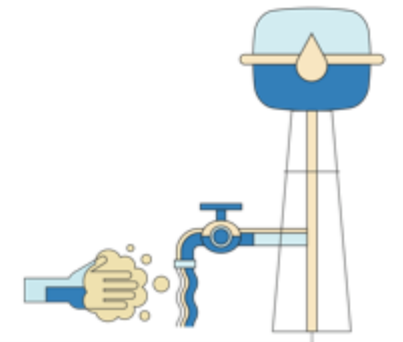


Apparent Losses



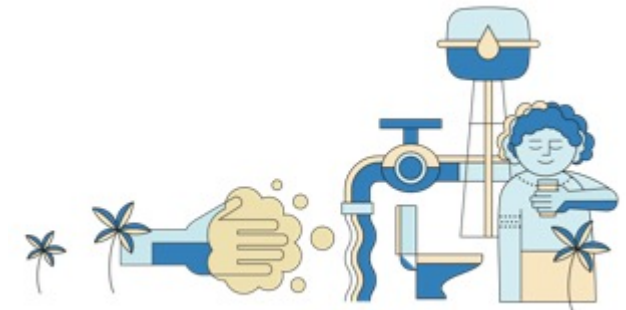
NRW Manager's Handbook - Ranhill and USAID

Summary





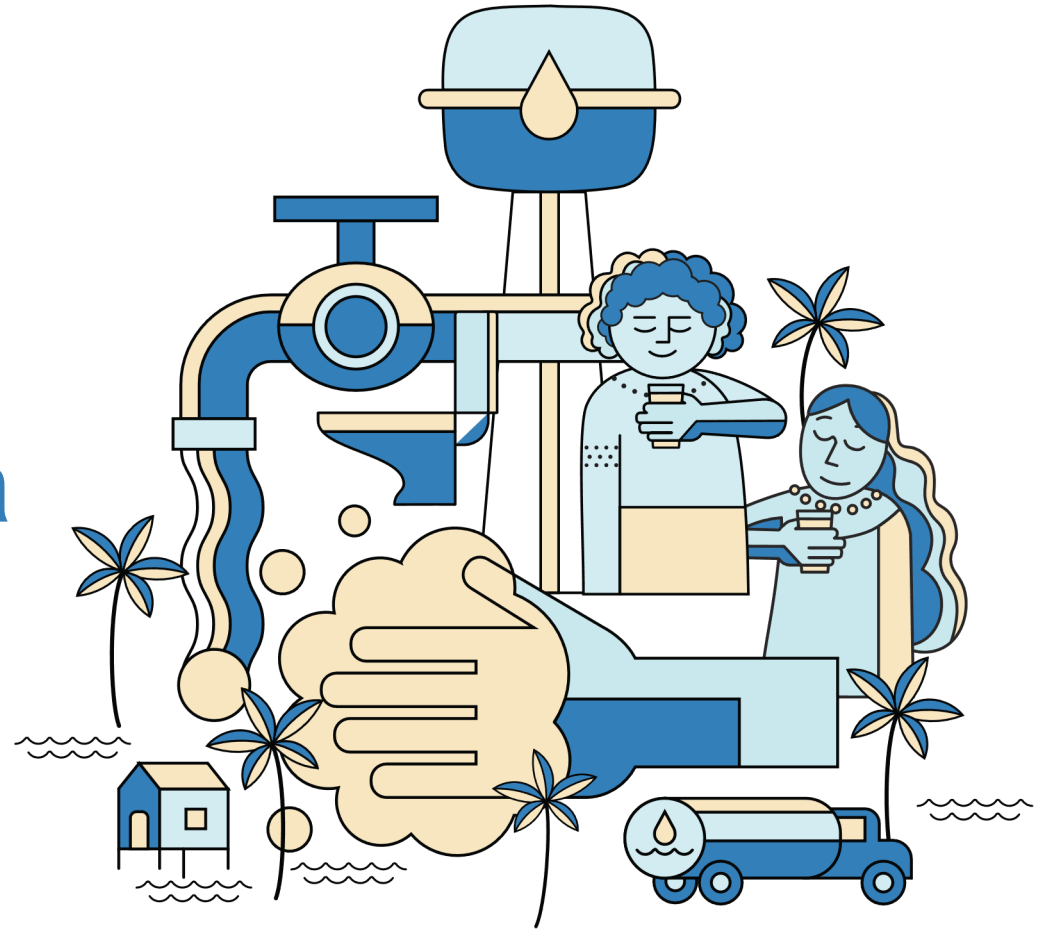
- NRW is a complex problem
- NRW minimization requires a long-term focus across the utility
- Need to recognize both the real and commercial loss components
- Engagement with customers is vital to success in NRW management



Non-Revenue Water Management in Tonga

Quddus Fielea

Deputy CEO (Engineering Manager)
Tonga Water Board





PRESENTATION

Non-Revenue Management in Tonga

Pacific WASH Webinar World Water Day 22nd March 2023

CONTENT



1. Background
2. Water Scarcity & Environment
3. Water Efficiency & Non-Revenue Water
4. Strategic approach and NRW
5. Importance of Non-Revenue Water
6. Main pillars of actions
7. Benefits
8. Way Forward

TWB Background



- Tonga Water Board (TWB) is one of the Government Public Enterprises established in 1966 under the TWB Act updated in 2000 and which has subsequently been complemented by the Public Enterprise Act – 2002 with Amendment Acts No.40 of 2010.
- Areas of Operations – Urban centers of Nuku’alofa (Tonga Tapu), Neiafu (Vava’u), Pangai-Hihifo (Ha’apai) and most of the ‘Eua Island.
- TWB has about 12,039 connections, covering some 65% - 70% of the country’s population. The remaining population manages its own water supply which often does not achieve health and environmental standards.
- TWB supplies drinking water to 100% of the population within its service area.
- TWB’s main source is groundwater, except for the island of ‘Eua where surface water is used.
- Water is supplied through piped networks with a total length of about 257 km.
- The TWB receives no formal subsidy from the Government in running its business.
- The total number of staff is 108 of whom 28% are female and 72% male;

Water Scarcity – Drought Season



CONSIDERATIONS

- ❑ Lack of support in many countries produces a budget based on demanding water supply efficiency.
- ❑ Water is a basic necessity of life – important for all relevant agencies to enforce the importance of water for all
- ❑ Economic crisis as water is a vital factor of production, diminishing water supplies leads to slower growth....(lack water infrastructure or poor management water resources)
- ❑ Social crisis due to lack of water women and children are worse affected as they are vulnerable to diseases due to dirty water.
- ❑ Conserving water is everyone's business.

Why do TWB struggle with NRW



- Not understanding the problem (magnitude, source, costs)
- Lack of capacity (insufficient trained staff)
- Inadequate funding to replace infrastructure (aging pipes)
- Lack of management commitment
- Weak enabling environment and performance incentives
- Poor information system due that no network model available caused poor maintenance
- Procurement and stock taking (lack awareness, location and repair.
- Lack of system control (flow control valves etc.)

Strategic approach & NRW analysis



❖ DO WE USE THE AVAILABLE WATER EFFICIENTLY?

What is NRW?

NRW: Water supplied that give “no revenue”

= Actual Supply – registered consumption

DO WE KNOW IT?

HOW ACCURATE CAN WE BE?

➤ Is the equipment used to identified NRW accurate

ACCURATE DATA

➤ (Quantity & Quality of data received for NRW)

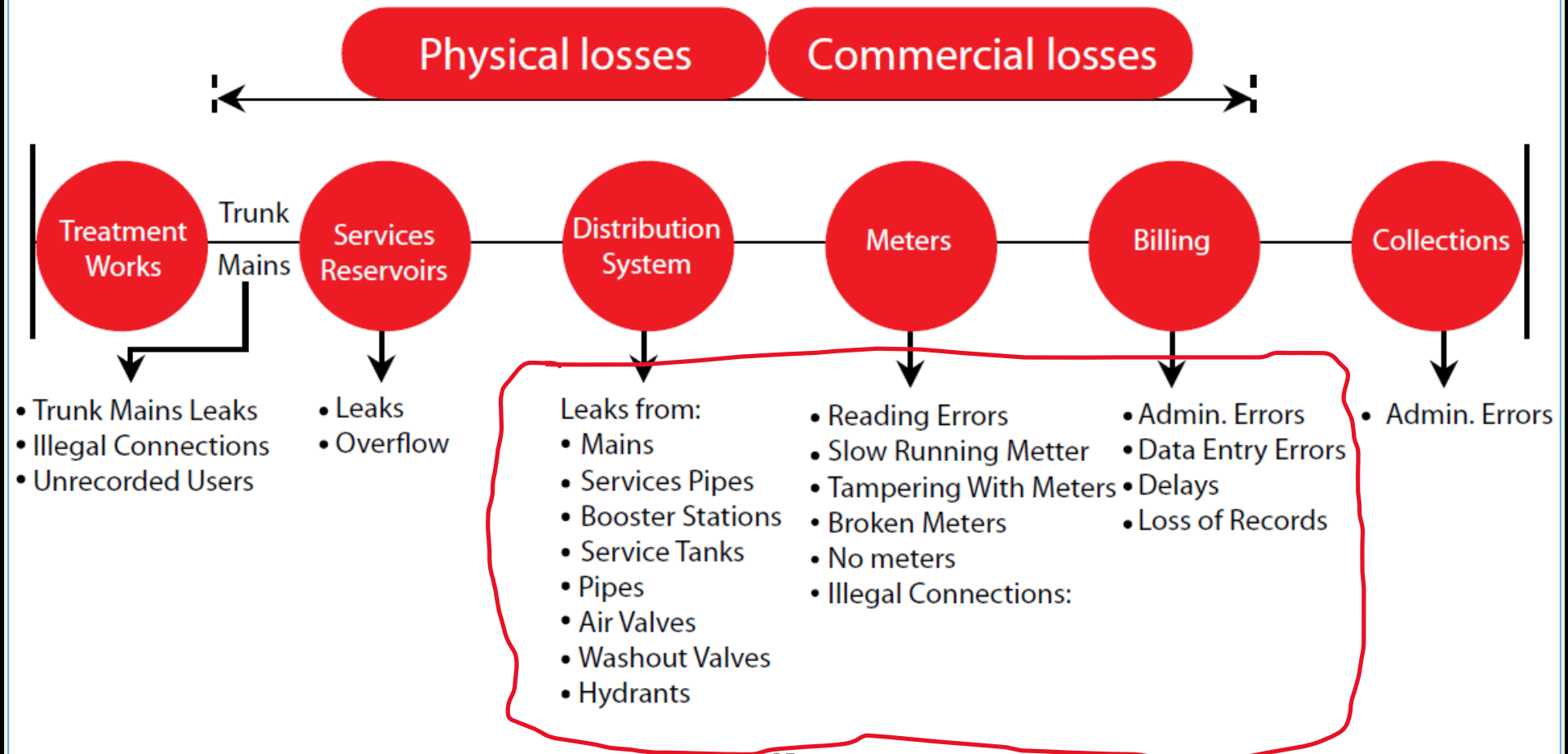


NEED FOR A STRATEGY TO ESTIMATE NRW

NRW COMPONENTS



Typical Losses From A Water Supply System



TWB Managing NRW



- Reducing NRW is everyone's responsibility across the organisation from BOD, Managers, Finance, Administration, Production, Distribution, Customer Service & Outer Island.
- Established a NRW Management Team to develop a strategy to ensure all relevant component of NRW are addressed, verify and the strategy is feasible and practicable in terms of staff capability.
- Emphasises level of awareness required at all level from top decision makers to the customers
- Address commercial losses: charge tampered meters, replaced broken meters, legal action on unauthorized connection, disciplinary action taken on staff responsible for meter and billing errors.
- Urgent action taken once physical losses is identified to ensure within 48 hours responsive time on transmission, distribution mains and overflow storage as well as customers meters.

Steps to reduce and manage NRW



- Verify the customers database
- Repair broken water meters and visible leakages
- Testing and calibrating production and district meters
- Testing customer meters
- Active leakage management
- Improve the quality of materials, installations and repair
- Pressure management
- Asset management
- Reducing unauthorised consumption
- Managing authorized unmetered consumption
- Reduce data handling errors
- Collection efficiency and debt management

TWB NON REVENUE WATER LOSSES

FY 2014/15 - FY 2019/21

Water Input (100%) (units – millions) FY 14-15 (3662) FY15-16 (3639) FY16-17 (3474) FY17-18 (3304) FY18-19 (3315) FY19-20 (3650) FY20-21 (3900)	Authorised Consumption FY 14-15 (1540 - 42%) FY15-16 (1699 - 43%) FY16-17 (1723 - 50%) FY17-18 (1862 - 57%) FY18-19 (1994 - 60%) FY19-20 (2360 - 65%) FY20-21 (2780 - 70%)	Billed Authorised Consumption (41%,42%,49%,56%,59%,64%,69%)	Billed Metered Consumption
		Unbilled Authorised Consumption (1% throughout the 7 FY)	Unbilled Metered Consumption <i>Ex. HRM Residence</i>
			Unbilled Unmetered Consumption <i>Ex. Tonga Fire Department</i>
	NRW Water Losses FY 14-15 (2122 - 58%) FY15-16 (1940- 57%) FY16-17 (1751 - 50%) FY17-18 (1441 - 43%) FY18-19 (1321 - 40%) FY19-20 (1287 - 35%) FY20-21 (1010 - 30%)	Apparent Losses /Non-Physical Losses (34%,34%,32%,30%,10%,10%,10%)	Water losses from Illegal connections, meter inaccuracies, inoperative meters, billing errors, etc.
		Real Technical Losses /Physical Losses (24%,23%,18%,13%,30%,25%,20%)	Water losses from mainlines, service connections, reservoirs, pump stations, distribution network etc.

ILLEGAL CONNECTION



Illegal connection

Recover > 90% monthly

Smart meter

Recover > 90% financial impact

Home Visit

Recover > 20% aging debtor return

ILLEGAL CONNECTION



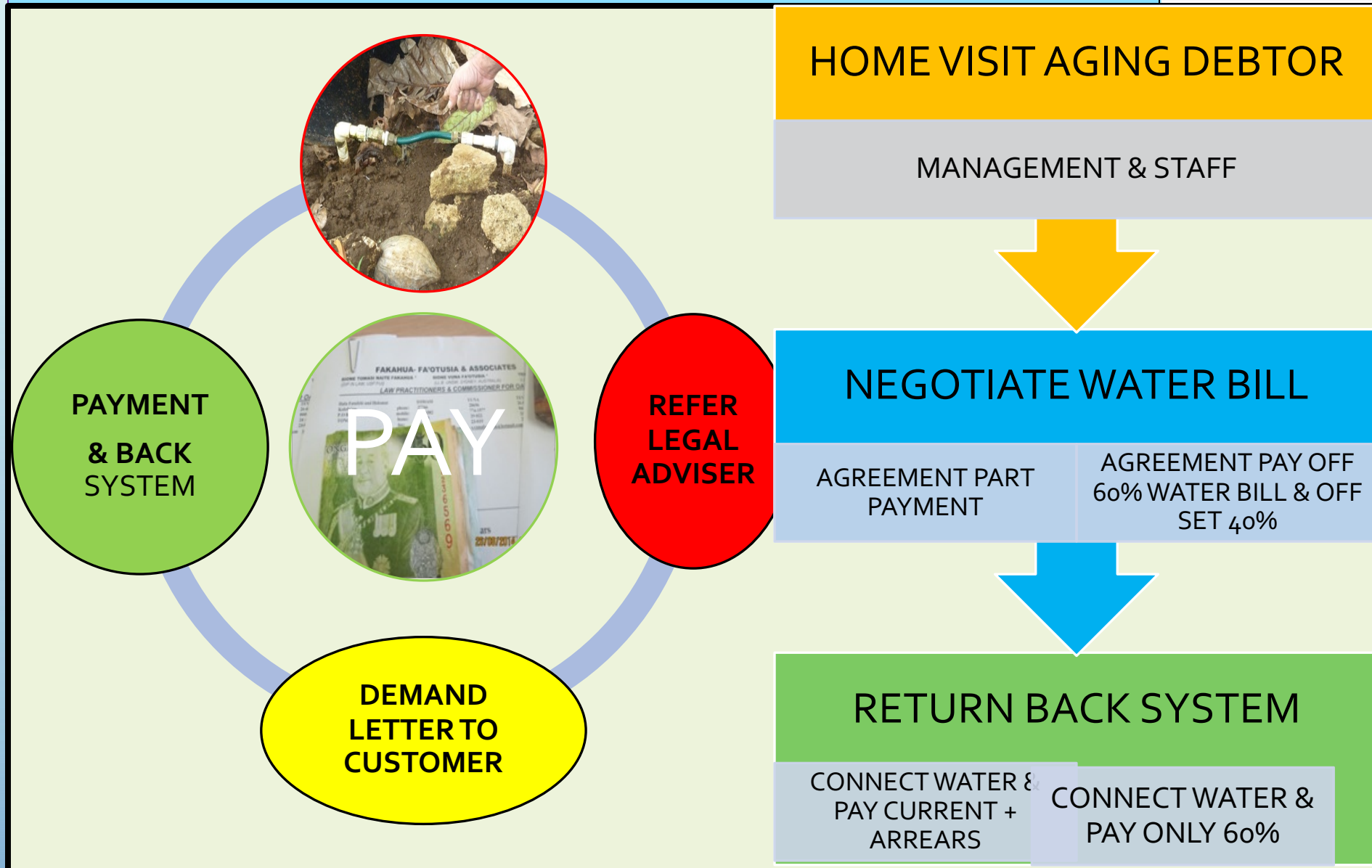
METER REPLACEMENT



Home Visit – Aging Debtor



Process recovery illegal connection



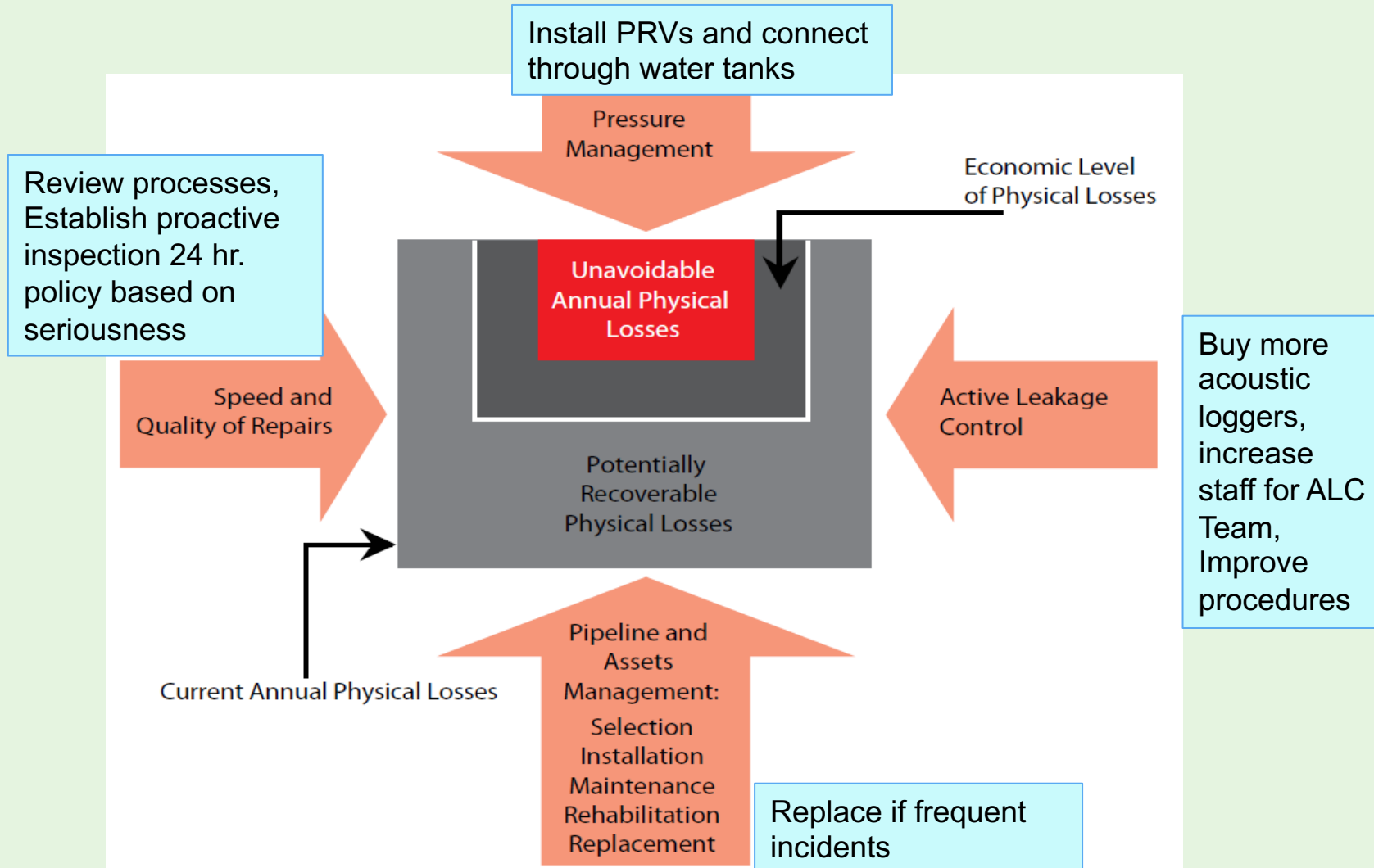
Importance of Non-Revenue Water



- Improve financial sustainability, serviceability and the management of the water resources
- Improved local operational skills and knowledge by engaging building capacity (twinning program)
- More efficient use of limited water resources and reduced potential for exceeding water resources, safe yields at production well field due to reduction in leakages.
- Reduced potential for underground water resources salinity due to reduce pumping
- Improved health and living conditions through more reliable and quality water supply.
- Increase Revenue, water pressure & production by reducing non-revenue water.

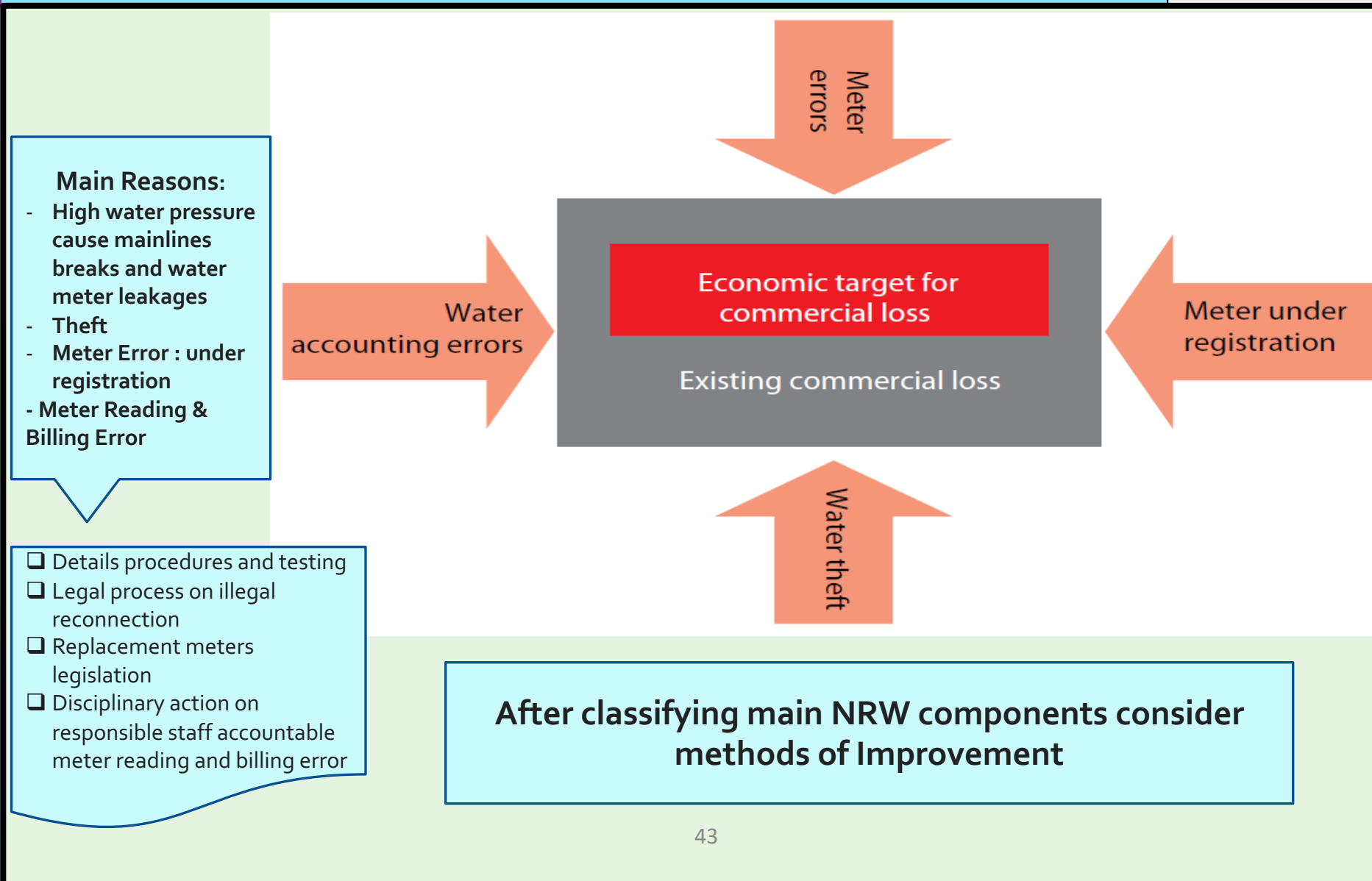
Main pillars of action :NRW Management

Apparent and Real Losses

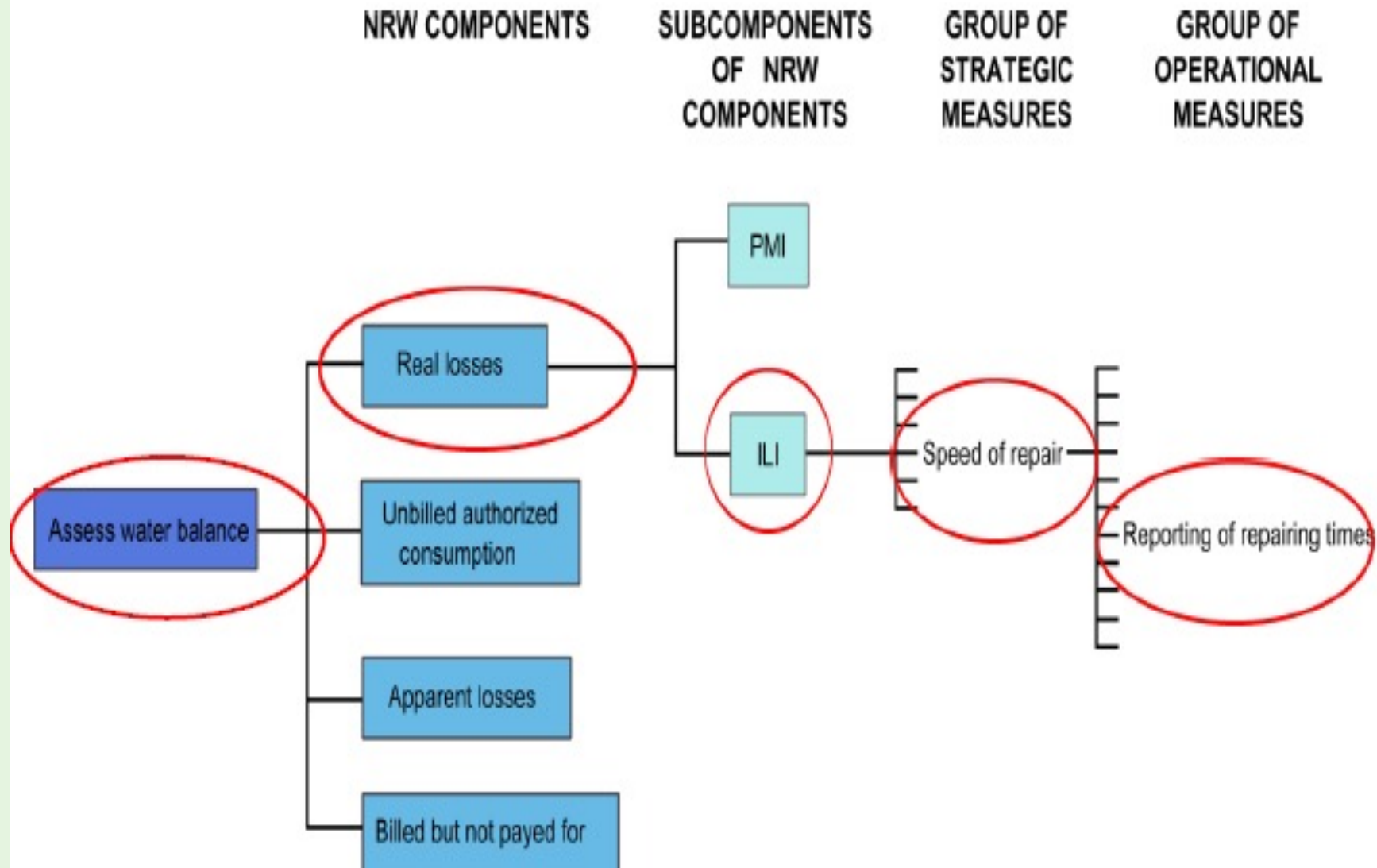


Main pillars of action :NRW Management

Apparent and Real Losses



Component of NRW and Strategic Operational Measures for NRW-reduction



BENEFITS



- Satisfied customers
- Less energy consumption
- Less carbon footprint from Water supply chain
- Less Non-Revenue Water; reduce cost increase revenue
- Better reputation to public
- Better knowledge of the system
- Less system input volume
- Less number of leaks recorded
- Decrease in overtime work
- Better system operation
- Decrease apparent losses

WAY FORWARD



- Top priorities for TWB to manage NRW strategy effectively to avoid losses either in productivity due to water of water. Quality management is essential
- TWB to adopt relevant technology to upgrade managing Non-Revenue Water
- TWB seek NRW expert to develop a network model
- Adopt a Support System / tool (DSS) to help simplifying processes.
- Review Asset Management Plan to improve infrastructure and the processes.
- Engage capacity building to improve staff knowledge.

TONGA WATER BOARD

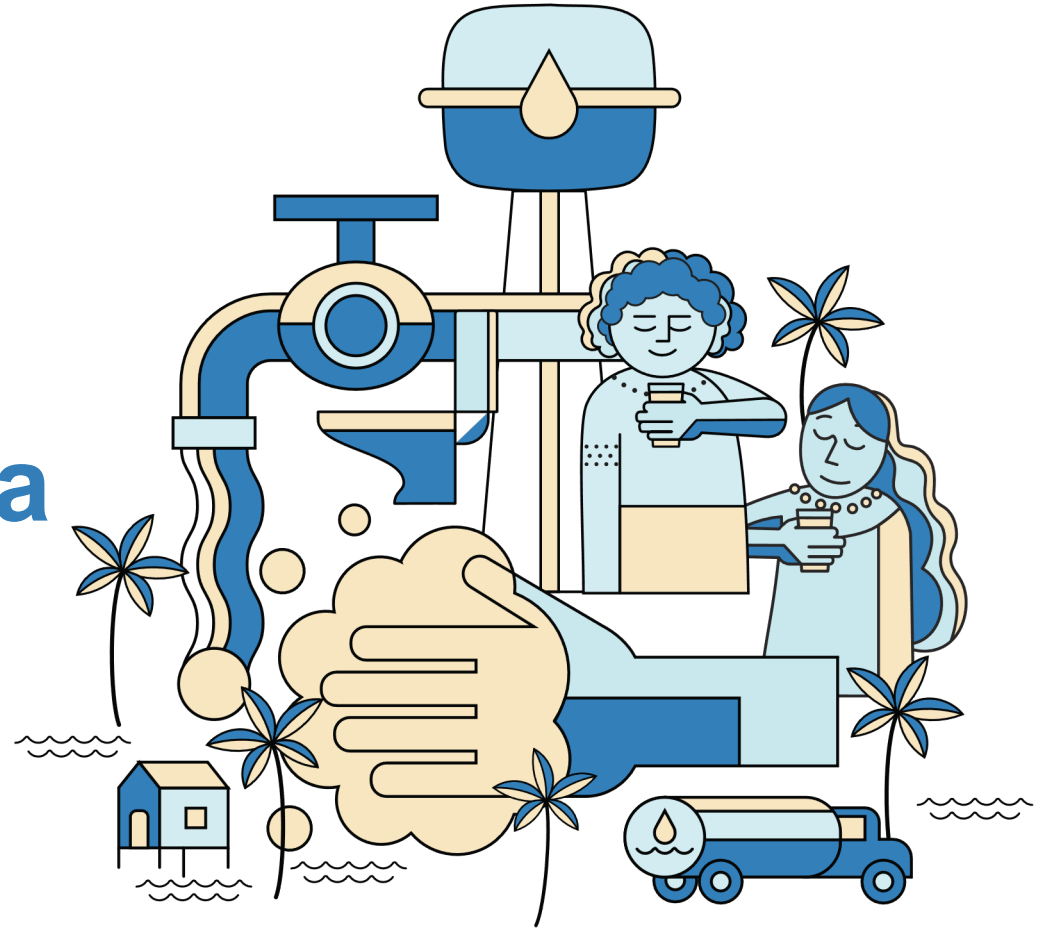
THANK YOU

MALO

Non-Revenue Water Management in Samoa

Julius Matthes

Rural Division NRW & Leak Detection Engineer, Samoa Water Authority



Introduction

- **Samoa Water Authority**

“sustainable water and wastewater utility provider founded on excellence”

- **Non-Revenue Water**

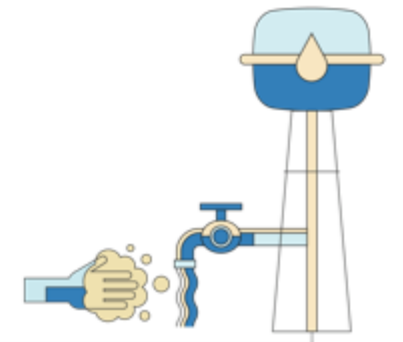
“is water that has been produced and is "lost" before it reaches the customer”

- Physical Loss
- Commercial Loss



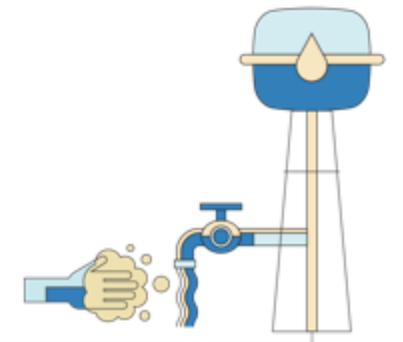
Content

- Challenges
- Issues
- CEPISO 1 Project
- CEPISO 2 Project
- Capacity Building
- Public Awareness Program



Challenges

- Financial Support
- Lack of Knowledge & Experience
- Climate Change
- COVID 19
- Staff turn over



Issues (1/2)

- Aging infrastructure/assets
 - *Conduct leakage survey and prioritize areas with very high leakage points to fix or to replace.*
 - *Water Balance analysis study to determine which distribution line can be replaced within the budget.*
- Limited Resources
 - *Manage/Utilize the available recourses wisely.*
 - *Request Doners for financial assistance.*

Issues (2/2)

- Data discrepancies (human error, data collection delay)
 - *Incorporate SCADA (telemetry).*
 - *SWA is open for Digital Transformation.*
- Illegal Connections
 - *Conduct thorough survey for suspicious cases.*
 - *Incur a WST\$1,000.00 fine for a domestic case whereas a WST\$2,000.00 fine for commercial case.*

CEPSO 1 Project

Overall Goal

Safe and stable water is supplied to SWA customers in Apia.

Project Objective

Safe and stable water is supplied to customers at Alaoa Supply Scheme

Nago city

OUTPUT1

Pipeline works and leakage repair

Okinawa City
Naha City

OUTPUT2

Distribution, pressure control management

Nanbu
Waterworks

OUTPUT3

Leak detection management

Okinawa
Prefecture

OUTPUT4

Water quality monitoring system

Ishigaki City
Dr.Nakamoto

OUTPUT5

Water treatment plant management

Establishing a leak detection method that fits in Samoa



On-site instruction on how to operate various detectors

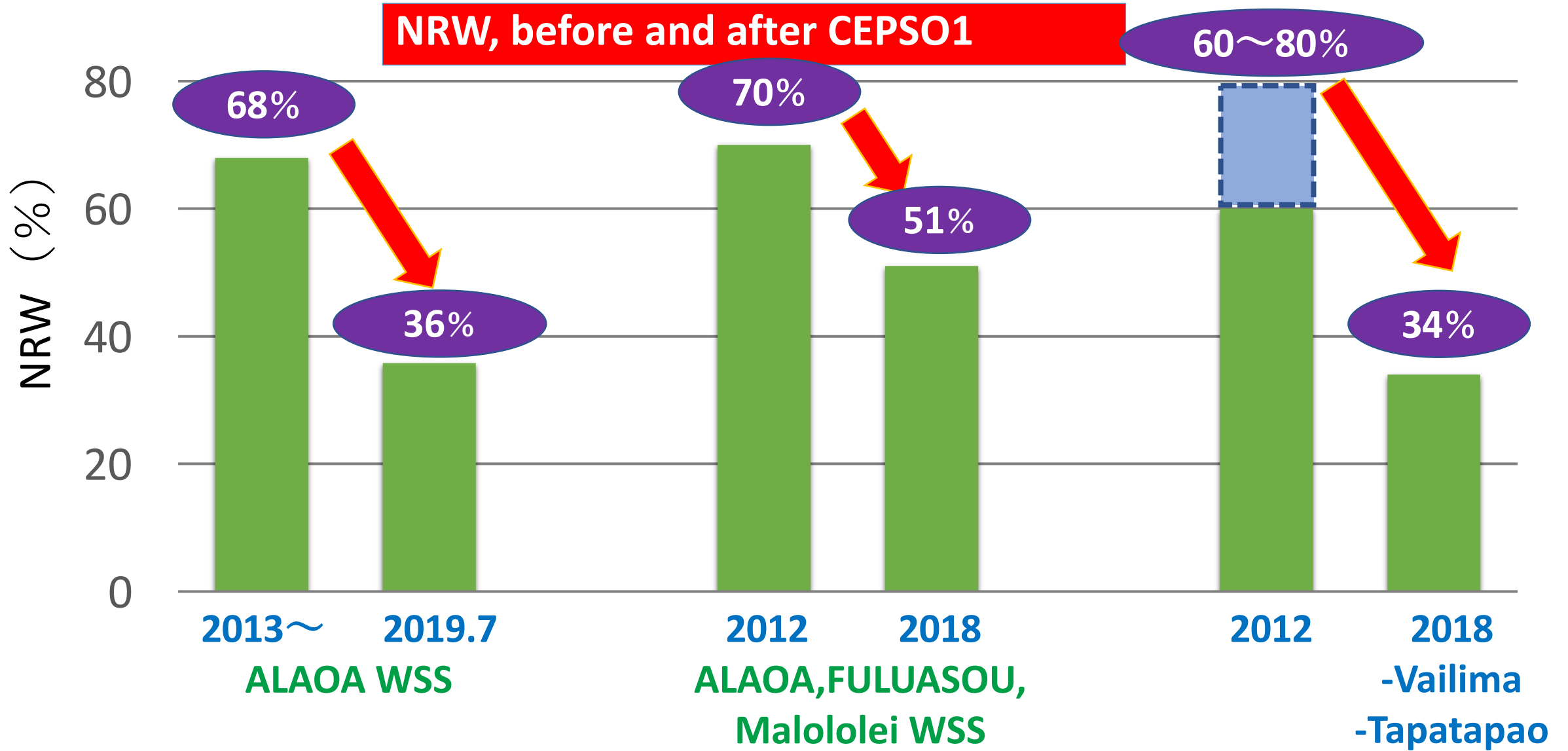
Leakage survey of water pipes using an ultrasonic flow meter.



150 water pipe leakage surveys were conducted to determine the amount of leakage in all project areas.

**Transmission
Leakage
Approx - 12l/s**





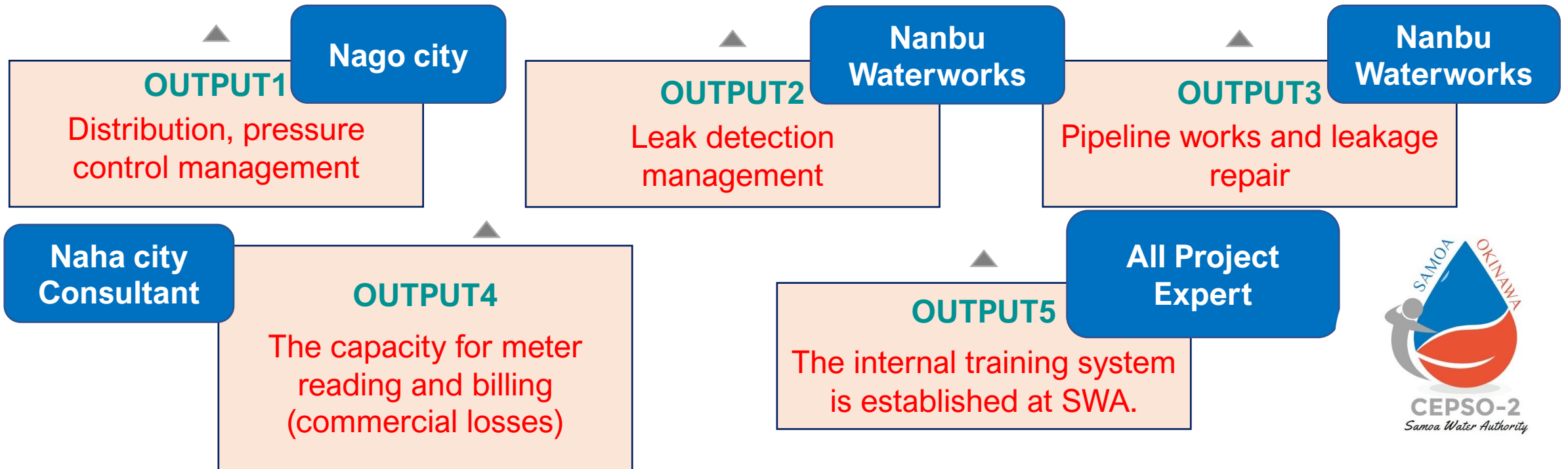
CEPSO 2 Project (Ongoing)

Overall Goal

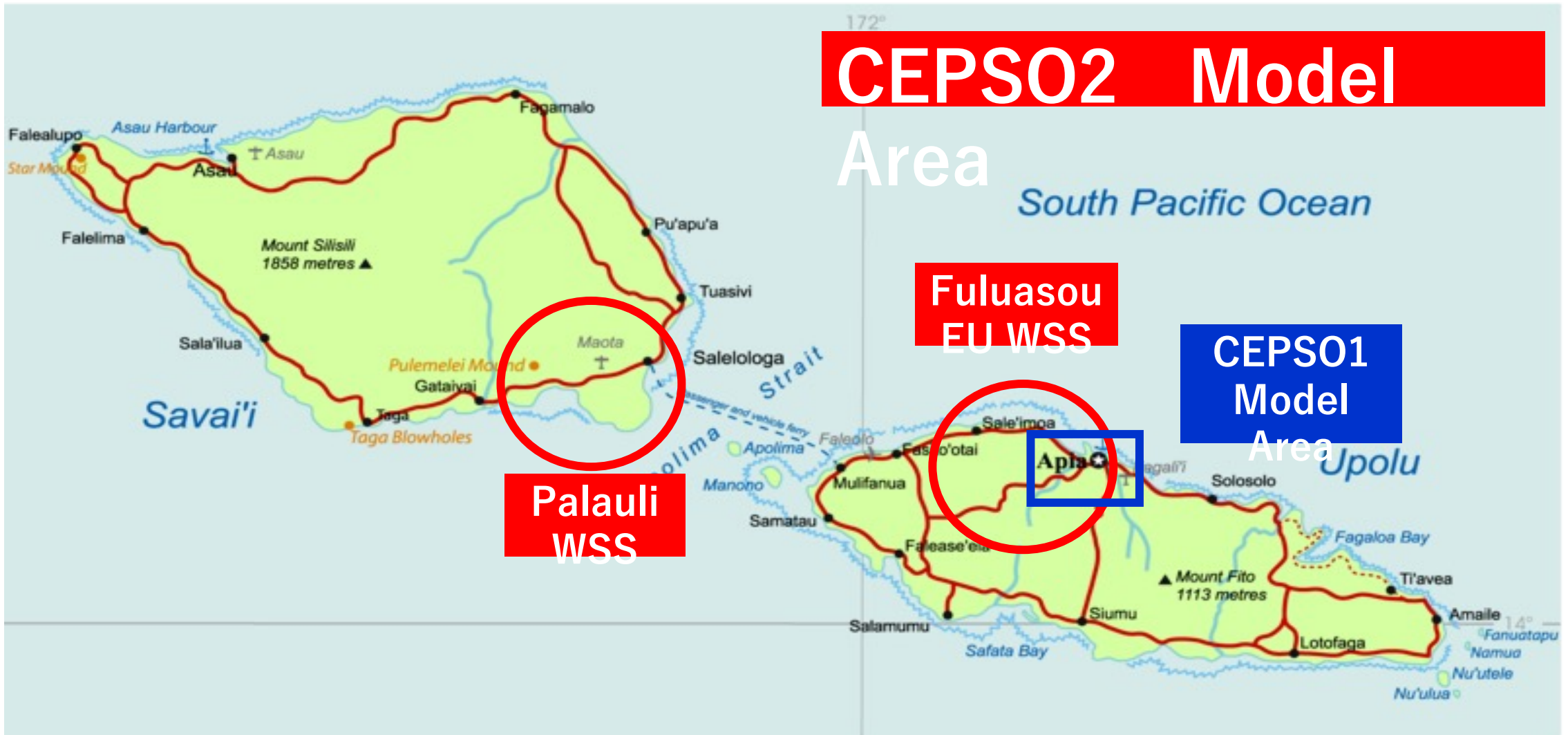
Safe water is supply by Samoa Water Authority (SWA).

Project Objective

Be able to provide sustainable and safe water supply in Fuluasou EU WSS and Palauli WSS.



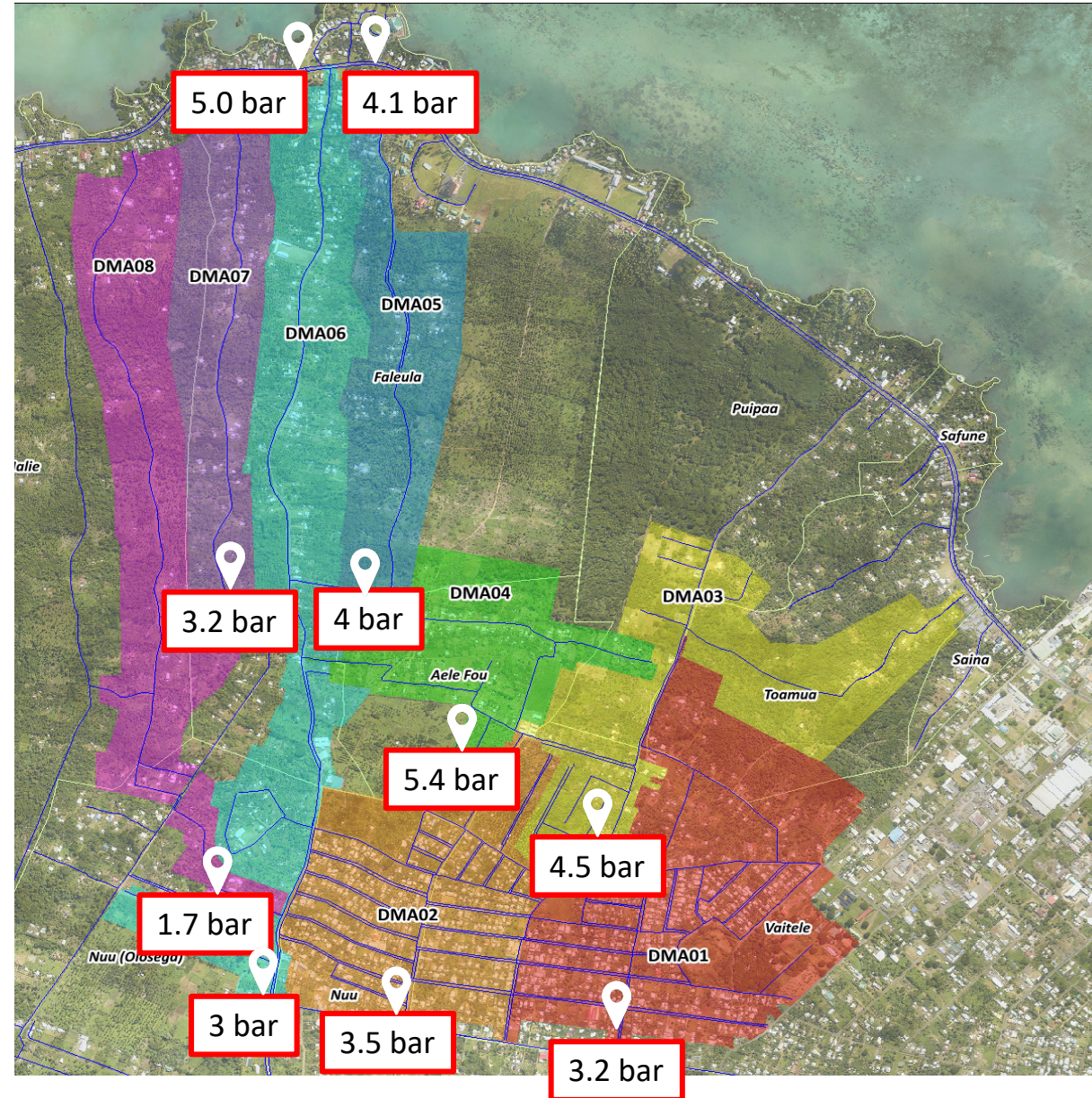
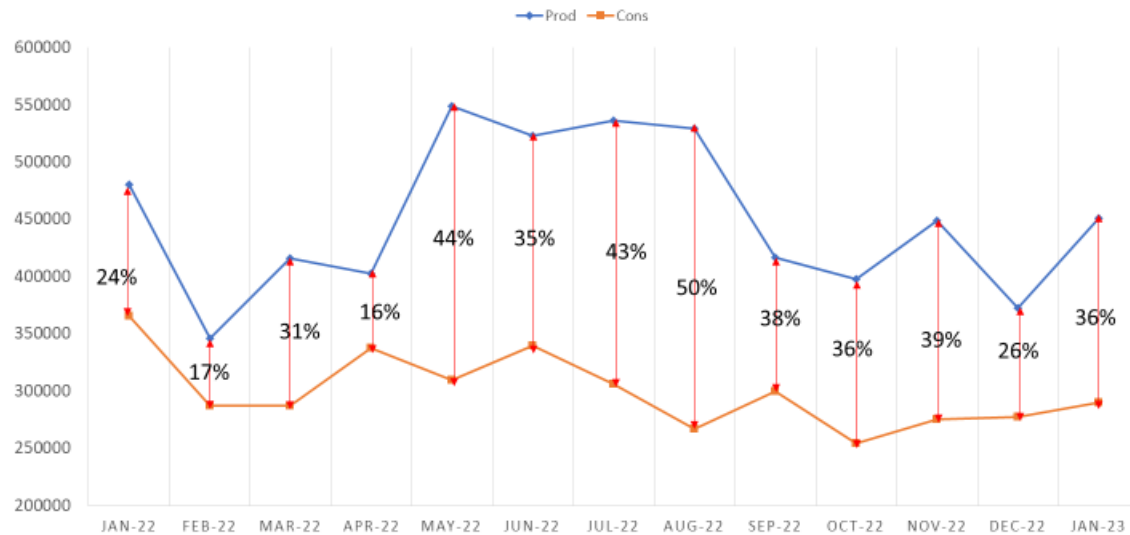
CEPSO 2 Project



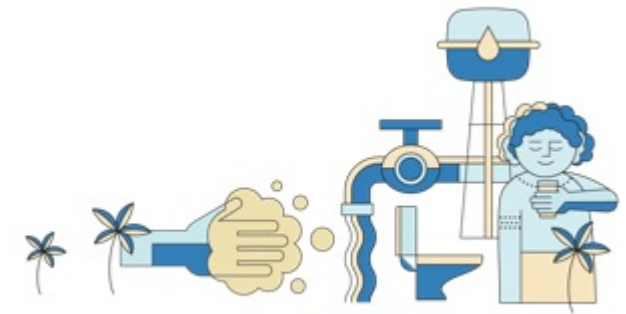
CEPSO 2 Progress

- Fuluasou EU System
 - 8 Blocks completed.
 - Consumption Data yet to be finalized.
 - Pressure management completed for 1 to 8

4. FULUASOU EU NRW%



Capacity Building



Public Awareness Program

PAY YOUR WATER BILL USING:

1. Pacific40 talofa voucher
2. SamoaPost
3. Western Union
4. Vodafone M-tala
5. Local Banks Online Payment

<p>SAMOA WATER AUTHORITY Account No# 2000177705 SWIFT CODE: BOSPWSWS BSB No: 039049</p>	<p>SAMOA WATER AUTHORITY Savings Acct# 1010672394201</p>	<p>SAMOA WATER AUTHORITY Savings Acct# 5160657001 P.O BOX-3047L</p>	<p>SAMOA WATER AUTHORITY Account Name: General Account Operations Account No# 1234109 SWIFT CODE: ANZBWSWW BSB No: 010979</p>
--	---	--	--

Contact 21267 or 8421267 to confirm ACCOUNT NUMBER and ACCOUNT NAME before payment

Samoa Water Authority
1 d · 🌐

Coming across a leakage 😞, water wasted.

Please report any leakages as soon as possible to avoid water loss.

Call 21267/8421267 for Upolu or 51215 for Savaii.



BE WATER READY DURING HEAVY RAINFALL!

STORE WATER BY USING:

- CLEAN POTS
- LARGE WATER BOTTLES
- CLEAN COOLERS
- BUCKETS
- PLASTIC BOTTLES



Samoa Water Authority
28 Feb · 🌐

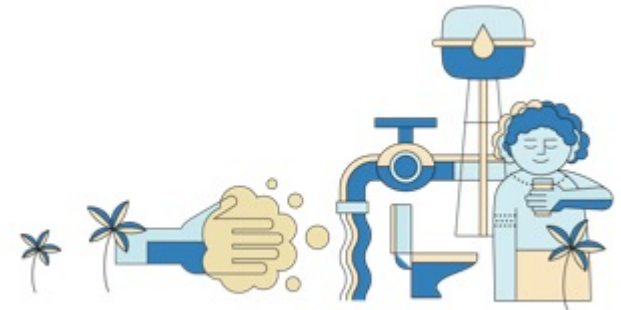
Rehabilitation works to a burst main pipe which caused disruption of water service to customers residing in the villages of Nuu to Leulumoega Tuai, is completed.

Due to the huge coverage of this system, it will be a few hours before it fully recovers.

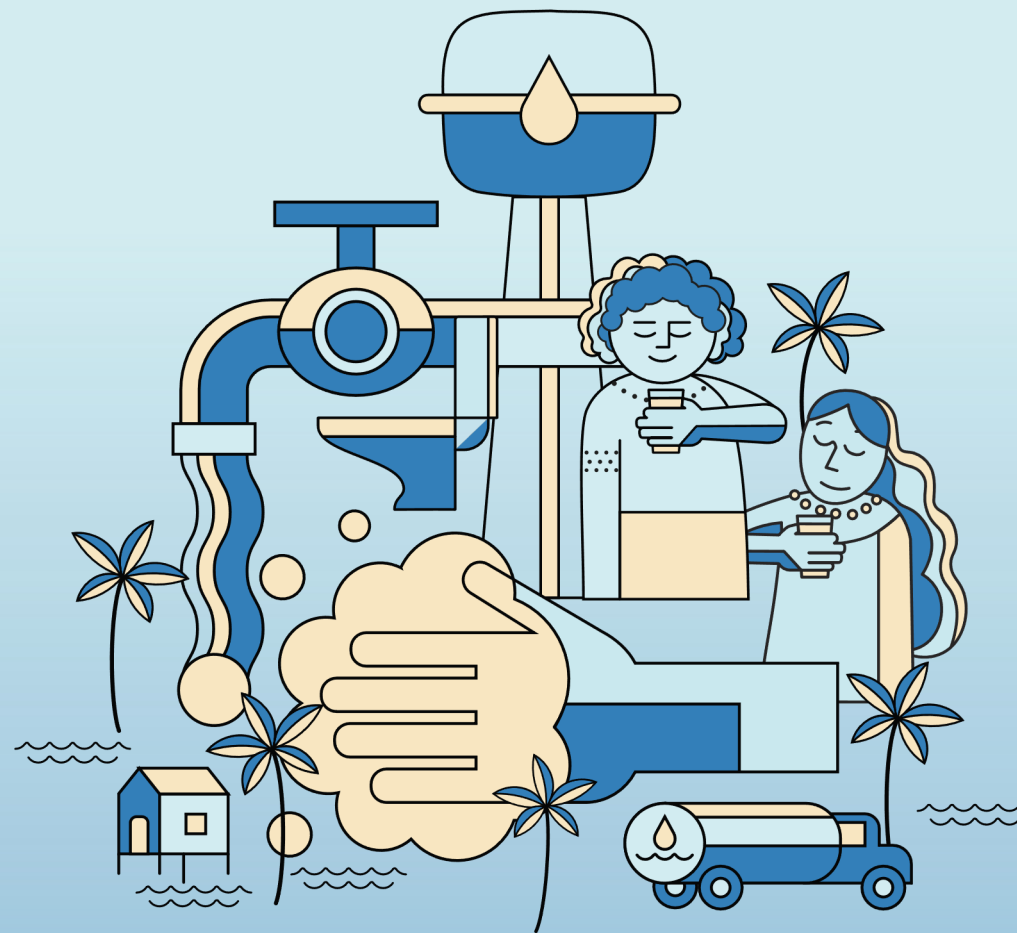
Thank you for your patience.



Thank you.

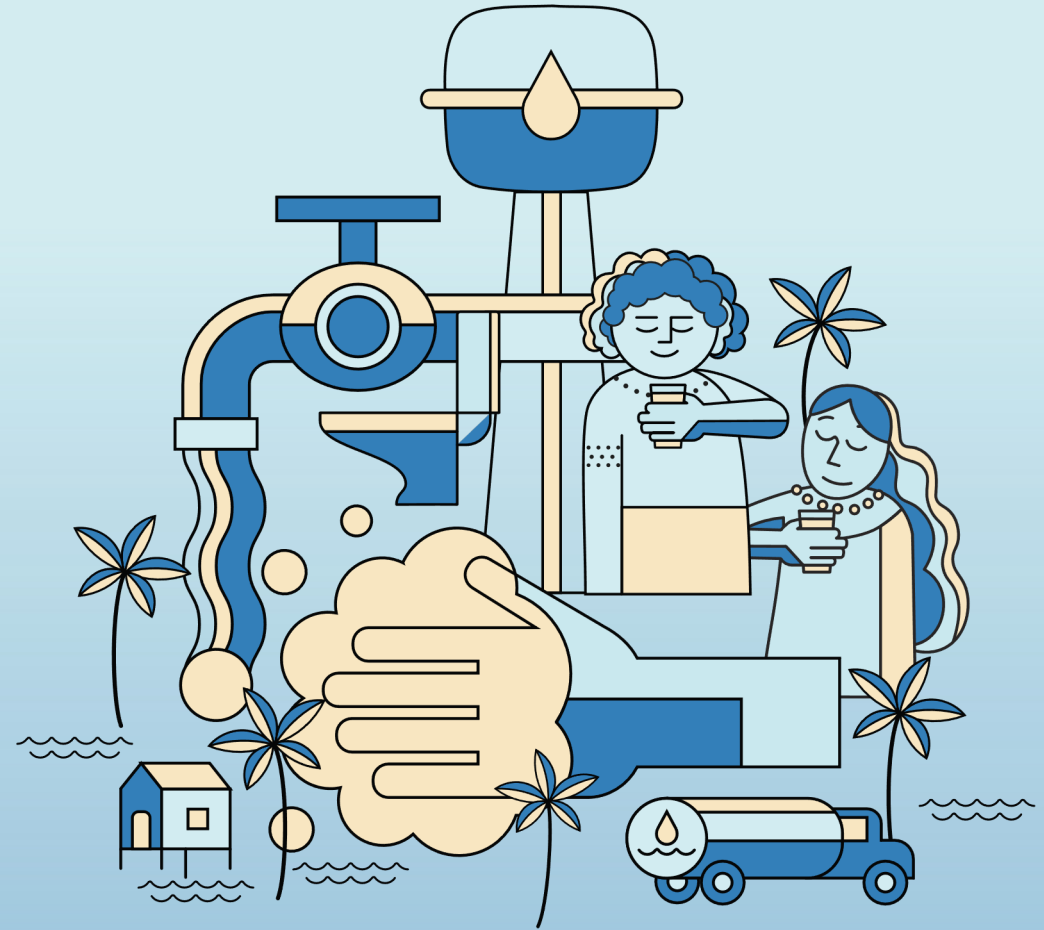


Q&A

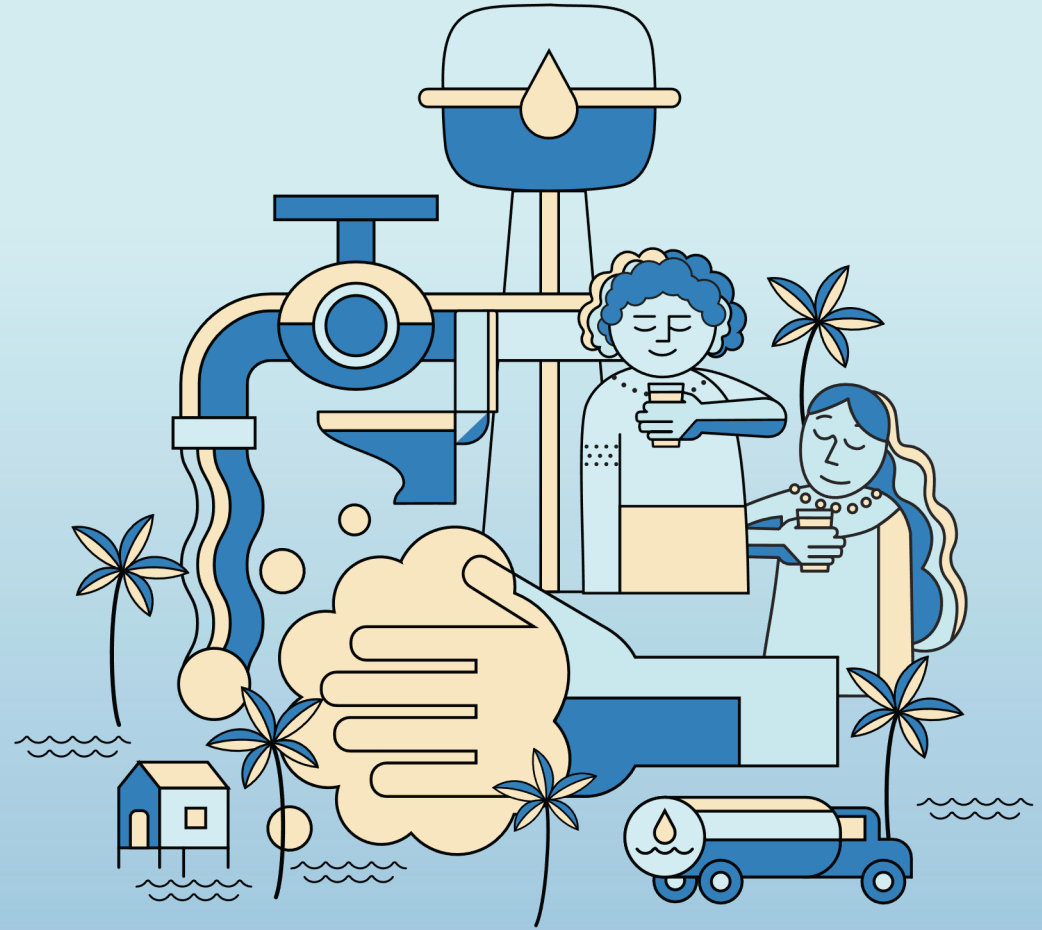


Poll

Did today's webinar expand your knowledge/skills on the topic discussed?



Group photo



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