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HR2W
Office of Environmental Health Hazard Assessment
Attn: Carolina Balazs
1515 Clay Street, 16th Floor
Oakland, CA 94612

Environmental Working Group comments on the Office of Environmental Health Hazard Assessment draft report "Achieving the Human Right to Water in California: An Assessment of the State's Community Water Systems."

The Environmental Working Group, a nonprofit research and policy organization with offices in San Francisco and Sacramento, as well as nationally, submits comments to the California Office of Environmental Health Hazard Assessment on the draft assessment and data tool[1] developed to further the state's goal to provide safe drinking water in every California community.

EWG has worked on water quality issues for over two decades, advocating for stronger protections for drinking water supplies. In 2019 EWG published California-specific[2] and national-level[3] cumulative risk assessments for drinking water contaminants. EWG comments listed here include specific recommendations for further refinement of water quality, accessibility, and affordability indicators presented in OEHHA's draft report.

Overall, EWG supports OEHHA's proposed approach in these areas and applauds OEHHA's decision to focus on all three components together, since water quality, quantity, and cost to consumers are inextricably linked. At the same time, EWG highlights the aspects of the draft proposal where OEHHA's approach can be strengthened, particularly with respect to water quality indicators. EWG comments below are organized into three sections, which correspond to water quality, accessibility, and affordability, respectively.

Section 1: Water Quality

For the water quality component, OEHHA's draft report includes two subcomponents, which focus on a) exposure to a select group of water contaminants; and b) the issue of compliance with state and federal regulations for those contaminants. Taken together, this component includes

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[1] California Office of Environmental Health Hazard Assessment. September 19, 2019. The Human Right to Water in California. https://oehha.ca.gov/water/report/human-right-water-california
[2] Stoiber T, Temkin A, Andrews D, Campbell C, Naidenko OV. 2019. Applying a cumulative risk framework to drinking water assessment: a commentary. Environ Health. 18(1): 37. http://doi.org/10.1186/s12940-019-0475-5
[3] Evans S, Campbell C, Naidenko OV. 2019. Cumulative risk analysis of carcinogenic contaminants in United States drinking water. Heliyon, in press. https://doi.org/10.1016/j.heliyon.2019.e02314

seven indicators, which include high potential exposure; presence of acute contaminants; maximum duration of high exposure; contaminant occurrence data availability; compliance or noncompliance with drinking water standards; number of acute contaminants with noncompliance; and maximum duration of noncompliance. These seven indicators are combined together in a composite water quality score, which weighs equally the exposure subcomponent and noncompliance subcomponent.

OEHHA's overall approach and formula for the composite score hold merit. The framework fittingly gives weight to noncompliance within the overall composite score, as systems that are struggling to meet state and federal drinking water standards experience the greatest water quality challenges. Those systems should be prioritized to receive help and resources so they can come back into compliance. At the same time, OEHHA's focus on Maximum Contaminant Levels, or MCLs, for calculating the exposure subcomponent score does not go far enough from the public health perspective. We feel this approach should be replaced with a framework that focuses on health benchmarks for contaminants included in the assessment. EWG provided similar feedback in our organization's comments, submitted to OEHHA on Jan. 30, 2019, on the proposal to establish a framework for evaluating key objectives of the human right to water.

To explain this recommendation, EWG would like to bring OEHHA's attention, and the attention of all stakeholders reviewing this issue, to the fact that the vast majority of the existing MCLs are based on toxicological studies that are decades old and may no longer be protective.

OEHHA's draft report stated that "it is not practical to use the PHGs [public health goals] as benchmark for these indicators, as the detection limits for many contaminants are well above their corresponding PHGs." This statement presents an artificial dichotomy between benchmark choices – between prioritizing a PHG or an MCL. It is correct that, due to the high toxicity of many drinking water contaminants, their corresponding PHGs are quite low, and they can be lower than the state's official detection limits for purposes of reporting (DLRs). Yet analytical chemistry detection limits are constantly evolving and becoming more sensitive. Some labs and analytical techniques are already able to detect much lower contaminant levels than the state DLRs. For example, the DLR for arsenic is 2 μg/L. Notably, a national testing lab can detect arsenic to a concentration of 0.1 μg/L, 20 times lower than the state's official DLR.[4] For a contaminant such as arsenic, with a public health goal of 0.004 μg/L, it may be some time before labs across the state have the capacity to detect these low part-per-trillion levels. The Human Right to Water framework should not preclude the option of using health-based contaminant information and upholding the MCLs as the relevant benchmarks just because the PHGs are not ***currently*** attainable as analytical limits.

Further, by focusing on the MCLs only, the draft report ignores the health risks posed by contaminants at levels that comply with existing legal standards – yet still carry significant health risks. Figure 1 presents EWG's analysis of arsenic concentrations in California community water systems, investigated as a part of a cumulative risk analysis for drinking contaminants by Stoiber

[4] Eurofins USA. Arsenic. https://www.eurofinsus.com/environment-testing/testing-services/drinking-waterpotable-water-testing/arsenic/ Accessed September 21, 2019.

et al. 2019.[5] In this graphic, each point represents one water system. For each system, the average arsenic concentration was calculated using all tests results reported between 2013 and 2015. Next EWG analyzed cancer risk due to arsenic and four disinfection byproducts (regulated as total trihalomethanes) in California community water systems, shown in Figure 2. This analysis was published as a part of a peer-reviewed study by Evans et al. 2019.[6] These data demonstrate a wide range of cancer risks resulting from arsenic and the group of four trihalomethanes (THM4) in surface- and groundwater systems in California. Notably, the majority of the systems have risks well in excess of 10^{-6}, which is often described as the *de minimus* risk by government health agencies.

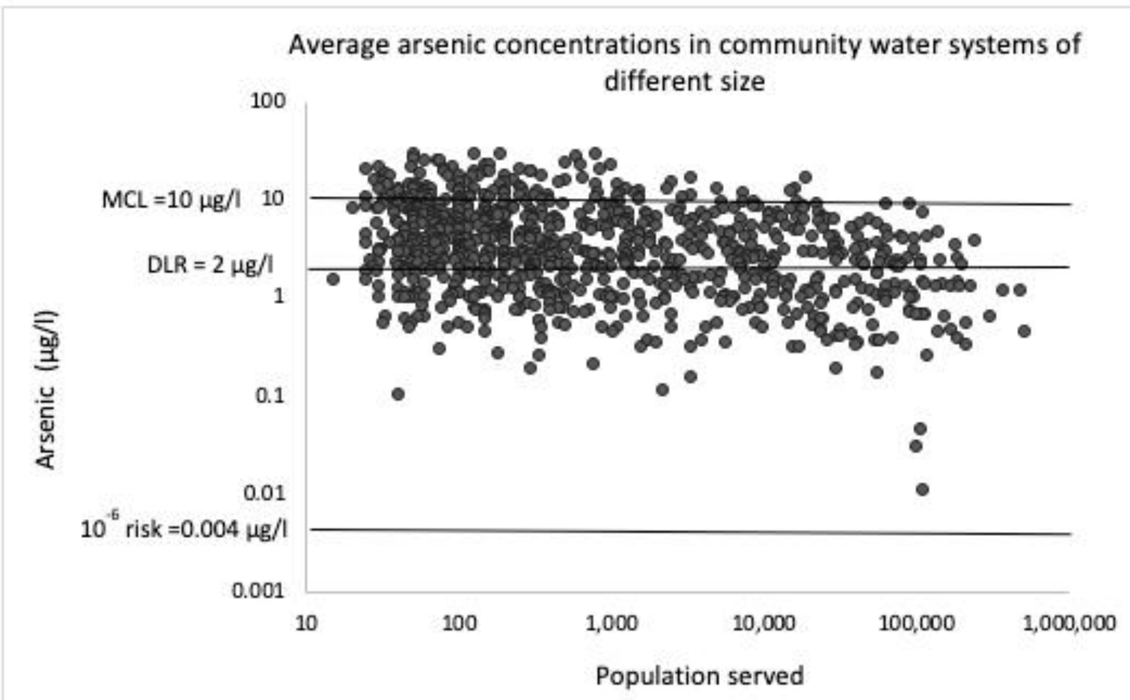

Figure 1. Occurrence of arsenic in California drinking water systems.

[5] Stoiber T, Temkin A, Andrews D, Campbell C, Naidenko OV. 2019. Applying a cumulative risk framework to drinking water assessment: a commentary. Environ Health. 18(1): 37. http://doi.org/10.1186/s12940-019-0475-5
[6] Evans S, Campbell C, Naidenko OV. 2019. Cumulative risk analysis of carcinogenic contaminants in United States drinking water. Heliyon, in press. https://doi.org/10.1016/j.heliyon.2019.e02314

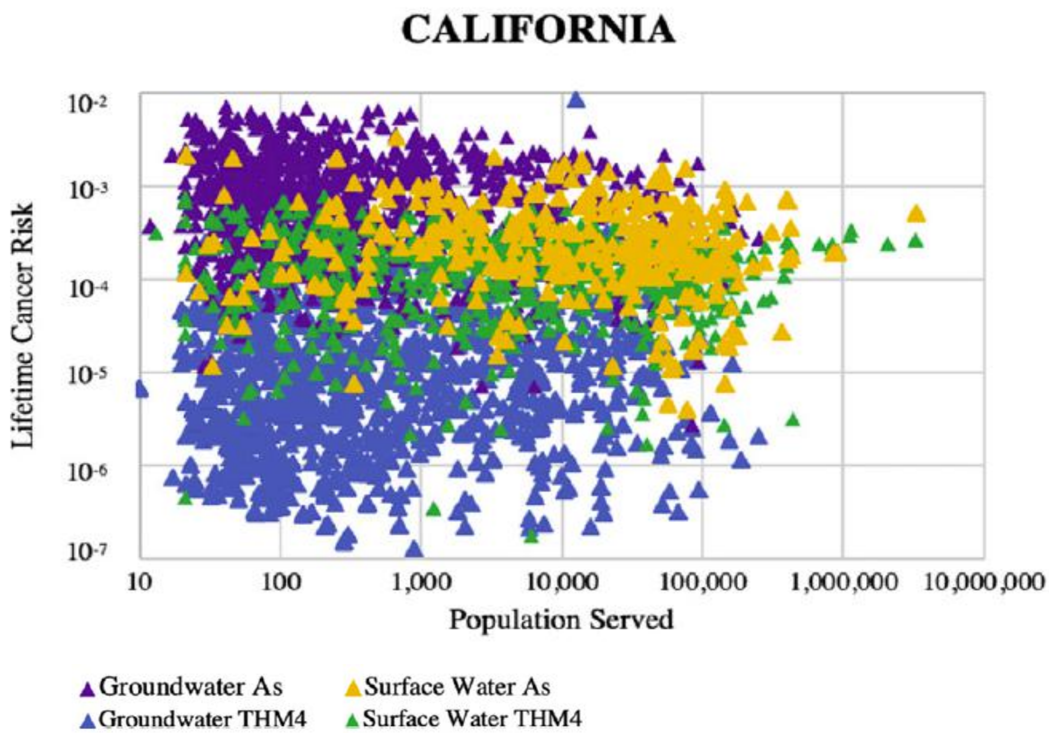

Figure 2. Lifetime cancer risk due to arsenic and trihalomethanes in California drinking water systems.

EWG also reviewed the MCLs, detection limits and public health goals for 18 chemical contaminants that the draft OEHHA assessment included in the exposure indicator. Table 1 lists those contaminants together with their MCLs, PHGs, and DLRs; the data draw on information posted on https://www.waterboards.ca.gov on March 13, 2019.

Table 1: Contaminants selected by OEHHA for the Human Right to Water analysis. All concentrations are in mg/L.

Regulated Contaminant	**California detection limits for purposes of reporting**	**Public Health Goals published by OEHHA**	**California's maximum contaminant levels**
Arsenic	0.002	0.000004	0.010
Barium	0.1	2	1
Benzene	0.0005	0.00015	0.001
Cadmium	0.001	0.00004	0.005
Carbon tetrachloride	0.0005	0.0001	0.0005
Mercury (inorganic)	0.001	0.0012	0.002
Methyl tertiary butyl ether (MTBE)	0.003	0.013	0.013
Nitrate (as nitrogen, N)	0.4	45 as NO3 (=10 as N)	10 as N
Tetrachloroethylene (PCE)	0.0005	0.00006	0.005
Perchlorate	0.004	0.001	0.006
Trichloroethylene (TCE)	0.0005	0.0017	0.005
Toluene	0.0005	0.15	0.15
Xylenes	0.0005	1.8	1.750
1,2-Dibromo-3-chloropropane (DBCP)	0.00001	0.0000017	0.0002
1,2,3-Trichloropropane	0.000005	0.0000007	0.000005
Total Trihalomethanes	Not listed	Not available	0.080
Uranium	1	0.43	20
Lead	0.005	0.0002	0.015 (Action Level)

EWG highlights several examples illustrating why the majority of the existing MCLs are not health-protective, which makes them unsuitable benchmarks for the assessment of human health impact from exposure to drinking water contaminants:

- The legal limit for nitrate, established in 1962, was developed to protect infants from acute methemoglobinemia, a life-threatening disorder of oxygen transport in the body. This limit does not fully protect against the risk of cancer and harm to the developing fetus.[7]

[7] Temkin A, Evans S, Manidis T, Campbell C, Naidenko OV. 2019. Exposure-based assessment and economic valuation of adverse birth outcomes and cancer risk due to nitrate in United States drinking water. Environ Res. 176: 108442. https://doi.org/10.1016/j.envres.2019.04.009

- The legal limit for cadmium, established in 1991, was based on studies of cadmium toxicity conducted in the 1970s. This limit may not fully protect against the risk of cancer. The cadmium DLR is 5-fold below the MCL.
- The legal limit for trichloroethylene, established in 1987, was based on analytical detection limits at the time that the standard was set. This limit does not fully protect against the risk of cancer. This same reason, namely, the analytical limits of the time, applies to the MCL for tetrachloroethylene, which was established in 1991. Moreover, the current California DLRs for these two chemicals are below the MCL, demonstrating the evolution of detection methods between the time MCLs were first set and the present.
- The legal limit for arsenic of 10 μg/L, established by the EPA in 2001, was based on costs for arsenic removal, as calculated at the time that the standard was set. This MCL is 2500-fold greater than the one-in-a-million (10^{-6}) risk of cancer due to arsenic exposure.
- The legal limit for the group of four trihalomethanes, established in 1998, was based on the need for residual disinfectant levels in water served to customers and the cost of treatment. This limit does not fully protect against the risk of cancer due to exposure to trihalomethanes, as OEHHA's own research on the public health goal for trihalomethanes has demonstrated.
- The federal action level for lead of 15 parts per billion (ppb) is 15-fold greater than the level of 1 ppb recommended by the American Academy of Pediatrics.[8]

EWG has three key recommendations about how OEHHA can move toward using health-based information for the exposure indicator in the water quality component of the framework:

1. Using the toxicological information compiled and analyzed as part of the public health goal development. This information is valuable and can be used in a flexible way for OEHHA to establish a process for integrating health-based information in exposure indicators for the Human Right to Water framework.
2. Considering comparable alternative approaches for deriving health benchmarks. For example, if the 10^{-6} benchmark for a contaminant such as arsenic is orders of magnitude below the detection limits and thus, in the current view of the state, cannot be used directly, OEHHA can consider the option of using a parallel risk benchmark that allows higher risk yet still incorporates health information. EWG highlights the example of Minnesota, which uses 10^{-5} risk benchmark for its drinking water guidelines.[9] For arsenic, it might be preferable to use a 10^{-5} cancer risk benchmark, or even, in a worst case scenario, a 10^{-4} cancer risk benchmark, rather

[8] American Academy of Pediatrics Council on Environmental Health. 2016. Prevention of Childhood Lead Toxicity. Pediatrics 138(1): e20161493. https://pediatrics.aappublications.org/content/138/1/e20161493
[9] Minnesota Department of Health. Guidance Values and Standards for Contaminants in Drinking Water. https://www.health.state.mn.us/communities/environment/risk/guidance/gw/index.html Accessed September 21, 2019.

than discarding all health information and focusing solely on the MCL, which was developed on the basis of treatment costs and allows significant excess cancer risk.

3. Including information from the peer-reviewed scientific literature for interim health benchmarks. As an illustration, EWG recently published a meta-analysis for nitrate and estimated that the annual 10^{-6} cancer risk benchmark for nitrate in drinking water is 0.14 mg/L.[10]

In sum, EWG firmly believes in the importance of using the latest toxicological and epidemiological information for analyzing health risks due to drinking water contaminants and urges OEHHA to start developing health-based metrics for water quality assessment within the Human Right to Water framework.

Section 2: Water Accessibility

For the water accessibility component, OEHHA's draft report focuses on physical and institutional vulnerability subcomponents. EWG supports OEHHA's approach and especially agrees with the importance of considering the number of water sources that a system might have as a key indicator of that system's vulnerability to drinking water outages. At the same time, EWG urges OEHHA, together with the State Water Board, to conduct additional research into the topic of the institutional vulnerability of California drinking water sources.

OEHHA's initial approach to the assessment of institutional vulnerability focuses on the Median Household Income (MHI) within the community in comparison to the statewide Median Household Income, and thereby defines disadvantaged communities and severely disadvantaged communities as those that have less than 80 percent and 60 percent, respectively, of the statewide MHI. OEHHA further defines the "Managerial Constraints" indicator of the water accessibility component by classifying systems according to the number of Monitoring and Reporting violations for regulated drinking water contaminants.

These components of institutional vulnerability are an important starting point for analyzing water accessibility, but they must be refined further in order to be truly useful within the Human Right to Water framework. For example, as Figure 24 in the draft report demonstrates, water access component scores are largely similar across the state, with median scores between 1.5 and 3.0 for different regions (on the OEHHA's chosen scale of 0 for worst score and 4 for best score), and for 6 out of 8 regions analyzed in this approach, the score is approximately 2. Thus, in its current version, this component does not seem to sufficiently identify vulnerable regions.

Currently, OEHHA has only a single indicator for the physical vulnerability subcomponent and just two indicators for the institutional subcomponent, in comparison with the water quality component, which has a total of seven indicators. EWG would like to suggest additional

[10] Temkin A, Evans S, Manidis T, Campbell C, Naidenko OV. 2019. Exposure-based assessment and economic valuation of adverse birth outcomes and cancer risk due to nitrate in United States drinking water. Environ Res. 176: 108442. https://doi.org/10.1016/j.envres.2019.04.009

resources for defining water accessibility indicators that, if incorporated within the Human Right to Water framework, could improve the resolution of the water accessibility component.

Much like the OEHHA and the Human Right to Water framework, the Policy Research Initiative developed the Canadian Water Sustainability Index (CWSI) to measure water well-being in Canadian communities[11]. Many of the indices used in the CWSI align with components of the OEHHA Human Right to Water framework, but the CWSI incorporates additional quantitative factors that could provide measurable insight into improving the water accessibility scoring in the OEHHA framework.

The CWSI has a total of 15 indicators across five components. CWSI indicators for Availability (the amount of renewable fresh water available per person) and Demand (the level of demand for water) could further improve the physical vulnerability subcomponent. There are a number of institutional vulnerability indicators that could be incorporated as well. For example, the number of service disruption days per person (Reliability) and the physical condition of water mains and sewers as reflected by system losses (Condition).

The Human Right to Water Framework and Canadian Water Sustainability Index are not unique in their attempts to quantify water health and sustainability of communities. Juwana, Muttil, and Perera (2012)[12] reviewed indicator-based water sustainability frameworks, including the Water Poverty Index (Sullivan 2002)[13], the CWSI, the Watershed Sustainability Index (Chaves & Alipaz, 2007)[14], and the West Java Water Sustainability Index (Juwana et al. 2010).[15] As discussed in the review, these frameworks incorporate a number of indicators that could be considered for the Human Right to Water framework.

EWG is confident that the data analysis and resolution for this component can be improved by incorporating additional indicators and urges OEHHA to look for ways to strengthen its analysis for both physical and institutional vulnerability subcomponents.

Section 3: Water Affordability

For the water affordability component, OEHHA's draft report focuses on the relationship between water rates, or the monthly payments that water system customers owe their water providers, and household income indicators, in the water system service area. EWG supports

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[11] Policy Research Initiative. 2007. Canadian Water Sustainability Index. http://publications.gc.ca/site/archivee-archived.html?url=http://publications.gc.ca/Collection/PH4-38-2007E.pdf

[12] Juwana, I., Muttil, N., Perera, B.J.C., 2012. Indicator-based water sustainability assessment – A review. Sci Total Environ 438:357-371.

[13] Sullivan, C. 2002. Calculating a Water Poverty Index. World Development, 30(7):1195-1210.

[14] Chavez, H.M.L. & Alipaz, S. 2007. An integrated indicator based on basin hydrology, environment, life, and policy: The Watershed Sustainability Index. Water Resources Management, 21(5):883-895.

[15] Juwana, I., Perera, B., & Muttil, N. 2010. A water sustainability index for West Java-Part 2: refining the conceptual framework using Delphi technique. Water Science and Technology, 62(7):1641-1652.

OEHHA's focus on the issue of water costs for communities across California as an essential economic and human rights issue.

EWG appreciates the opportunity to submit comments to OEHHA on the critical issue of the Human Right to Water, and we thank you for considering our letter. Additionally, we appreciate the opportunity to present comments at a public workshop.

Submitted on behalf of the Environmental Working Group,

Olga V. Naidenko, Ph.D., EWG Vice President, Science Investigations

Tasha Stoiber, Ph.D., Senior Scientist, EWG San Francisco office