

This presentation premiered at WaterSmart Innovations

watersmartinnovations.com





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Strategic Water Loss Reduction

What's your water loss and how do you measure it?

We know it's 15% because that's what our neighbor water systems are.

We know it's 10% because that's what it's supposed to be

It's 40%. We don't know how to measure it.

We lose 25%. We have PVC pipe so we know that's what it is.

We lose 60%. We have lots of leaks in our system.

We lose 30%. We subtract the meters we read from our master meter





So, what's the issue?



Water Loss

Or

Inability to calculate





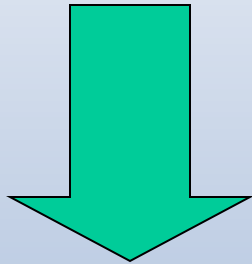
Both



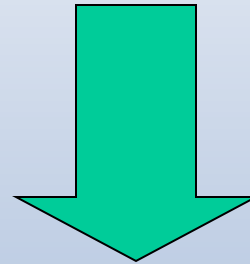


Issue – Water Loss

Water Loss



Lost Revenue



Lost Resource





Issue – Inability to Calculate

Don't know the
true magnitude of
the problem



No understanding
of how best to
address it

Wrong solution
may be applied



Problem won't be
addressed
adequately





Two Levels of Concern

State Level

- Collective water loss can be significant, or maybe not
- If Water losses addressed
 - Need for new/expanded source may be deferred or eliminated
 - Cost of compliance may be reduced

• Water System

- Cost of pumping & treating unbilled/lost water
- Reduction of water resource
- New source infrastructure required too soon
- If Water losses addressed
 - Reduce overtime & emergency repairs
 - Improve public relations
 - Reduce property damage





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So... Where do we start?



Determine the Nature and Extent of the Problem





Step 1: Water Audit – AWWA Method

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
			Unbilled Unmetered Consumption	
	Water Losses	Apparent Losses	Unauthorized Consumption	
			Customer Meter Inaccuracies	
		Real Losses	Leakage in Transmission & Distribution Mains	
			Leakage at Overflows and Reservoirs	
			Leakage on Service Connections up to Metering Point	



High Unbilled Authorized Consumption

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High Unbilled Authorized Consumption

- Not Water Losses
- Lost revenue due to subsidization of user classes
- May be metered or not
- Examples
 - Governmental uses: schools, parks, open space, fire
 - Low income; fixed income; elderly
- If this use is high, biggest issue is equitability
 - Is it fair for users to be subsidized? Is it transparent?
 - Should unmetered use be metered?
 - Users in this category should get a statement describing how much service they receive





High Apparent Losses

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
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High Apparent Losses

- Not actually losing water!!!!
- Represents revenue lost to the system
 - User(s) not paying for water they use
- Two sources
 - Illegal use of water; illegal hook-ups
 - Meter inaccuracies
 - Meters typically fail low
- If this portion of the water balance is high – insufficient revenues





High Real Losses

System Input Volume	Authorized Consumption	Billed Authorized Consumption	Billed Metered Consumption	Revenue Water
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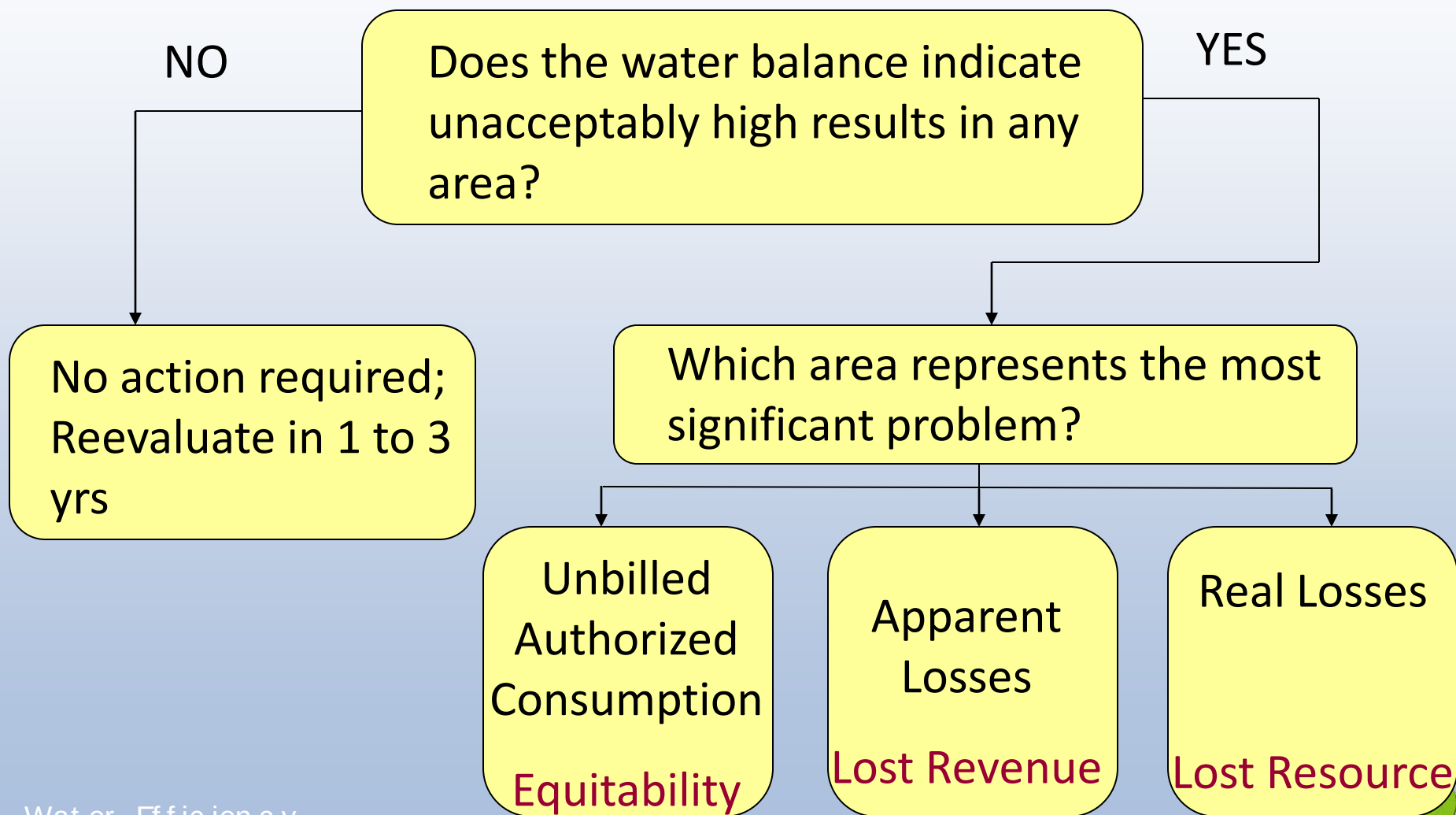
High Real Losses

- These factors represent water that is lost from the system
 - Water has been pumped from source, but never reaches customers/users
- Three sources
 - Pipe leakage
 - Reservoir leaks and overflows
 - Leakage on service connections (prior to meter)
- If this portion of the water balance is high – losing water resources





Step 2: Is there a problem & how big is it?





Step 3: Devise a Strategy

Work on the most significant problem first

If 70% of the problem is apparent losses and 30% is leaks – spend your money on apparent losses

Money should be spent where it will have the most impact



What are your goals?

Set goals for
revenue
increase and
water loss
reduction

- To obtain the maximum revenue possible?
- To achieve the lowest water loss possible?
- To prevent catastrophic failures?
- To address high priority/high risk assets?
- Reduce repair peaks (either summer or winter)

Goals define the program & strategy





Step 4: Real Water Loss

Let's assume that
the issue is Real
Water Loss





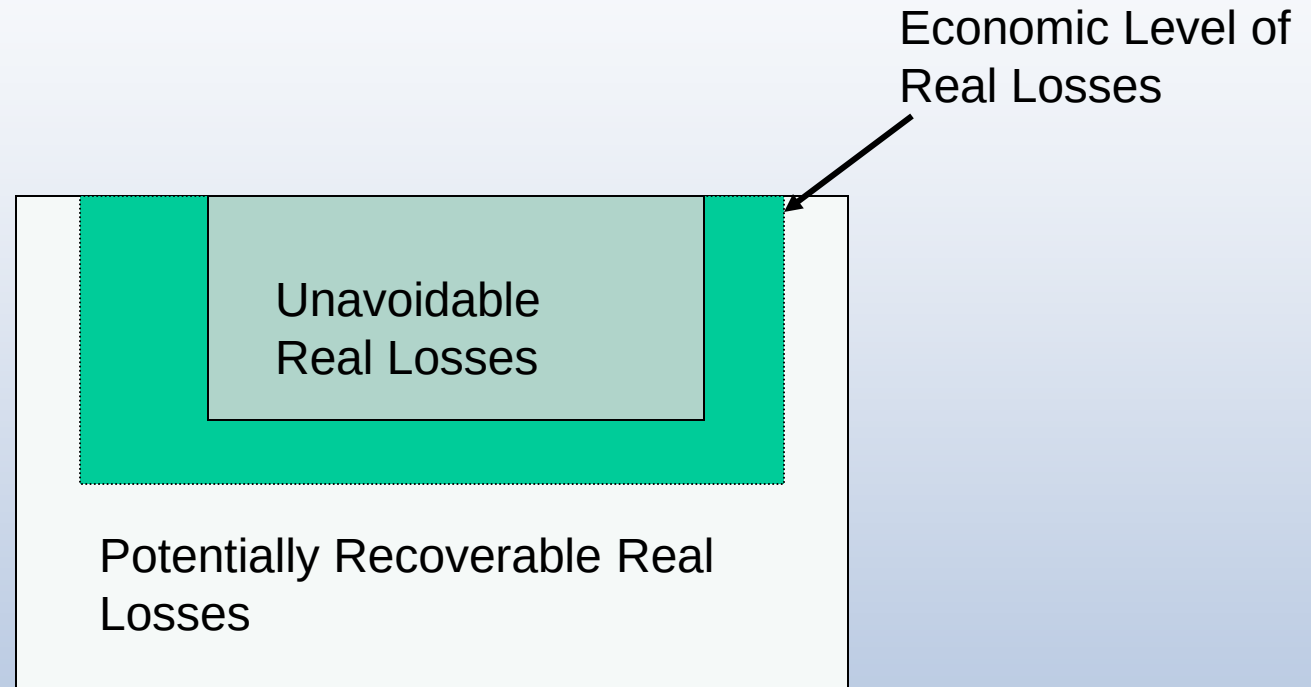
Real Losses

- Can we save all of the losses that are considered “real losses”
 - No
 - Why not?
 - Some losses are considered “unavoidable real losses”
 - Some losses are considered uneconomical to address





More on Real Losses



Real Loss reduction is only looking for the “**Potentially Recoverable Real Losses**” portion. If this portion is not significant to the system, stop here





Methods to Address Real Losses

- Pressure Management
- Active Leakage Control
- Speed and Quality of Repairs
- Pipeline Asset Management

Only going to address 2 of these: Active Leakage Control and Speed and Quality of Repairs





Real Loss Control

Active Leakage Control

- Major activity – Leak detection
 - One size does not fit all
 - Amount and type of leak detection should fit system, resources, personnel, and goals
 - Leak detection is not all or nothing; can do a little or a lot
 - Can be passive or active
 - Frequency will determine how soon leaks are found

Speed & Quality of Repairs

- Finding leaks by itself does not save one drop of water
- Pipe repair or replacement saves water
- The sooner the leak is repaired the sooner the water loss will stop and the more water that will be saved
- If insufficient resources to fix leaks, don't look for them
- Only do as much detection as ability to do repair



Two Methods for Leak Detection

- Passive & Active
 - Passive Leak Detection
 - Deployment of noise data loggers to listen for “noise” on main water lines
 - Active Leak Detection
 - Deployment of a survey crew with listening devices (microphones) to actively listen to hydrants, valves and meters
 - Can be used together
- Purpose of Leak Detection is to find leaks sooner – before they become visible or catastrophic





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Examples



EFC/ABCWUA Activities

- Several Beta Tests
 - Head to Head: Active vs. Passive
 - Head to Head: Passive Devices
 - Fixed Based Metering w/ Automatic Leak Detection
 - Pipe Break Data Review: 15 years of data
 - Different deployment methods for Passive Devices
 - Hydrant Survey: 14,000 hydrants





Findings

- Devices don't replace humans
- Devices don't detect hydrant, meter, service, or house-side leaks well
- Jury's still out on smaller main leaks
- Time savings?????
- Valve placement & pipe type are key factors
- Ease of use important
- Cost – full deployment \$\$
- Time consuming
- Need trained staff





Findings

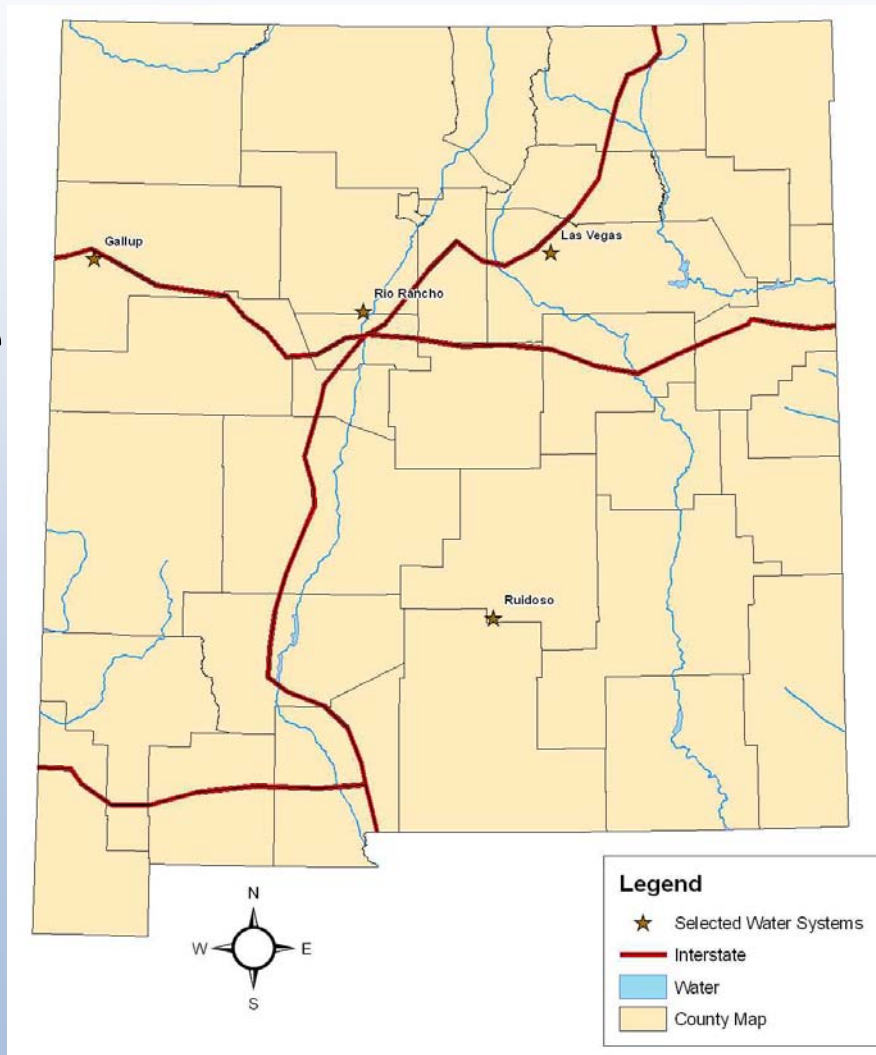
- Pipe break data
 - Approx. 50% of all breaks from 5% of the system (steel water lines)
- Over time, summer peaks dampened
- Trend – steel breaks decreasing as steel replaced by PVC
- Commitment is key
 - No repair, no water loss reduction





Results of Investigating 4 Communities for ELL

- Survey the entire system for leaks
- Could be passive or active
- Looked at potential cost effectiveness of doing a complete survey or more
- One survey will not find all leaks



ELL:

Save water
at a rate
you can
afford





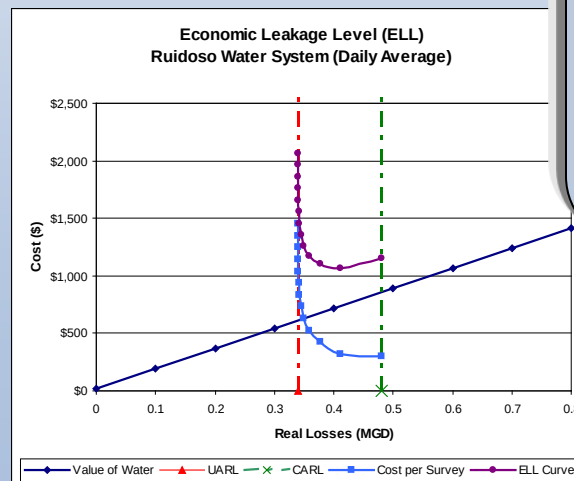
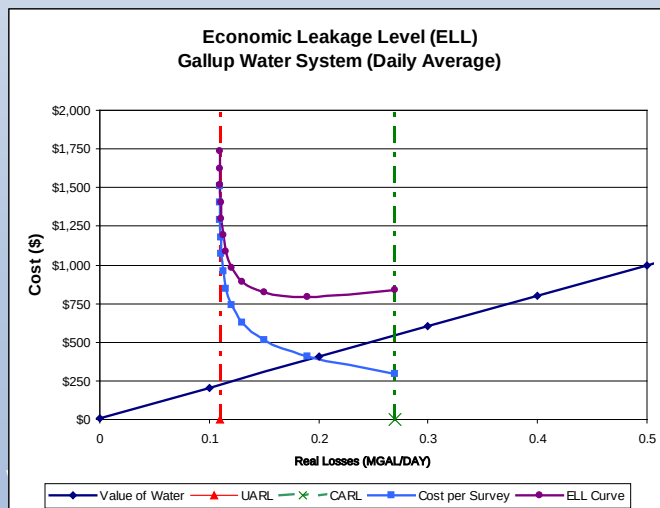
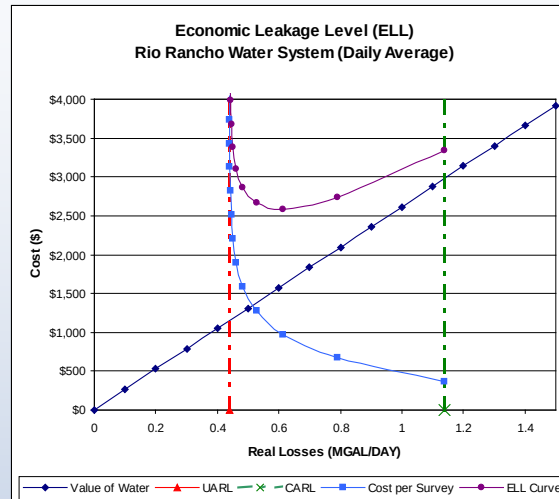
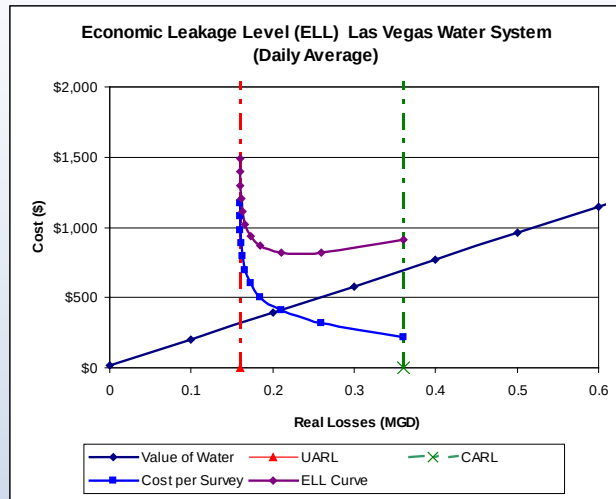
Results of ELL Study

- In concept, ELL is great idea
- In practical terms, it can be difficult to apply





4 Communities ELL



Economical in two cases, questionable economics in 1 case, should address unavoidable losses in last case





Findings

- ELL helps formulate the role of leak management strategies in reducing real losses
- Helps to select a leak detection strategy that does not cost significantly more than the lost water is worth
- If water is cheap, hard for the value of water saved to exceed the cost of leak detection
- Water supply savings may be better argument than ELL or maybe add “intrinsic” value to cost of water to change economic outcome
- Good data = good decisions





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A Few Cautionary Words



A Word of Caution



- Watch out for unrealistic claims of water savings
 - Lots of room for fudging the numbers
- Example
 - One company claimed to have found 60% of a system's total water loss in surveying less than 10% of the system (a random 10%)





A Word of Caution



Over Time

A program may state it can find leaks early before they are a problem

OR

The program may save high volumes of water

Watch out for claims of both

However either is a good thing!!!!





Summary

- Make sure you understand your problem!!
- Setting goals and measuring progress towards meeting those goals is critical
- Make sure the program you select fits your staff, capabilities, and budget
- Make sure you can fix the leaks or don't bother finding them
- Make sure that the economics makes sense OR that the value of the water supply is important enough to outweigh the economics





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Questions? Comments?



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