

A man wearing a grey t-shirt, dark pants, and a dark baseball cap is pouring water from a bright blue bucket into the water tank of a light-colored car. The scene is outdoors, with trees and a building visible in the background. The image has a blue tint.

Measuring Progress Toward Universal Access to Water in California

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Background: Pacific Institute

- **Organization:** Independent non-profit research institute.
- **Mission:** Create and advance solutions to the world's most pressing water challenges.
- **Strategy:** Research on science-based approaches to a sustainable environment, healthy economy, and equitable society.

Overview

Part 1: Indicators of Unsustainable Water Systems & Context




Part 2: Defining Goals and Performance Indicators for Drinking Water

Part 3: Conclusions and Recommendations

Part 1: Indicators of Unsustainable Water Systems

With a focus on information that already is, or could be, collected for:

- **Small water systems** (15-3,000 connections)
- **Via Sanitary Surveys or Small Water System electronic Annual Reports** collected by State Water Board

Vulnerability Category	Example Vulnerability Indicators
Economies of Scale	Small number of service connections 
Legal Obligations	High rate of Safe Drinking Water Act (SDWA) reporting and monitoring violations 
Governance	No rate increase in X years AND low rate of infrastructure replacement or high rate of SDWA violations 
Supply	Exclusive reliance on declining groundwater, groundwater under direct influence of surface water, or highly variable surface water; AND lack of interties to more reliable supplies
Financial Capacity	Annual revenue < Annual expenditures
Financial Investment	Water main replacement rates below standard; water loss rates higher than standard
Managerial Capacity	Treatment and distribution system operators lack appropriate certifications
Environment	Unprotected source watershed

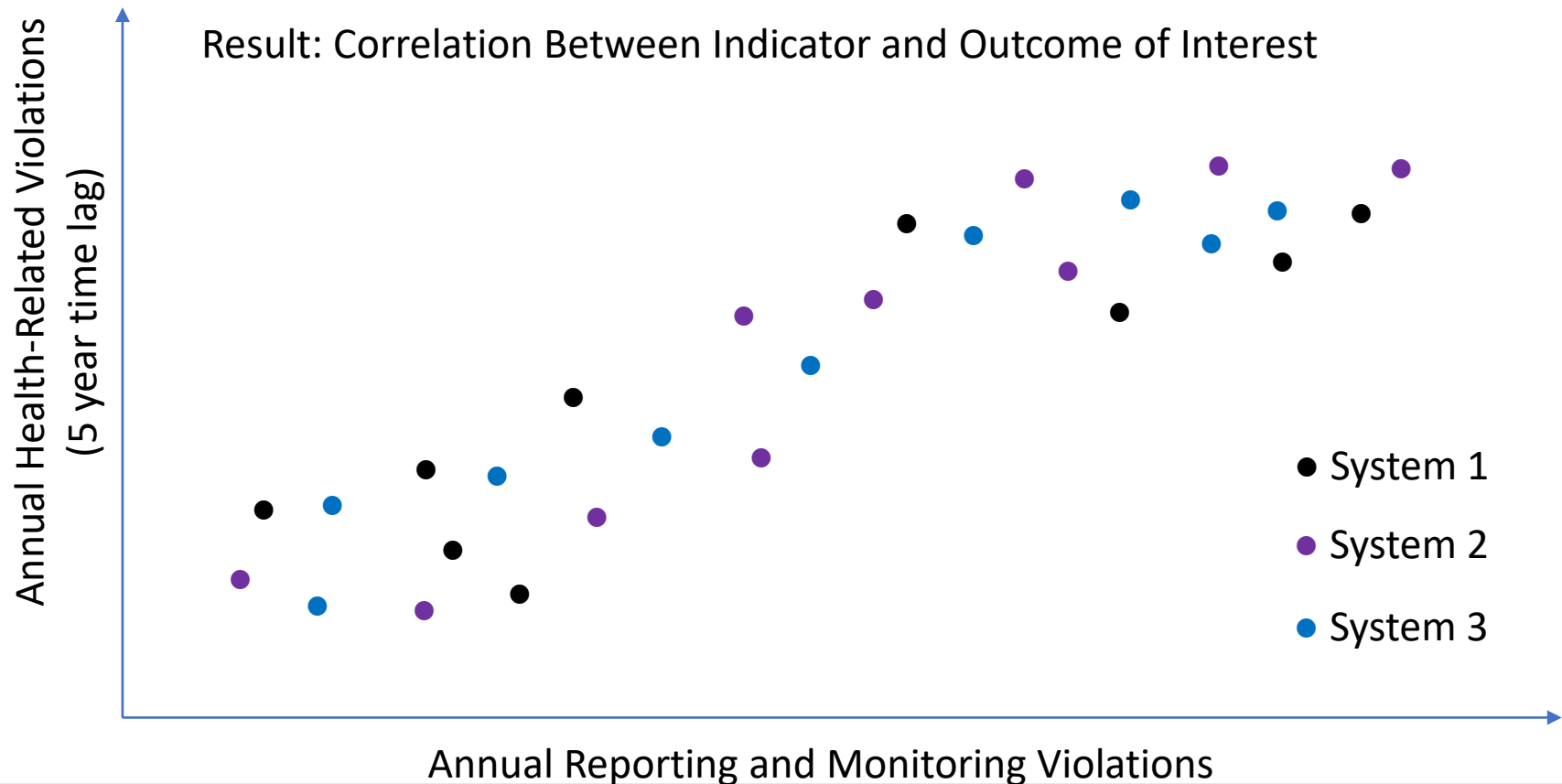
Indicators are not Goals

“Every human being has the right to safe, clean, affordable, and accessible water adequate for human consumption, cooking, and sanitary purposes.”

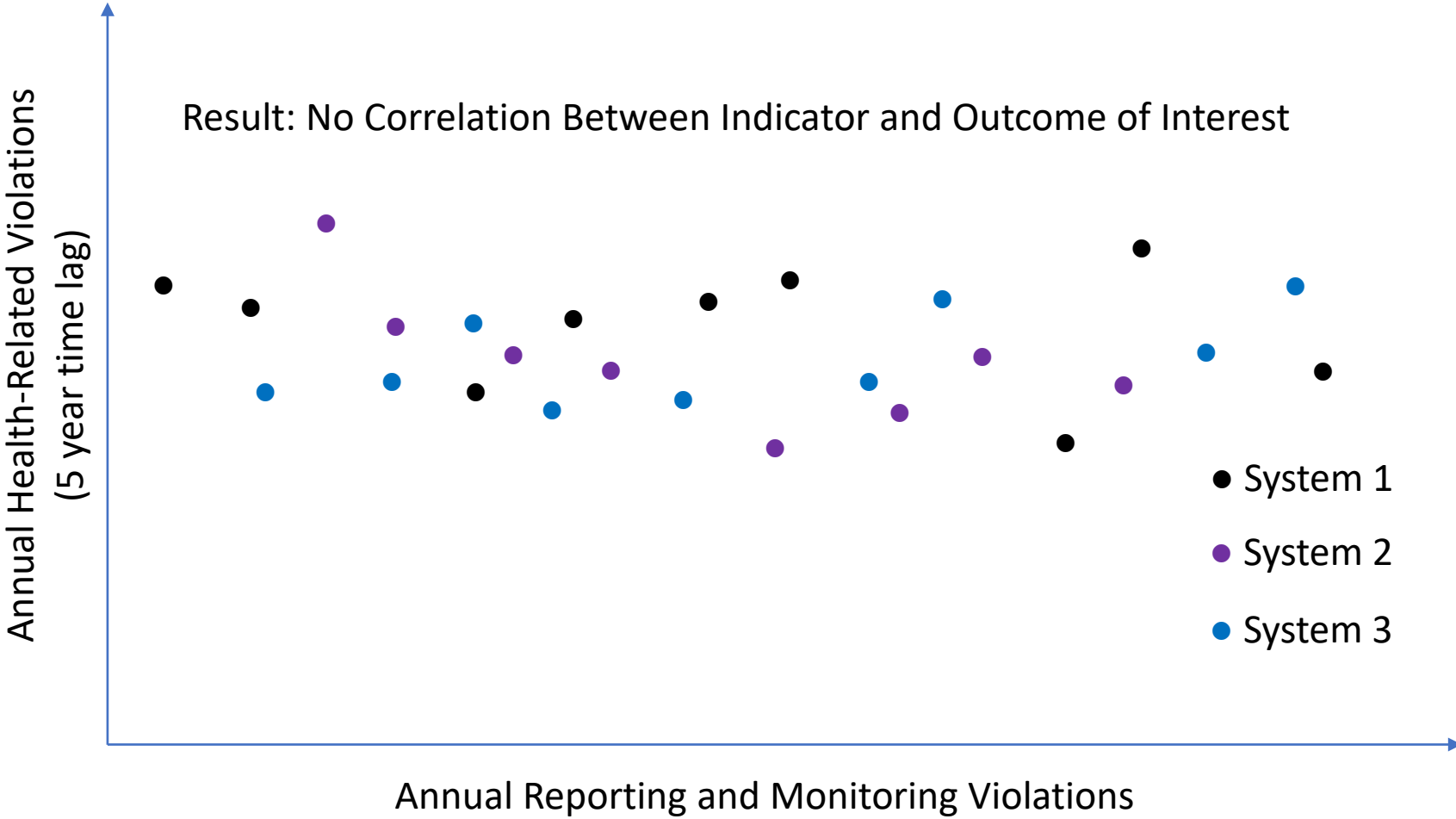
California Water Code §106.3

Validate Utility of Indicators...

Simplified Hypothetical Example of Statistical Model



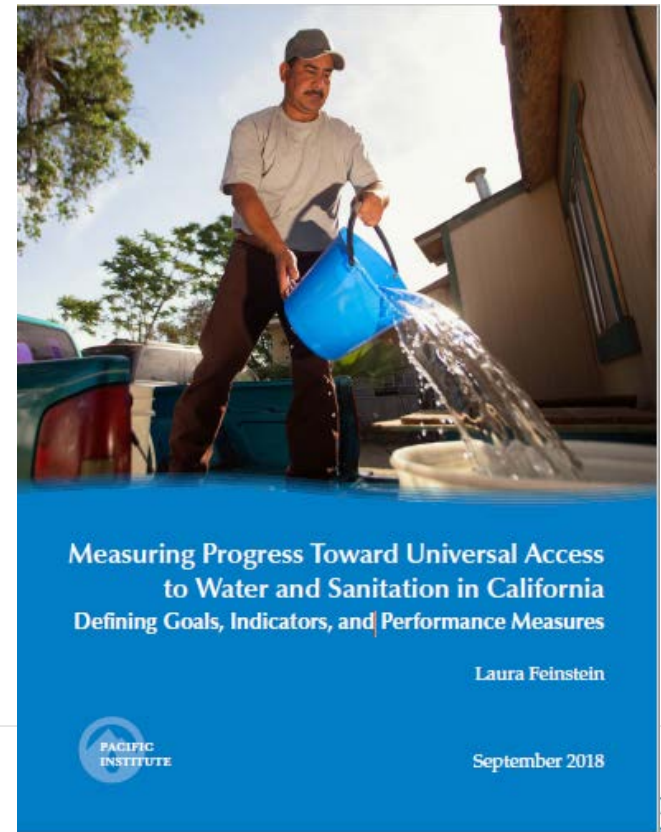
Or Eliminate Them



Part 2: Defining Goals and Performance Indicators

What does safe, affordable, and accessible water look like in California, in terms that are:

- Concrete,
- Measurable, and
- Aligned with state's laws and norms?



Approach: Service Ladders

SERVICE LEVEL	DEFINITION
SAFELY MANAGED	Drinking water from an improved water source that is located on premises, available when needed and free from faecal and priority chemical contamination
BASIC	Drinking water from an improved source, provided collection time is not more than 30 minutes for a round trip, including queuing
LIMITED	Drinking water from an improved source for which collection time exceeds 30 minutes for a round trip, including queuing
UNIMPROVED	Drinking water from an unprotected dug well or unprotected spring
SURFACE WATER	Drinking water directly from a river, dam, lake, pond, stream, canal or irrigation canal

From the World Health Organization and UNICEF, 2017

California-Specific Service Ladders

Service Ladders for:

Safe Water

Affordable Water and Sanitation

Accessible Water

Safe Sanitation

Accessible Sanitation

Customized for prevailing statutes and regulations, aligned with public datasets

Focused on household level

The service ladders are customizable

Safe Drinking Water

- Drinking water is often described as “safe” or “unsafe,” but these terms aren’t consistently defined
- There are approximately 100 enforceable standards under the Safe Drinking Water Act (e.g., Maximum Contaminant Levels or MCLs)
- Many variables: Does the contaminant have acute or chronic health impacts? Did the contaminant exceed the Maximum Contaminant Level by a small amount, or a lot? Was the quality problem an isolated event, or recurring problem?

Service Ladder: Safe Drinking Water

Goal: Chemicals regulated by state and federal SDWA standards should be consistently below levels that pose a significant risk to health.

		Household-Level Service Indicator	Household-Level Performance Measure
Service Level	Satisfactory	Water has met state and federal SDWA standards for Public Water Systems for the past three years.	Household served by Public Water System that has been without an enforcement action during the last three years for state or federal drinking water standards.
	Moderate	Water has met state and federal SDWA standards for Public Water Systems for the vast majority of time in the past three years.	Household served by Public Water System that 1) has been without an enforcement action for an acute drinking water standard during the last three years, and 2) has been without an enforcement action lasting more than one monitoring period during the last three years for state or federal chronic drinking water standards.
	Marginal	Water meets standards set by US Food and Drug Administration, is treated by Point of Use/Entry filter that meets California Title 22 regulations, or meets voluntary domestic well guidelines.	Household uses bottled water regulated by US Food and Drug Administration, or water from a Public Water System that does not have a centralized treatment facility but is treated by a Point of Entry/Use filter that meets State Water Board resolution 2016-0015, or water from well serving fewer than 15 connections that meets voluntary domestic well guidelines.
	Unacceptable	Drinking water quality that is not regularly tested and verified as meeting at least the Marginal standard for safety.	Any one of the characteristics of Marginal access to water is not met.

Accessible Drinking Water

Variables Considered:

- California statute legally requires homes to have hot and cold running water
California Civil Code §1941.1(a), California Health and Safety Code §17920.3
- American Community Survey tracks hot and cold indoor piped water
- 43 gallons per capita day (GPCD) is backed up by data on indoor water use, minus leaks, in California

Service Ladder: Accessible Drinking Water

Goal: Water should be available in sufficient volumes to meet domestic needs, at hot and cold temperatures, in a location near home, at the times needed.

		Household-Level Service Indicator	Household-Level Performance Measure
Service Level	Satisfactory	Sufficient hot and cold indoor piped water reliably available 24 hours a day.	At least 43 GPCD hot and cold indoor piped potable water available 24 hours a day.
	Moderate	Sufficient hot and cold water from an improved source available on premises (indoors or outside) and reliably available 24 hours a day; bottled or delivered water acceptable in some circumstances.	At least 43 GPCD hot and cold piped potable water available on the premises 24 hours a day.
	Marginal	Sufficient water from an improved source, including bottled water or tanks of water delivered by truck, provided collection time is not more than 30 minutes round-trip (including waiting time), and reliably available at least 12 hours a day.	Improved, potable water source providing at least 14 GPCD within 30 minutes round-trip of place of residence (including waiting time), available at least 12 hours a day.
	Unacceptable	Water that does not meet at least the Marginal standards for access.	Any one of the characteristics of Marginal access to water is not met.

Affordable Drinking Water

Affordable water has historically been measured as the cost of the average water bill as a percentage of median household income

- Better metric:
 - Essential indoor water use
 - Consider the range of income between households
 - Consider local cost of living
 - Consider cost of both water and wastewater, if possible

Service Ladder: Affordable Drinking Water

Goal: Cost of essential water and sanitation needs should be inexpensive enough that cost does not prevent access, nor interfere with other essential expenditures.

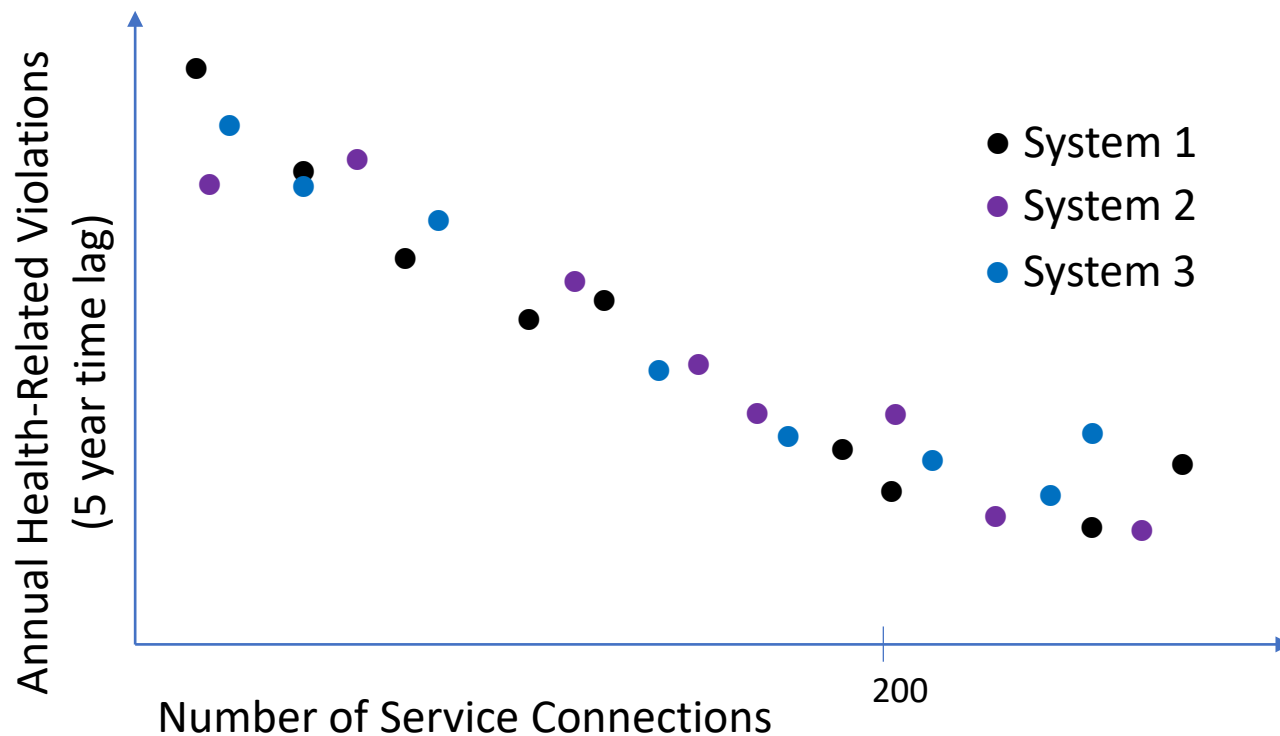
		Household-Level Service Indicator	Household-Level Performance Measure
Service Level	Satisfactory	Household can afford safe, accessible water and sanitation without facing tradeoffs with other essential expenditures.	Household spends $\leq 10\%$ of discretionary income on essential water and sanitation needs.
	Moderate	"	Household spends $> 10\%$ but $\leq 20\%$ of discretionary income on essential water and sanitation needs.
	Marginal	Household occasionally cannot afford safe, accessible water and sanitation without facing tradeoffs with other essential expenditures.	Household spends > 20 but $\leq 30\%$ of discretionary income on essential water and sanitation needs.
	Unacceptable	Household regularly cannot afford safe, accessible water and sanitation without facing tradeoffs with other essential expenditures.	Household spends $> 30\%$ of discretionary income on essential water and sanitation needs.

Next Steps

- Develop a shared understanding of what is safe, affordable, accessible water and sanitation
- Use existing public datasets to fill in numbers for the performance measures
- Identify problems proactively
- Adaptive management: track the impact of funded projects and change course as necessary

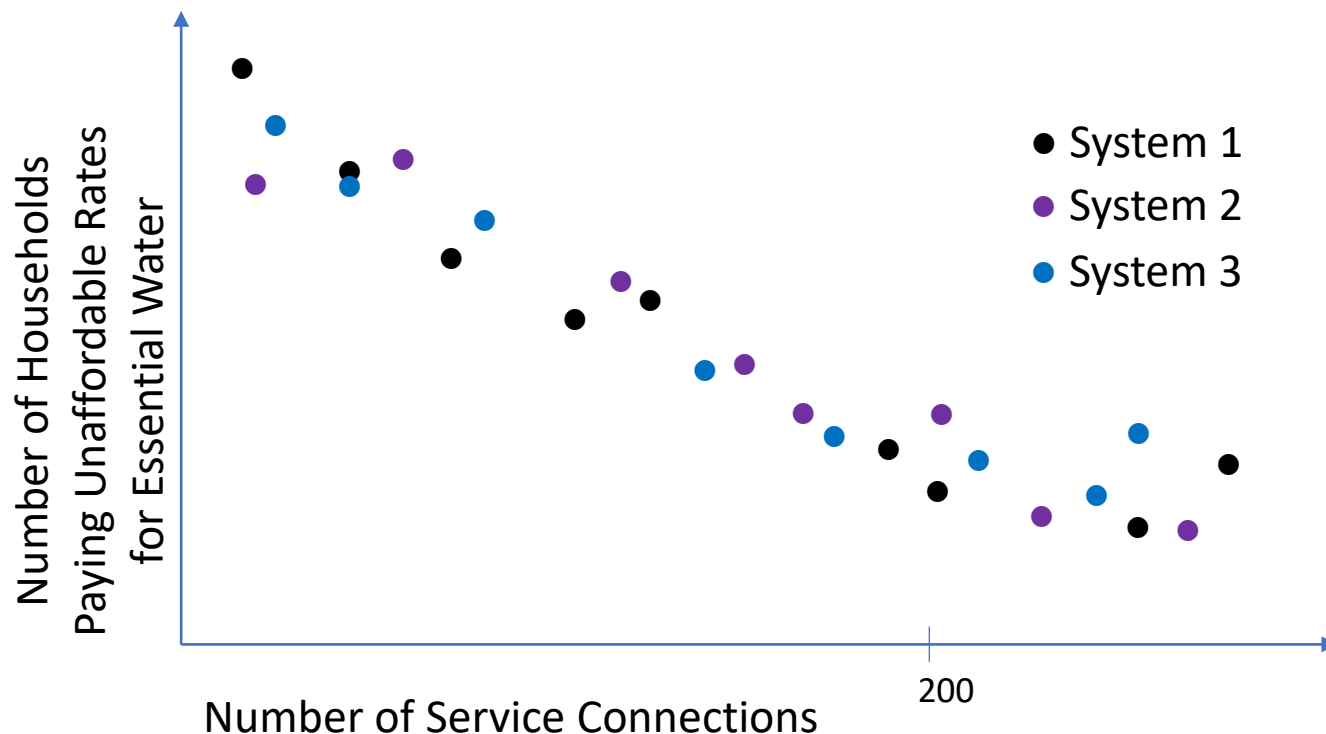
Conclusion & Recommendation

- Link indicators of an unsustainable water system to performance measures



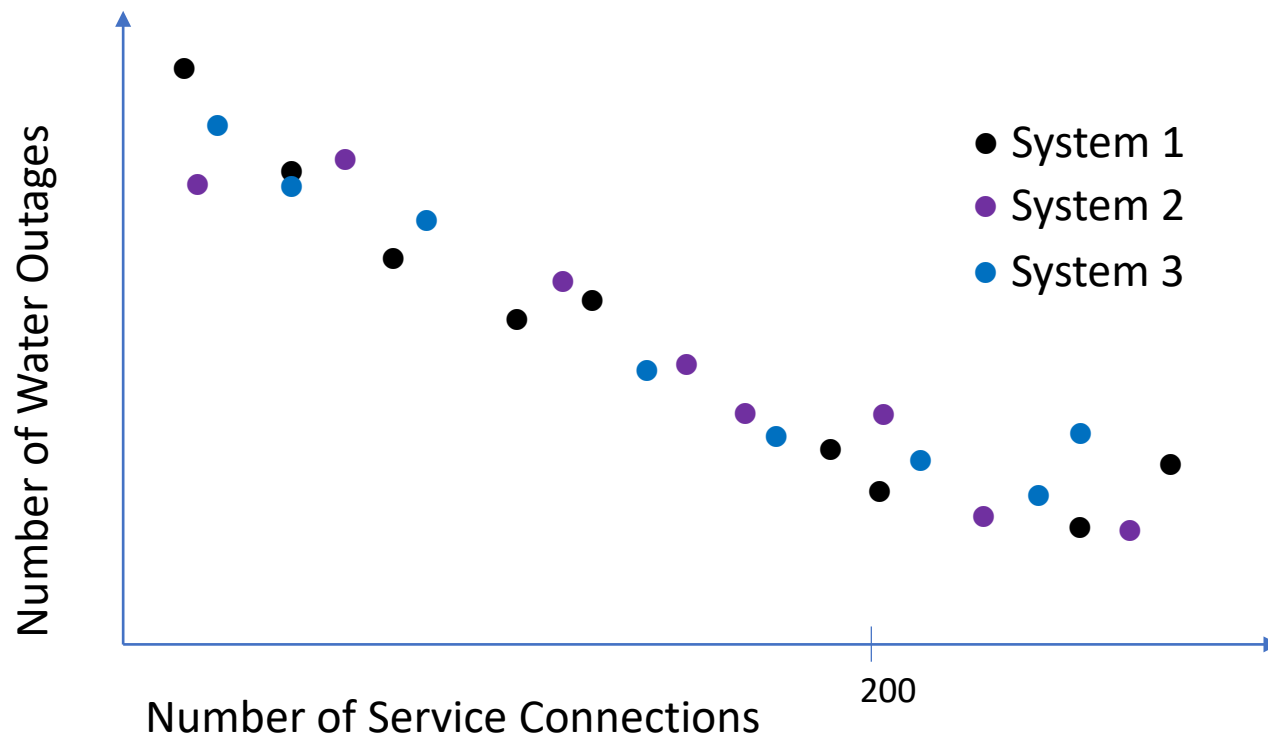
Conclusion & Recommendation

- Link indicators of an unsustainable water system to performance measures

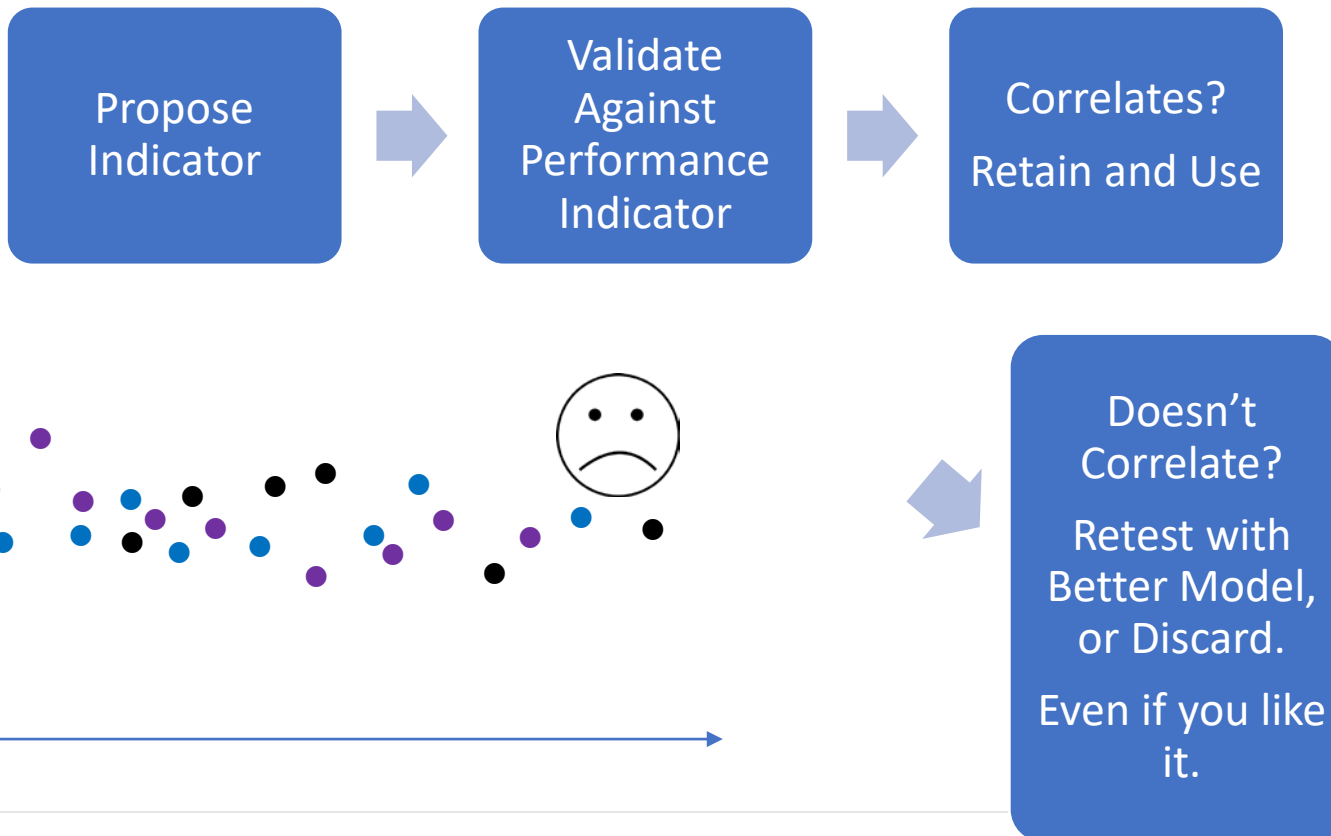


Conclusion & Recommendation

- Link indicators of an unsustainable water system to performance measures



Indicators are Supposed to Indicate Something



Additional Information

Visit Report Web Page:

<http://pacinst.org/publication/measuring-progress/>

- Report With Full Service Ladders
- Data Sources for Informing Performance Indicators

Coming Soon: *Californians with Incomplete Plumbing*



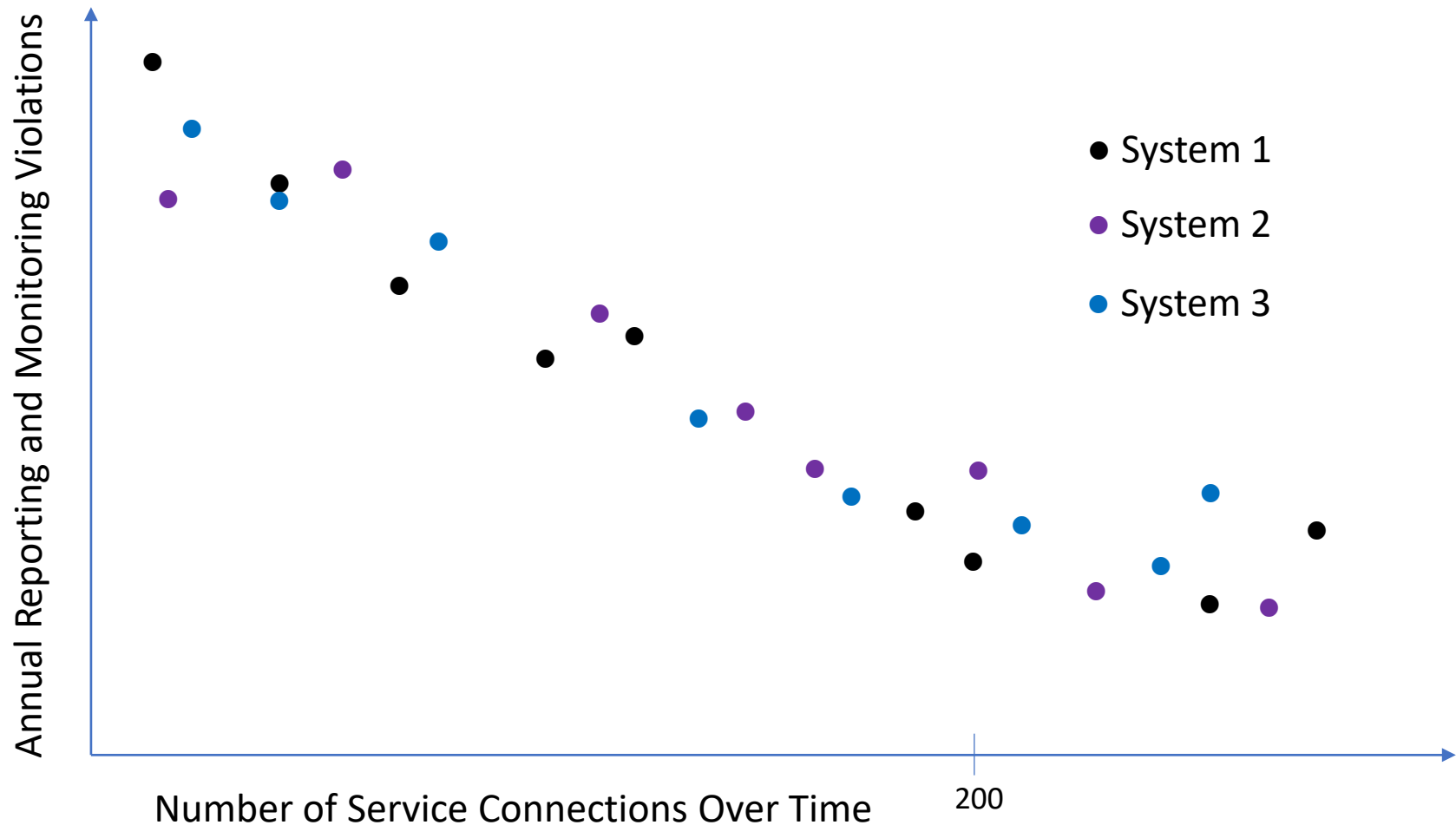
Questions?

Laura Feinstein

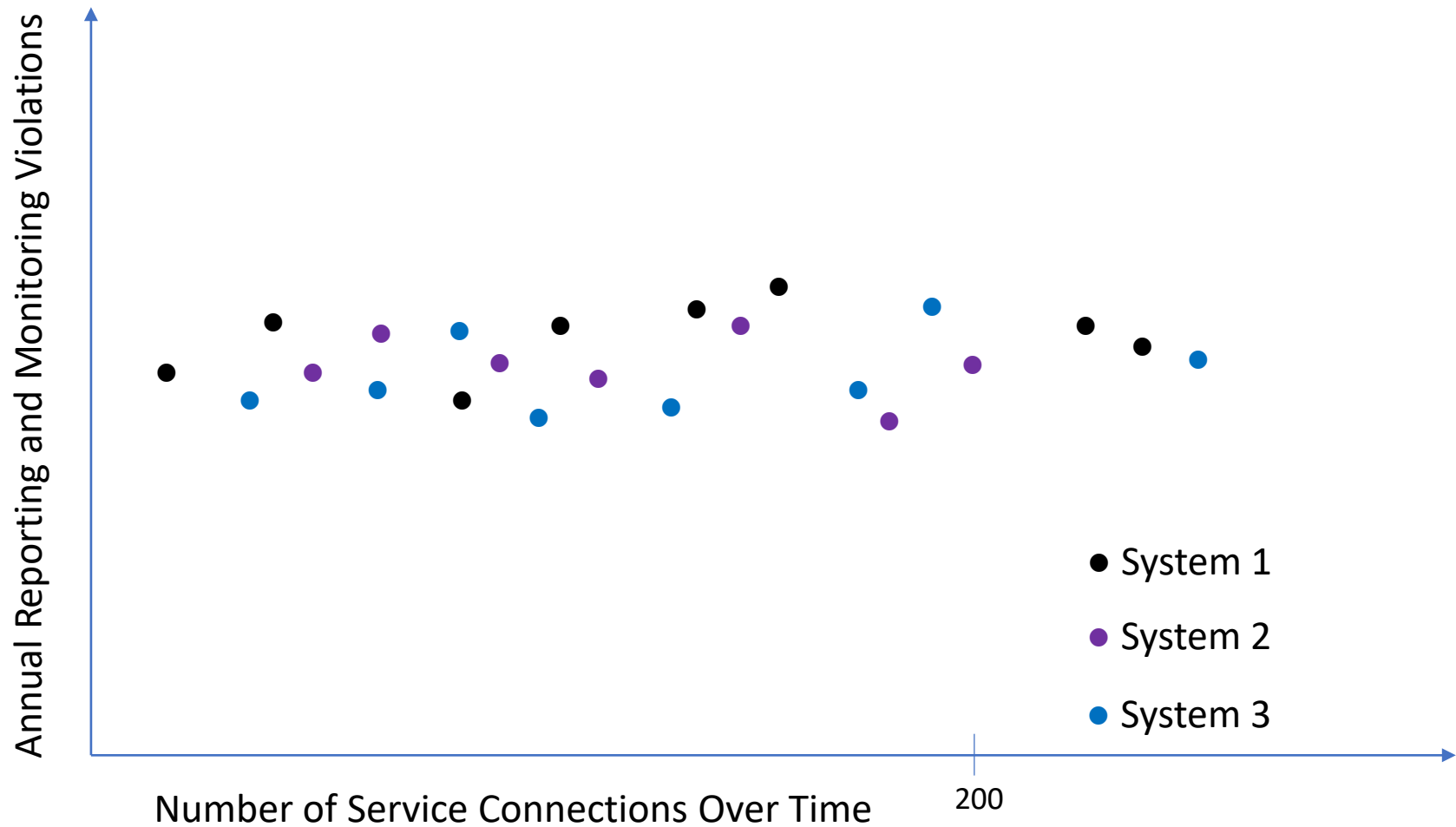
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Validate the Indicators



Validate the Indicators



Vulnerability Category	Example Vulnerability Indicators
Environment	Unprotected source watershed
Supply	Exclusive reliance on declining groundwater, groundwater under direct influence of surface water, or highly variable surface water; AND lack of interties to more reliable supplies
Demand	High per capita water use relative to other areas with comparable evapotranspiration
Economies of Scale	Small number of service connections
Financial Capacity	Annual revenue < Annual expenditures
Financial Investment	Poor infrastructure maintenance (water main replacement rates, percentage of water lost in leaks)
Affordability	Percentage of households spending more than 5% of discretionary income on essential indoor water uses
Managerial Capacity	Chief and shift Treatment and Distribution System Operators lack appropriate certifications; Failed to distribute Consumer Confidence Report
Governance	No rate increase in X years AND low rate of infrastructure replacement or high rate of SDWA violations
Legal Obligations	High rate of Safe Drinking Water Act (SDWA) reporting and