



A Framework and Tool for Evaluating California's Progress in Achieving the Human Right to Water



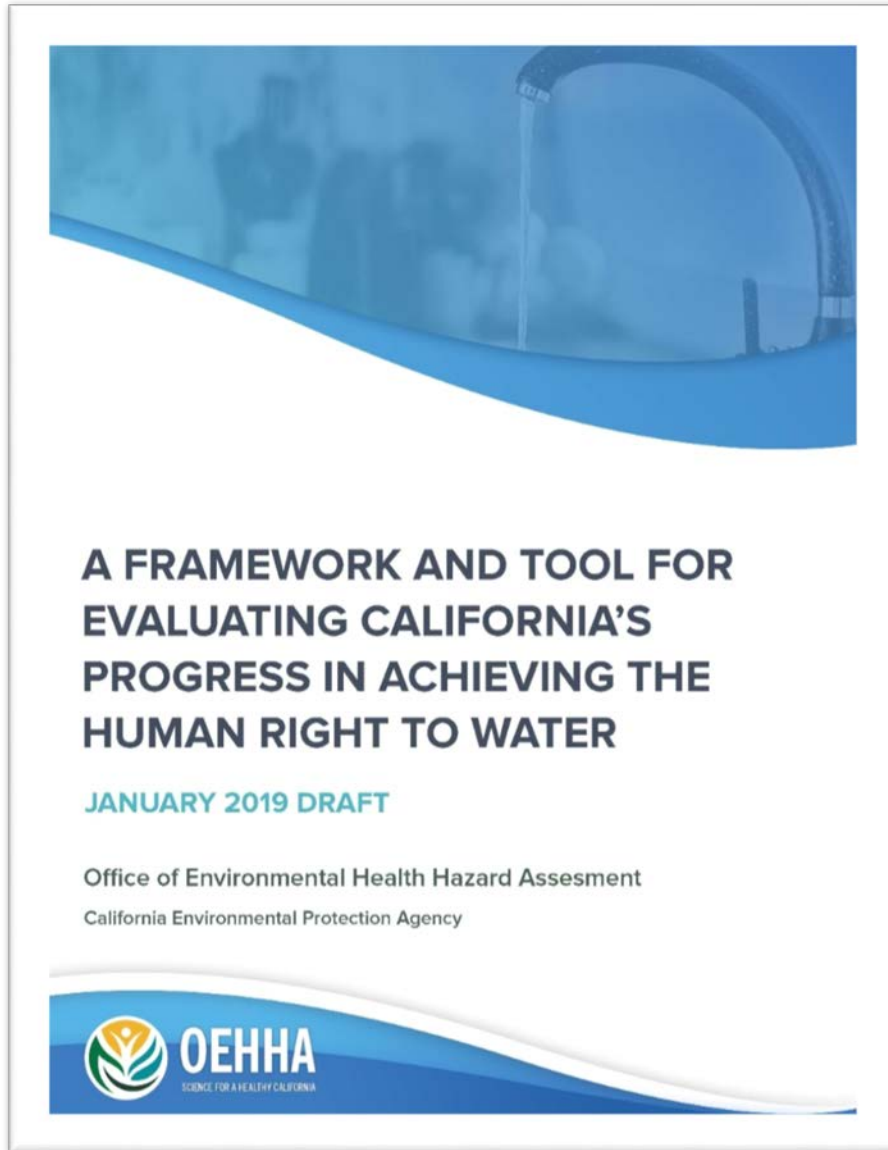
John B Faust, PhD
Office of Environmental Health Hazard Assessment

May 23, 2019

2019 CWA Spring Conference



OEHA
SCIENCE FOR A HEALTHY CALIFORNIA

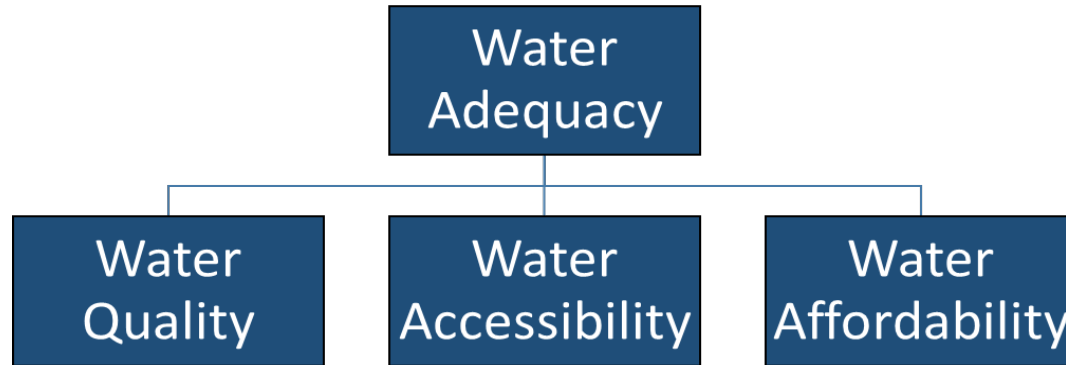


The framework and tool:

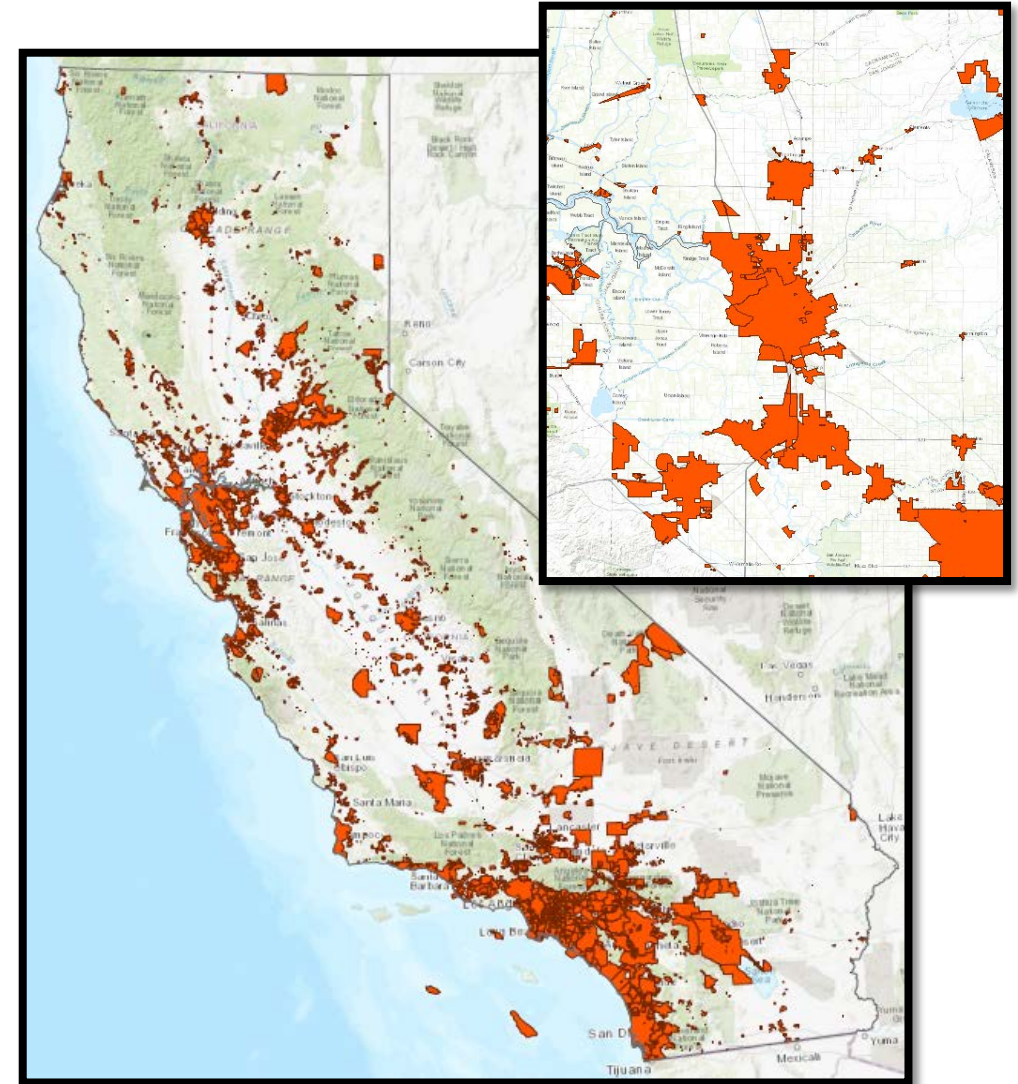
- **Monitors progress** in achieving the human right to water
- **Represents first state-led effort to holistically assess** the quality, accessibility and affordability of drinking water



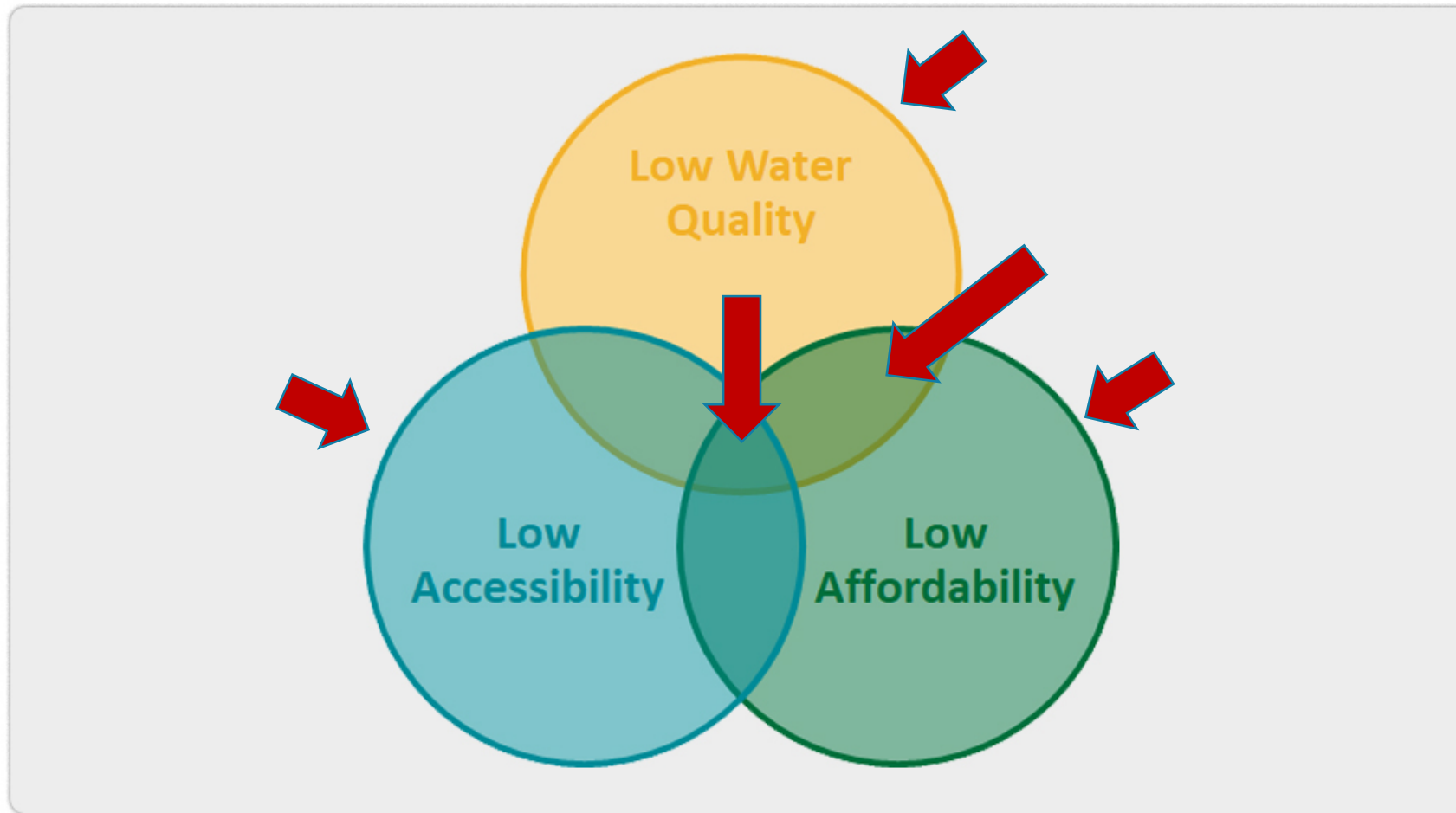
Framework Overview



- **13 indicators:** relevance, data quality, coverage, and public availability
- **Unit of analysis:** Community Water System
- **Time period:** 2008-2016
- **Statewide application**



A Holistic View of Water System Challenges





Water Quality:

Indicators rely on data for 19 contaminants

Criteria for contaminant selection:

- Significant coverage of water quality data:
 - $\geq 80\%$ of systems report at least one sample

Or

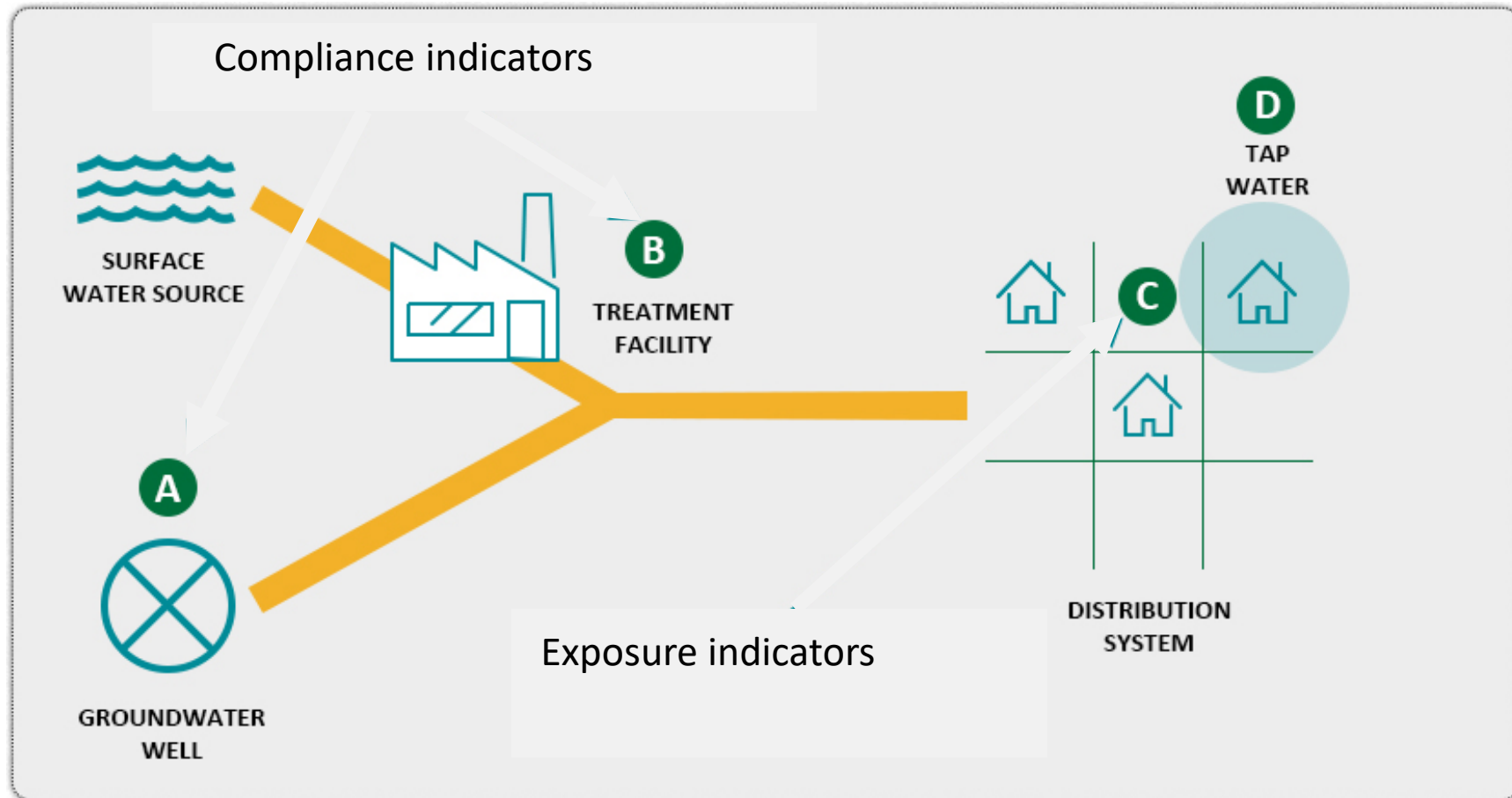
High priority:

- Significant number of MCL violations

Contaminant	Measure Used in Water Quality Indicators	
	Exposure	Compliance
Arsenic	Yes	Yes
Barium	Yes	Yes
Benzene	Yes	Yes
Cadmium	Yes	Yes
Carbon tetrachloride	Yes	Yes
Dibromochloropropane (DBCP)	Yes	Yes
Lead [†]	Yes	No
Mercury	Yes	Yes
Methyl tertiary butyl ether (MTBE)	Yes	Yes
Nitrate	Yes	Yes
Perchloroethylene (PCE)	Yes	Yes
Perchlorate	Yes	Yes
Trichloroethylene (TCE)	Yes	Yes
1,2,3-Trichloropropane (1,2,3-TCP) [†]	Yes	No
Toluene	Yes	Yes
Total Coliform [†]	Yes	Yes
Total Trihalomethanes (TTHM)	Yes	Yes
Uranium	Yes	Yes
Xylene	Yes	Yes



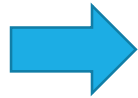
Two Types of Water Quality Indicators: Compliance vs Exposure





Water Quality: Four exposure indicators

**Annual average
contaminant
concentration in
delivered water**



Potential high exposure

How many contaminants' annual average concentration exceeded the MCL?



Presence of acute contaminants

Are the above contaminants associated with health effects from short term exposure? (nitrate, perchlorate, fecal/E. coli)



Maximum duration of potential high exposure

How long did exposure last?



Data availability

Was water quality data available?

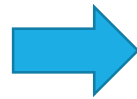
Data source:

Water Quality Monitoring database



Water Quality: Three compliance indicators

**Count of MCL
Violations**



Non-compliance with primary drinking standards

How many contaminants received at least one MCL violation in study period?



Presence of acute contaminants

Are the above contaminants associated with health effects from short term exposure? (nitrate, perchlorate, fecal/E. coli)



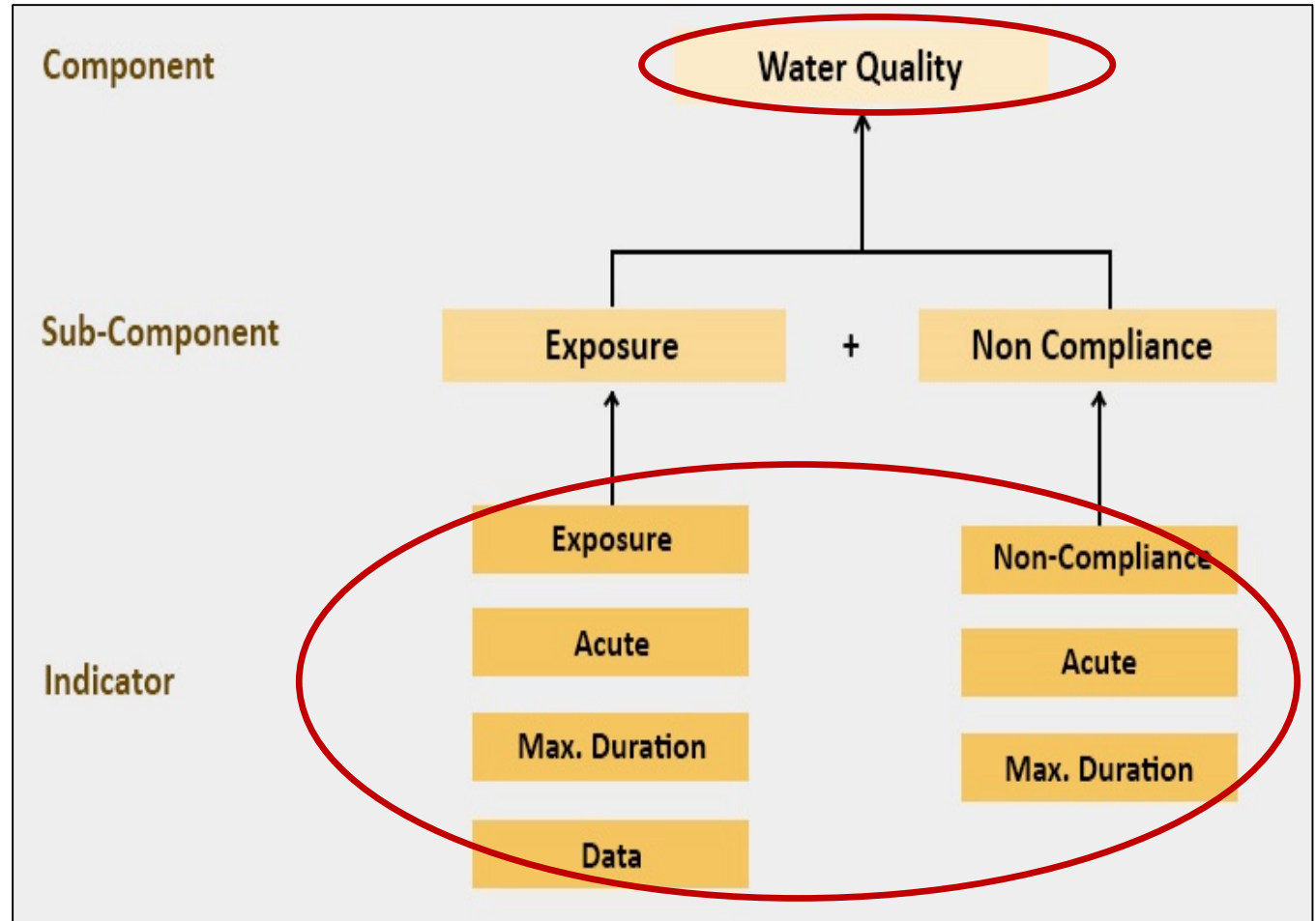
Maximum duration of non-compliance

How long did non-compliance last?



Composite View of Water Quality

- Individual indicators highlight specific outcomes
- Composite component score highlights outcomes across multiple indicators





Water Quality: Hypothetical example

Exposure



Potential high exposure

Result: Arsenic



**Presence of acute
contaminants**

Result: No



**Maximum duration of
potential high exposure**

*Result: 9 years of arsenic at
20-30 ppb*



Data availability

*Result: All required data
reported*

Compliance



**Non-compliance with primary
drinking standards**

Result: Arsenic



Presence of acute contaminants

Result: No



**Maximum duration of non-
compliance**

Result: 5 years of MCL violations

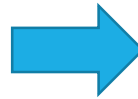


Water Accessibility



Entails:

- Physical quantity
- Availability and reliability of supply (sufficient and continuous)
- Source type and collection time



OEHHA's current focus:

System-related characteristics that can impede access

Physical vulnerability:

- Factors that may interfere with the availability and reliability of an adequate supply

Institutional vulnerability:

- Technical, managerial and financial capacity of a water system to conduct operations and maintenance



Water Accessibility: Three indicators

Physical Vulnerability



Physical vulnerability to water outages

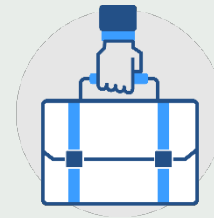
What is the source type and how many sources?

Institutional Vulnerability



Institutional capacity

What is the size and disadvantaged community (DAC) status?



Managerial constraints

How many monitoring and reporting violations?

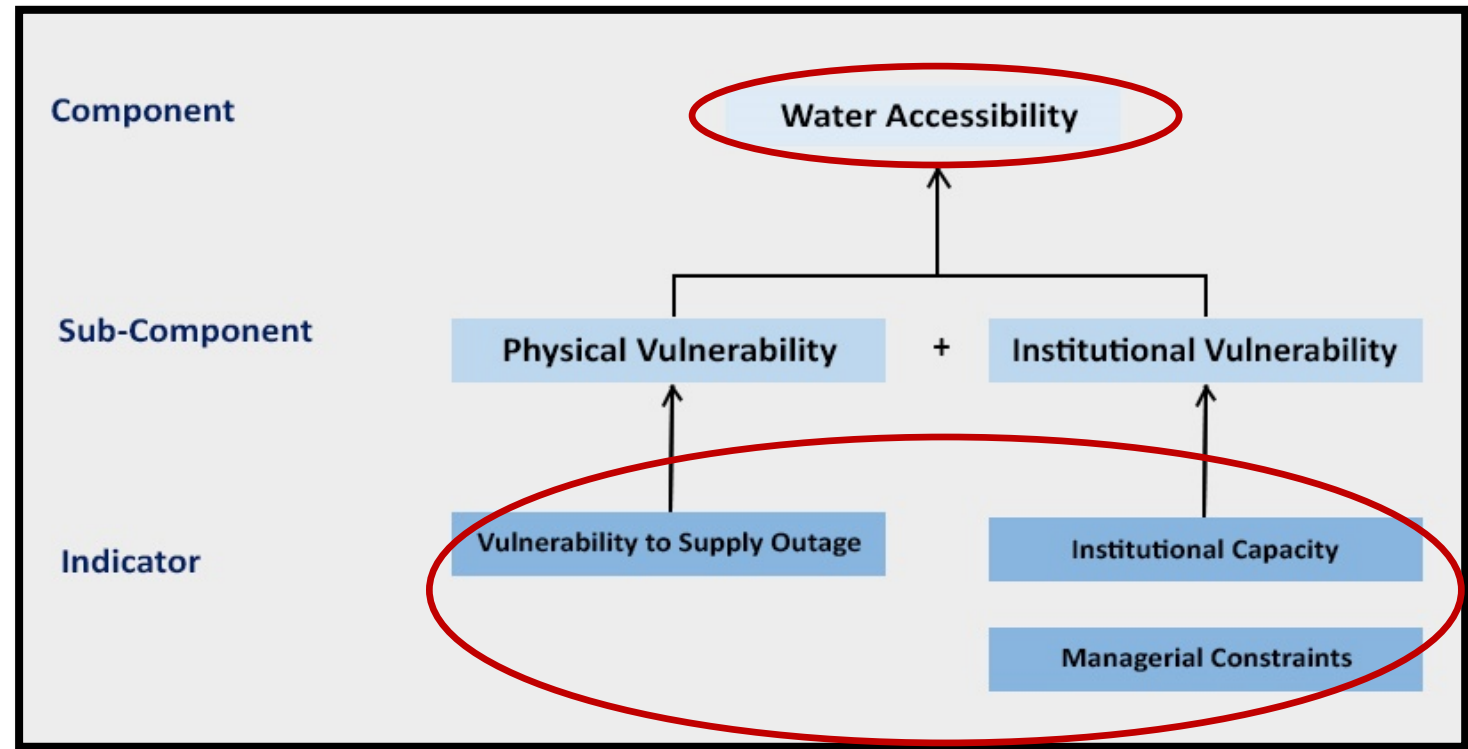
Data sources: SDWIS and U.S. census data

Future steps: Additional indicators to address other aspects of accessibility



Composite View of Water Accessibility

- Individual indicators highlight specific outcomes
- Composite component score highlights outcomes across multiple indicators





Water Accessibility: Hypothetical example

Physical Vulnerability



Physical vulnerability to water outages

Result: 1 groundwater well

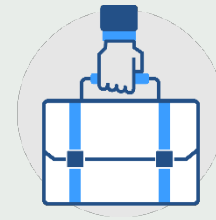
Institutional Vulnerability



Institutional capacity

Result: 50 connections

*Median Household Income:
\$42,271 (DAC)*



Managerial constraints

*Result: 10 Monitoring &
Reporting Violations*



Water Affordability: Three indicators

Proposed Affordability Ratio =

$$\frac{\text{Monthly Water Bill @ 6 Hundred Cubic Feet}}{\text{Income of Water System}} \geq \text{Multiple ratios}$$

Data sources: electronic Annual Report, census data, poverty threshold calculations from Public Policy Institute of California

Gaps: Additional effort needed to fill in water cost data gaps



Affordability Ratio at the
Median Household Income



Affordability Ratio at the
County Poverty Threshold



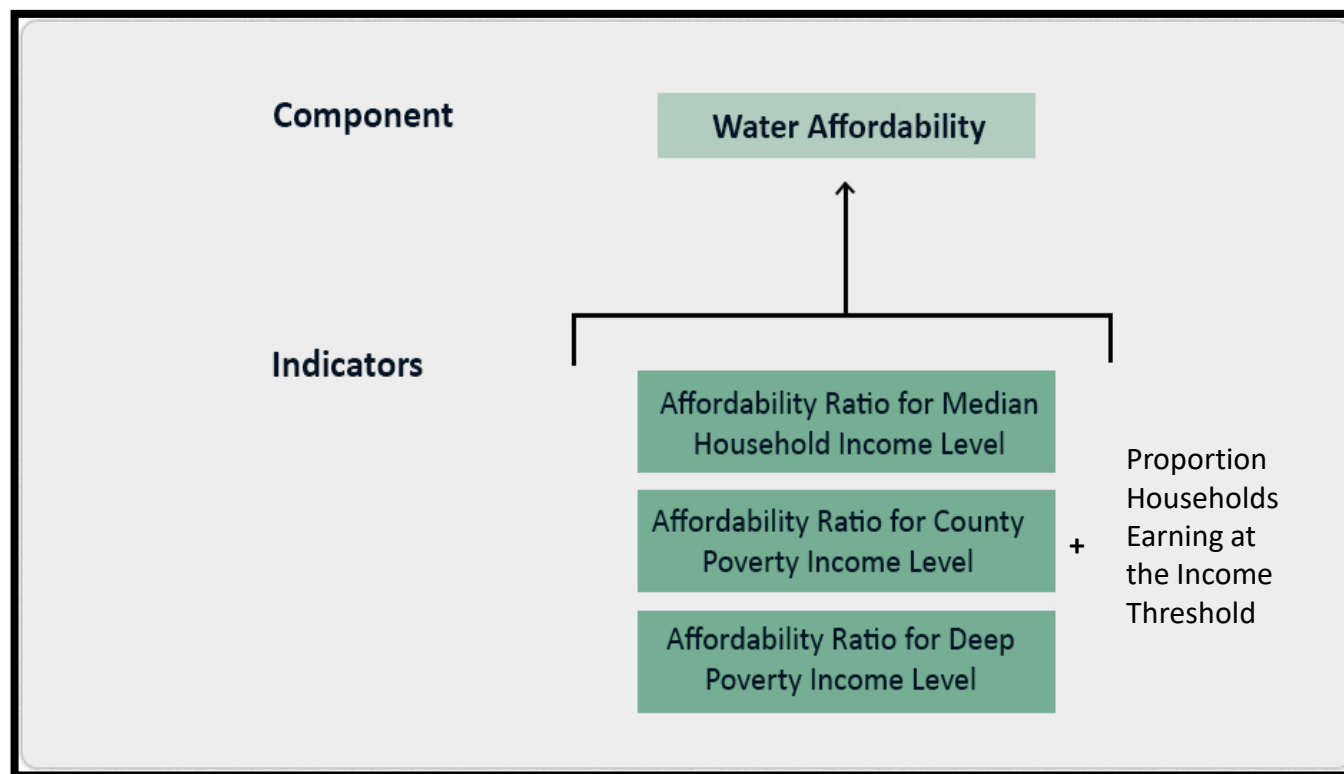
Affordability Ratio at the
Deep Poverty Threshold

+ Proportion
Households
Earning at
the Income
Threshold



Composite View of Water Affordability

- Individual indicator scores provide affordability information for specific income levels
- Composite score provides overall affordability burden:
 - Factors in economic vulnerability and proportion of households facing different burdens





Water Affordability: Hypothetical example

Monthly Water Bill:	\$72
Median Household Income:	\$42,279
County Poverty:	\$25,717
Deep Poverty:	\$12,858



Affordability Ratio at the
Median Household Income

Result: *2.1%*



Affordability Ratio at the
County Poverty Threshold














Result: *3.4%; 30% of households*



Affordability Ratio at the
Deep Poverty Threshold

Result: *6.8%; 5% of households*

Framework and tool allow for an assessment of the status of water systems...

	Water Quality							Accessibility			Affordability		
Indicator													
	1	2	3	4	5	6	7	1	2	3	1	2	3
System A													
System B													
System C													

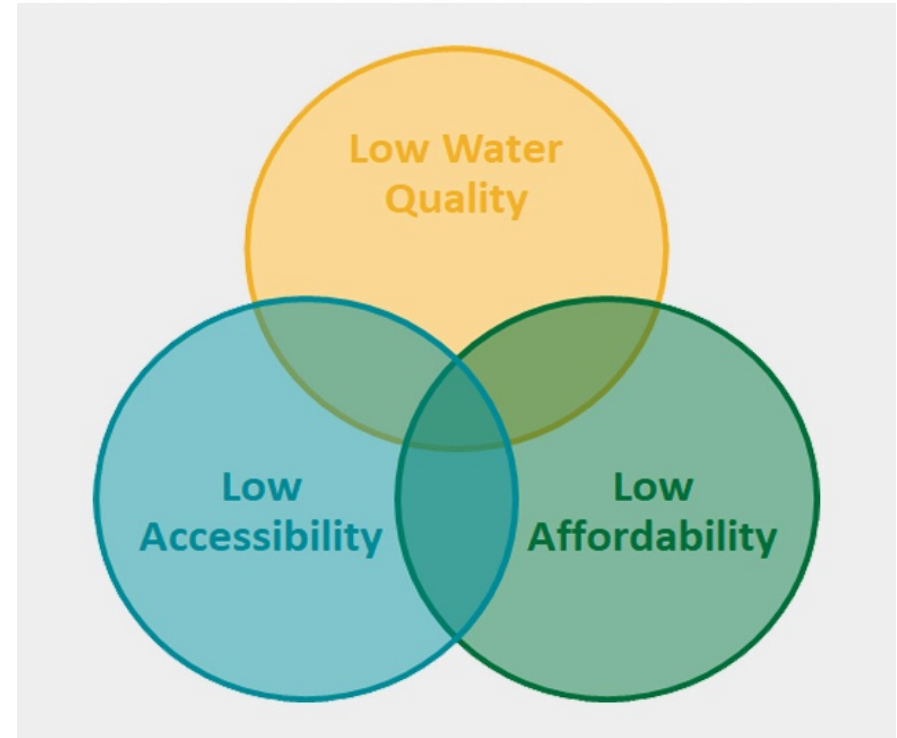




Conclusion

The framework and tool:

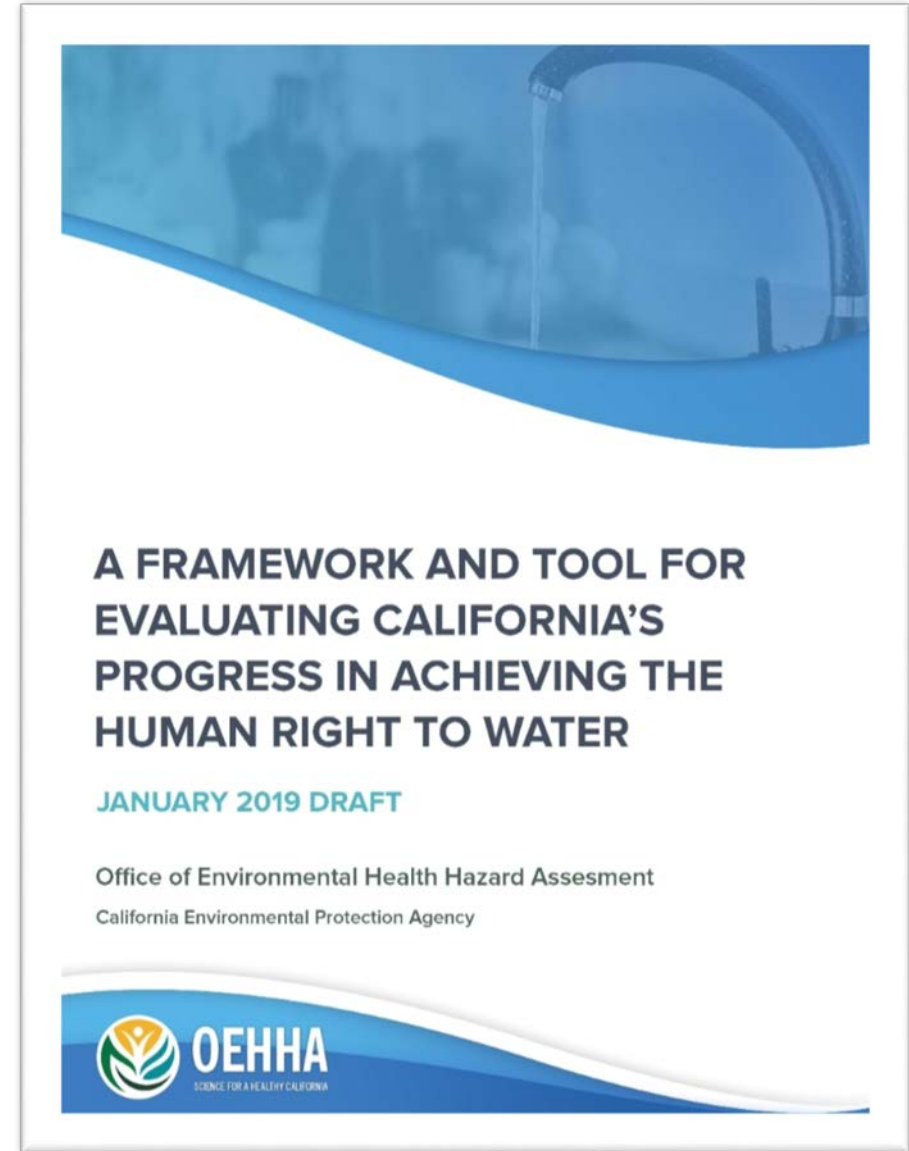
- Summarize 3 components and 13 indicators
- Offers holistic view that can help show interrelationships
- Provides a view of big-picture trends across water systems and regions, statewide
- Helps capture how those trends might change over time





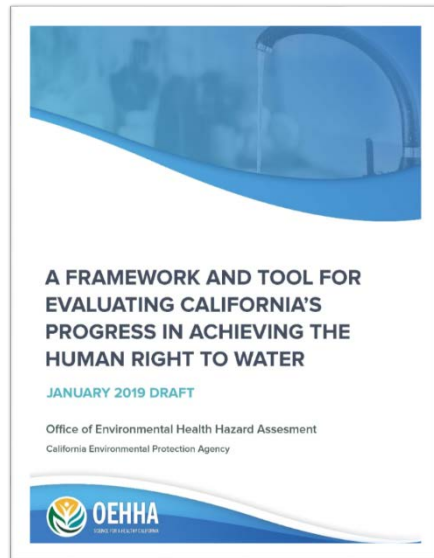
Next Steps

- Public comment closed February 4, 2019
- Public comments posted on OEHHA's website
- Next steps:
 - Ongoing OEHHA review of comments
 - Revisions to framework
 - Release of next draft document explaining the tool in detail



Contributors & Program Information

<i>Staff lead</i>	Carolina Balazs, PhD Research Scientist, OEHHA
<i>Program webpage</i>	https://oehha.ca.gov/water/report/human-right-water-california
<i>Program email</i>	HR2.Water@oehha.ca.gov



Authors	Reviewers	Technical Editor	CalEPA Reviewers
Carolina Balazs	Lauren Zeise	Krystyna von Henneberg	Yana Garcia
John B Faust	Allan Hirsch		Arsenio Mataka
Jessica J Goddard			Gina Solomon
Komal Bangia			
Emilie Fons			
Molly Starke			