

UC Berkeley

UC Berkeley Previously Published Works

Title

How a Community-Academic-Government Partnership for Drinking Water Justice Strengthens the Rigor, Relevance, Reach, and Reflexivity of Science

Permalink

<https://escholarship.org/uc/item/6rj2b2hd>

Authors

Karasaki, Seigi

Libenson, Arianna

Tran, Tien

et al.

Publication Date

2024

DOI

10.1089/env.2024.0039

Copyright Information

This work is made available under the terms of a Creative Commons Attribution License, available at <https://creativecommons.org/licenses/by/4.0/>

Peer reviewed

1 Full manuscript title:

2 How a community-academic-government partnership for drinking water justice strengthens the rigor, relevance,
3 reach, and reflexivity of science

4 Authors and affiliations:

5 Seigi Karasaki,^{1*} Arianna Libenson,² Tien Tran,³ Komal Bangia,⁴ Lara J. Cushing,⁵ Jenny L. Rempel,¹ Laura August,⁴
6 Lauren Baehner,⁶ Rachel Morello-Frosch,^{2,6**} Clare Pace^{2**}

7 1. Energy and Resources Group, University of California Berkeley

8 2. Environmental Science, Policy and Management, University of California, Berkeley

9 3. Community Water Center

10 4. Office of Environmental Health Hazard Assessment, California Environmental Protection Agency

11 5. Department of Environmental Health Sciences, University of California, Los Angeles

12 6. School of Public Health, University of California, Berkeley

13 * Corresponding author

14 ** Co-senior authors

15 Key words

16 environmental justice, environmental health, drinking water, Human Right to Water, collaborative research,
17 community-engaged research

18 Background

19 Community-academic partnerships have undertaken research on environmental health and justice that centers
20 communities' priorities¹ and strengthens science.² Our research collaborative, the Water Equity Science Shop (WESS;
21 Figure 1), integrates the European Science Shop model³ and principles of community-engaged research practices to
22 address drinking water challenges in California. WESS is led by the Community Water Center (CWC), a community-
23 based water justice organization, along with researchers at the University of California, Berkeley and Los Angeles, and
24 regulatory scientists from Cal-EPA's Office of Environmental Health Hazard Assessment (OEHHA).⁴ One fruit of this
25 collaboration is the Drinking Water Tool (DWT), a free online mapping platform owned and managed by CWC.⁵ CWC's
26 vision is safe, clean, and affordable drinking water for all, through movement-building for community-driven water
27 solutions. CWC convenes the AGUA Coalition (la Asociación de Gente Unida por el Agua, or the Association of People
28 United for Water), a grassroots coalition of 53 residents representing 34 impacted communities and 11 CBOs
29 dedicated to securing safe, clean, and affordable drinking water. When describing community members in WESS's
30 work, we are referring to residents who have established relationships with AGUA and/or CWC, many of whom live in
31 low-income communities and/or communities of color struggling with drinking water challenges in California's Central
32 Valley and Central Coast regions. The impetus for WESS to develop the DWT emerged from CWC's annual Needs
33 Assessment, which collects input from community members on organizing, advocacy, and research priorities. Many
34 AGUA members had advocated for a comprehensive and accessible statewide tool with information on water quality
35 concerns, drought impacts, and local groundwater agencies.

36 Launched in 2020, the DWT centralizes information on (i) water quality data and possible contamination sources; (ii)
37 predicted impacts on domestic wells under California's Sustainable Groundwater Management Act⁶-based
38 groundwater levels; and (iii) decision-makers, key agencies, and opportunities to get involved in water
39 governance. The bilingual English/Spanish DWT is designed for various end-users, including impacted residents, CBOs,

¹ Yahya Salimi et al., "Is Community-Based Participatory Research (CBPR) Useful? A Systematic Review on Papers in a Decade," *International Journal of Preventive Medicine* 3, no. 6 (June 2012): 386–93.

² Carolina L. Balazs and Rachel Morello-Frosch, "The Three Rs: How Community-Based Participatory Research Strengthens the Rigor, Relevance, and Reach of Science," *Environmental Justice* 6, no. 1 (February 2013): 9–16, <https://doi.org/10.1089/env.2012.0017>.

³ Loet Leydesdorff and Janelle Ward, "Science Shops: A Kaleidoscope of Science–Society Collaborations in Europe," *Public Understanding of Science* 14, no. 4 (October 1, 2005): 353–72, <https://doi.org/10.1177/0963662505056612>.

⁴ Lisa Mikesell, Elizabeth Bromley, and Dmitry Khodyakov, "Ethical Community-Engaged Research: A Literature Review," *American Journal of Public Health* 103, no. 12 (December 2013): e7–14, <https://doi.org/10.2105/AJPH.2013.301605>.

⁵ Clare Pace et al., "The Drinking Water Tool: A Community-Driven Data Visualization Tool for Policy Implementation," *International Journal of Environmental Research and Public Health* 19, no. 3 (January 2022): 1419, <https://doi.org/10.3390/ijerph19031419>.

⁶ State Water Resources Control Board, "The Sustainable Groundwater Management Act," accessed July 29, 2024, https://www.waterboards.ca.gov/sgma/about_sgma.html.

40 government agencies, academic researchers, and the public. The DWT addressed the need for more accessible data
41 on drinking water, which at the time was not easily available nor interpretable. California’s State Water Resources
42 Control Board has since developed online platforms such as the SAFER Dashboard⁷ to improve drinking water data
43 accessibility, with a specific focus on human right to water metrics. WESS updated the DWT in 2023 after several
44 rounds of community-engaged feedback (Figure 2), adding refined data on domestic well areas and contaminant
45 sources alongside improvements in mapping water quality, identifying monitoring gaps, and communicating potential
46 water quality threats. In this practice brief, we present lessons-learned in community engagement, environmental
47 justice (EJ) research, and knowledge-sharing through WESS and the DWT.

48 Findings

49 We apply a “4 Rs” framework to assess WESS’s outputs. Balazs and Morello-Frosch introduced the “3 Rs” framework
50 to show how community-engaged research can strengthen the rigor, relevance, and reach of science.⁸ They define
51 *relevance* as “whether science is asking the right questions”; *rigor* as the “practice and promotion of good science”;
52 and *reach* as “[how] knowledge is disseminated to diverse audiences and translated into useful tools.” Recent
53 scholarship has suggested *reflexivity* – self-examination of positionality, intention, and other aspects of research – as
54 a fourth “R.”⁹

55 *Relevance through responsiveness*

⁷ California State Water Resources Control Board, “SAFER Dashboard,” SAFER Dashboard, March 1, 2024, https://www.waterboards.ca.gov/drinking_water/certlic/drinkingwater/saferdashboard.html; California State Water Resources Control Board, “2023 Risk Assessment Dashboard - State Small Water Systems and Domestic Wells,” accessed March 1, 2024, <https://gispublic.waterboards.ca.gov/portal/apps/dashboards/4f7795ba4349464f9883827ad2e6b67a>.

⁸ Balazs and Morello-Frosch, “The Three Rs.”

⁹ Alissa Cordner et al., “Reflexive Research Ethics for Environmental Health and Justice: Academics and Movement Building,” in *Research Ethics and Social Movements* (Routledge, 2015); Stewart Lockie, “Privilege and Responsibility in Environmental Justice Research,” *Environmental Sociology* 4, no. 2 (April 3, 2018): 175–80, <https://doi.org/10.1080/23251042.2018.1460936>; Chad Raphael, “Engaged Communication Scholarship for Environmental Justice: A Research Agenda,” *Environmental Communication* 13, no. 8 (November 17, 2019): 1087–1107, <https://doi.org/10.1080/17524032.2019.1591478>.

56 In 2013, OEHHA launched CalEnviroScreen, the first state-managed tool for mapping cumulative health impacts
57 related to environmental and social stressors.¹⁰ Similar tools have since been developed in other states¹¹ and at the
58 federal level.¹² The first iteration of the DWT incorporated data from CalEnviroScreen’s drinking water quality
59 indicator.¹³ Strengths of such government tools include their rigor, accessibility, and legitimacy in the eyes of
60 policymakers. However, state agencies must navigate layers of bureaucracy for such tools to be approved and updated.
61 In contrast, responding quickly to community needs and changing conditions are high priorities for WESS and in
62 particular, CWC. Climate change and EJ concerns have brought the importance of such responsiveness into sharp
63 relief in California, as communities recover from thousands of domestic wells running dry during the recent record-
64 breaking drought¹⁴ and as the science on the health threats posed by drinking water contaminants such as per- and
65 polyfluoroalkyl substances (PFAS) rapidly advances.¹⁵

66 Tools managed by non-government actors also function as a proof-of-concept prior to state adoption. While planning
67 the latest DWT update, CWC raised the addition of PFAS data as a high priority, compelled by emerging research on
68 human exposures through drinking water and its potential health effects.¹⁶ At this point, the Water Board had made

¹⁰ George V. Alexeeff et al., “A Screening Method for Assessing Cumulative Impacts,” *International Journal of Environmental Research and Public Health* 9, no. 2 (February 2012): 648–59, <https://doi.org/10.3390/ijerph9020648>; Lara Cushing et al., “Racial/Ethnic Disparities in Cumulative Environmental Health Impacts in California: Evidence From a Statewide Environmental Justice Screening Tool (CalEnviroScreen 1.1),” *American Journal of Public Health* 105, no. 11 (November 2015): 2341–48, <https://doi.org/10.2105/AJPH.2015.302643>.

¹¹ e.g., Esther Min et al., “The Washington State Environmental Health Disparities Map: Development of a Community-Responsive Cumulative Impacts Assessment Tool,” *International Journal of Environmental Research and Public Health* 16, no. 22 (January 2019): 4470, <https://doi.org/10.3390/ijerph16224470>; Elizabeth Williams et al., “MD EJSCREEN v2.0: Visualizing Overburdening of Environmental Justice Issues Using the Updated Maryland Environmental Justice Screening Tool,” *Environmental Justice* 15, no. 6 (December 2022): 385–401, <https://doi.org/10.1089/env.2020.0055>.

¹² Council on Environmental Quality, “Explore the Map - Climate & Economic Justice Screening Tool,” accessed March 1, 2024, <https://screeningtool.geoplatform.gov/en/>.

¹³ Komal Bangia et al., “Assessment of Contaminants in California Drinking Water by Region and System Size,” *AWWA Water Science* 2, no. 5 (2020): e1194, <https://doi.org/10.1002/aws2.1194>.

¹⁴ Scott Jasechko and Debra Perrone, “California’s Central Valley Groundwater Wells Run Dry During Recent Drought,” *Earth’s Future* 8, no. 4 (2020): e2019EF001339, <https://doi.org/10.1029/2019EF001339>.

¹⁵ Jill Johnston and Lara Cushing, “Chemical Exposures, Health, and Environmental Justice in Communities Living on the Fenceline of Industry,” *Current Environmental Health Reports* 7, no. 1 (March 1, 2020): 48–57, <https://doi.org/10.1007/s40572-020-00263-8>.

¹⁶ José L. Domingo and Martí Nadal, “Human Exposure to Per- and Polyfluoroalkyl Substances (PFAS) through Drinking Water: A Review of the Recent Scientific Literature,” *Environmental Research* 177 (October 1, 2019): 108648, <https://doi.org/10.1016/j.envres.2019.108648>.

69 its PFAS sampling data available through GeoTracker, an environmental regulatory database.¹⁷ Though a powerful
70 resource as-is, the GeoTracker platform did not include EJ concerns as an analytical lens. To address this gap, we
71 integrated the Water Board’s data into the DWT to overlay PFAS data with demographic characteristics and domestic
72 well area boundaries, and tailored visualizations based on new regulatory standards.¹⁸ WESS is using these spatial
73 layers to identify partner communities for a drinking water sampling project to test for PFAS in unregulated domestic
74 well areas. This EJ and health-motivated approach to mapping PFAS data is now being considered for the next
75 CalEnviroScreen update.

76 Despite the success of the DWT, there remain barriers to entry to its use; for example, some communities may lack
77 access to computers, the internet, or computer literacy. To this end, CWC’s public training workshops have proven
78 invaluable, but going forward, WESS will need to consider and develop lower-tech alternatives to the DWT, as well as
79 translate it into more languages. It is also likely that the needs and priorities we elevate through the DWT may not
80 completely align or resonate with other EJ communities in California. To build trust in and legitimacy of the DWT,
81 WESS must continually create room for conversations about water justice and broaden opportunities for communities’
82 feedback on the tool. Our view of building legitimacy with EJ communities is less a static benchmark and more an
83 ongoing process, requiring consistent communication to strengthen existing relationships as well as constant outreach
84 to establish new connections.

85 *Rigor through collaborative methods development*

86 Our facilitation of diverse partnerships and conversations about drinking water justice represents our effort to practice
87 and promote “good science” with the objective of equitably improving health outcomes and protecting drinking water
88 sources. The strength of our science is in our community-centered approach, which allows for rigorous study designs
89 grounded in local needs and experiences. It is the input and direction from CBOs and community members – from
90 defining the research question to recruiting participants and collecting data – that lays the foundation for WESS’s
91 rigorous science. This would not be possible without the relationship of trust, built upon years of collaboration,
92 between CWC and its community members, OEHHA, and the research team. Since 2018, we have organized meetings
93 to bring together DWT user groups to provide opportunities for dialogue. The goal is to establish an iterative process
94 of collectively identifying data gaps and brainstorming ways to leverage existing resources to address drinking water
95 threats, such as providing interim water access to domestic well users.

¹⁷ Lila Beckley et al., “The California GeoTracker Database: A Unique Public Resource for Understanding Contaminated Sites,” *Groundwater Monitoring & Remediation* 42, no. 3 (2022): 105–15, <https://doi.org/10.1111/gwmr.12520>.

¹⁸ Seigi Karasaki et al., “PFAS Detections in Drinking Water, 2016-2024,” 2024, https://drinkingwatertool.communitywatercenter.org/wp-content/uploads/2023/09/PFAS_detections_metadata_060724.pdf.

96 One challenge (and solution) that came up from these conversations was how to handle uneven data coverage. Given
97 California’s incomplete domestic well drilling records, state and local agencies were struggling with how to include
98 domestic well communities in their sustainable groundwater planning decisions – or whether to do so at all. WESS
99 recognized that including domestic well communities in planning decisions by estimating domestic well reliance using
100 incomplete data was preferable to excluding domestic well communities from planning altogether. To enhance the
101 accuracy of our domestic well use estimates, we integrated residential parcel data with water systems’ service area
102 boundaries to better define the spatial extent of domestic well communities.¹⁹ This enabled WESS to estimate
103 domestic well populations across multiple spatial scales, and to develop the first statewide estimates of populations
104 reliant on domestic wells versus community water systems. WESS is using these data refinements to strategize
105 outreach to communities at risk of elevated contaminant exposure and cumulative health effects.

106 *Reach through community and interagency knowledge-sharing*

107 Knowledge-sharing is frequent and multidirectional with community partners, CBOs, and state agencies. This feedback
108 process helps drive WESS’s research and tool development. For example, during an advisory meeting in 2022,
109 community partners proposed adding drinking water threats as a standalone data layer. How-to workshops – e.g.,
110 step-by-step walkthroughs on the DWT, attended by interested user groups ranging from community members to
111 state agency employees – have been particularly effective for presenting our updates and work while providing
112 feedback opportunities on the tool’s design and functionality. To maximize the accessibility and reach of our work,
113 WESS has also engaged in other non-academic forms of knowledge dissemination including op-eds,²⁰ podcast
114 episodes,²¹ and blog posts.²²

115 OEHHA’s participation in WESS has been key to legitimizing our projects within the regulatory space and bridging
116 relationships with other agencies striving to improve the accessibility and interpretability of their drinking water data.
117 A key component of our reach has been to create opportunities for research groups and agencies facing similar
118 challenges, such as how to overlay water sampling data with demographic data, to compare methods and results.
119 Under OEHHA’s lead, WESS hosted a meeting with Water Board researchers in 2023 to share geographic information
120 system (GIS) best practices for designing state-owned drinking water tools with a variety of end-users. Together, we

¹⁹ Jenny Rempel et al., “Domestic Well Areas Version 2.0, Update for the Drinking Water Tool,” 2023,
https://drinkingwatertool.communitywatercenter.org/wp-content/uploads/2023/09/DWA_v2_plss_020824_Metadata.pdf.

²⁰ Jenny Rempel and Kristin Dobbin, “10 Years Later, California’s Promise of a Human Right to Water Remains Unfulfilled,” *CalMatters*, December 28, 2022, sec. Commentary, <http://calmatters.org/commentary/2022/12/water-human-right-law-california/>.

²¹ Clare Pace, “TT016 – Listening to People and Data – Tap Talk,” March 24, 2022,
<https://www.drinkingwaterpodcast.org/tt016/>.

²² Clare Pace, Lara Cushing, and Rachel Morello-Frosch, “Research to Quench the Thirst for Water Justice in California,” *Public Health Post*, June 27, 2022, <https://publichealthpost.org/environment/water-justice-in-california/>.

121 evaluated the implications of common analytical choices, such as areal versus population weighting for estimating
122 median household income within water system boundaries. It became clear the two methods could produce different
123 income estimates, with implications for which communities might be prioritized for state funding and resources.
124 Although it will take time for these conversations to translate into action, this meeting underscored the importance
125 of interagency data sharing and research transparency.

126 *Reflexivity through multidirectional learning*

127 WESS has encouraged multidirectional learning between CWC and its community partners, OEHHA, and university
128 researchers. Additionally, over years of collaboration, many WESS collaborators have worn different “hats” of
129 advocacy, academia, and government, resulting in overlapping experiences, shared understandings, and trust. While
130 this has strengthened WESS’s capacity to undertake community-driven research that informs policy and regulatory
131 change, it is important to acknowledge and address asymmetries in power and privilege among researchers,
132 regulatory scientists and community partners. Given the diverse lived experiences among WESS members, our
133 collaborative works to address these power dynamics by centering the needs expressed by AGUA and community
134 members as communicated through CWC in how we prioritize our research and policy translation activities. This work
135 also requires extensively forecasting the benefits of projects (e.g., informing advocacy and organizing priorities related
136 to policy initiatives) as well as their potential for unintended harm (e.g., community stigma related to drinking water
137 sampling campaigns), while maximizing community empowerment and movement-building. Clear and transparent
138 consultation is required to solicit community feedback and approval, provide equitable compensation for participants,
139 and ensure benefits for all partners;²³ it is also necessary for establishing a culture of accountability and reciprocity.²⁴
140 Table 1 summarizes our reflections on structural asymmetries in power and positionality in community-engaged EJ
141 research along with implications for WESS.

142 Some EJ scholars have understandably challenged the EJ movement’s reliance on the state for solutions or
143 reparations,²⁵ while others have characterized this critique as an over-simplification of the complex relationships
144 between EJ movements and government actors.²⁶ It is true that “the state” - here construed as governmental

²³ Meredith Minkler, “Community-Based Research Partnerships: Challenges and Opportunities,” *Journal of Urban Health* 82, no. 2 (June 1, 2005): ii3–12, <https://doi.org/10.1093/jurban/jti034>.

²⁴ Laura Pulido, “FAQs: Frequently (Un)Asked Questions about Being a Scholar Activist,” in *Engaging Contradictions* (University of California Press, 2008), 341–66, <https://doi.org/10.1525/9780520916173-017>.

²⁵ Hilda E. Kurtz, “Acknowledging the Racial State: An Agenda for Environmental Justice Research,” *Antipode* 41, no. 4 (2009): 684–704, <https://doi.org/10.1111/j.1467-8330.2009.00694.x>; David Naguib Pellow, *What Is Critical Environmental Justice?* (John Wiley & Sons, 2017), 12–13.

²⁶ Jill Lindsey Harrison, “Environmental Justice and the State,” *Environment and Planning E: Nature and Space* 6, no. 4 (December 1, 2023): 2740–60, <https://doi.org/10.1177/25148486221138736>; David Purucker, “Critical Environmental Justice and the State: A Critique of Pellow,” *Environmental Sociology* 7, no. 3 (July 3, 2021): 176–86, <https://doi.org/10.1080/23251042.2021.1878575>; Seigi Karasaki et al., “Environmental Justice and Drinking Water:

145 institutions - has historically played an outsized role in the marginalization and disenfranchisement of low-income
146 communities and/or communities of color, environmentally and otherwise;²⁷ the environmental racism embedded in
147 the policy decisions that resulted in the lead crisis in Flint, Michigan’s drinking water is one of many examples.²⁸
148 Similarly, in California, there are state documents rationalizing disinvestment in rural, low-income, communities of
149 color along with testimonies by residents who had their concerns about drinking water quality and access continually
150 dismissed by regional water board administrators due to their Spanish-speaking accents.²⁹ To advance EJ through
151 policy-making, communities, often in collaboration with academic researchers and regulatory scientists, typically have
152 to actively engage the state in order to dismantle these racist legacies in environmental decision-making. Our
153 experience suggests that while often challenging, such state engagement can enable EJ communities to effectively
154 (re)shape environmental decision-making as well as the science that informs it.

155 Practice Recommendations

156 We conclude with three community-engaged research practice recommendations that have guided our work.

157 *Recommendation 1: leverage non-governmental tools to respond to evolving crises*

158 One of the primary strengths of the DWT is the nimbleness with which it can respond to evolving EJ priorities and
159 emerging research. This responsiveness was made possible through CWC’s frequent and bi-directional community
160 outreach (e.g., through their Annual Needs Assessments and public-facing workshops) as well as the research team
161 and OEHHA’s efforts to stay abreast of breaking research and new data. We recommend development and
162 deployment of non-governmental tools to collect, synthesize, and visualize environmental justice-relevant data for
163 their responsiveness, in ways that support their future integration into state-managed regulatory instruments.

164 *Recommendation 2: work with state agencies to enhance the reach and sustainability of advocacy and research*

165 Ensuring the reach and sustainability of tools like the DWT outside of state contexts is challenging. While WESS has
166 enjoyed success applying for various funding sources that encourage such initiatives, collaborating directly with state
167 agencies facilitated translation of WESS’s research and CWC’s advocacy into policy decisions concerning drinking
168 water access and resource distribution to impacted communities. It is important to acknowledge, however, that state

A Critical Review of Primary Data Studies,” *WIREs Water* 10, no. 5 (2023): e1653,
<https://doi.org/10.1002/wat2.1653>.

²⁷ Laura Pulido, “Geographies of Race and Ethnicity II: Environmental Racism, Racial Capitalism and State-Sanctioned Violence,” *Progress in Human Geography* 41, no. 4 (August 1, 2017): 524–33,
<https://doi.org/10.1177/0309132516646495>.

²⁸ Laura Pulido, “Flint, Environmental Racism, and Racial Capitalism,” *Capitalism Nature Socialism* 27, no. 3 (July 2, 2016): 1–16, <https://doi.org/10.1080/10455752.2016.1213013>.

²⁹ Carolina L. Balazs and Isha Ray, “The Drinking Water Disparities Framework: On the Origins and Persistence of Inequities in Exposure,” *American Journal of Public Health* 104, no. 4 (April 2014): 603–11,
<https://doi.org/10.2105/AJPH.2013.301664>.

169 agencies have played (and continue to play) a direct role in enabling environmental injustices. Thus, it is critical to
170 forecast the potential benefits and pitfalls of working with state agencies and ensure that these collaborations be
171 steered by the needs, priorities, and well-being of community partners.

172 *Recommendation 3: invest in sustainable relationships that enable collaboratives to weather ebbs and flows in funding*
173 WESS partners co-developed federal, state and foundation funding proposals to support community- and data-driven
174 research that advances water justice goals in policymaking. Common ethical challenges of community-based
175 participatory research often involve differences in power, perspectives, priorities, and resources between researchers,
176 CBOs, and government agencies.³⁰ Our core strength stems from our history of successful and iterative work together
177 that has sustained our collaborative over the long-term, both when funding has been abundant and when it has
178 temporarily run dry. As a collaborative, we have taken particular care to anticipate ebbs and flows in funding to
179 minimize the burden placed on CWC or their constituents. We have found that “braiding” funding streams³¹ - for
180 example, by pulling from multiple sources, or by CWC taking on the role of primary fiscal grantee - has supported a
181 flexible research agenda and a more equitable balance of power related to setting research and policy advocacy
182 priorities. Together, WESS partners have ensured a nimbleness in research aims and approaches, which integrate
183 primary and secondary data analysis to enable the collaborative to keep policy relevant work active, even during
184 temporary shortfalls in funding.

185 Figure Legends

186 Figure 1: Water Equity Science Shop. Collaboration outputs are listed next to their primary agents.

187 Figure 2: Timeline of the Water Equity Science Shop's (WESS) development, the evolution of its Drinking Water Tool
188 (DWT), and the broader landscape of California drinking water policy.

189 Table 1: Structural asymmetries in power and positionality in community-engaged environmental justice research,
190 and its implications for WESS

191 Acknowledgements

³⁰ Ann Rosegrant Alvarez and Lorraine M. Gutiérrez, “Choosing to Do Participatory Research: An Example and Issues of Fit to Consider,” *Journal of Community Practice* 9, no. 1 (June 26, 2001): 1–20, https://doi.org/10.1300/J125v09n01_01; Barbara A. Israel et al., “Review of Community-Based Research: Assessing Partnership Approaches to Improve Public Health,” *Annual Review of Public Health* 19, no. Volume 19, 1998 (May 1, 1998): 173–202, <https://doi.org/10.1146/annurev.publhealth.19.1.173>.

³¹ Meredith Minkler, “Ethical Challenges for the ‘Outside’ Researcher in Community-Based Participatory Research,” *Health Education & Behavior* 31, no. 6 (December 1, 2004): 684–97, <https://doi.org/10.1177/1090198104269566>; Galen El-Askari et al., “The Healthy Neighborhoods Project: A Local Health Department’s Role in Catalyzing Community Development,” *Health Education & Behavior* 25, no. 2 (April 1, 1998): 146–59, <https://doi.org/10.1177/109019819802500204>.

192 We are grateful to everyone who participated in our advisory committee webinars and contributed to this tool. We
193 especially want to thank the AGUA Coalition (la Asociación de Gente Unida por el Agua, or the Association of People
194 United for Water) a regional, grassroots coalition of impacted community residents and allied non-profit organizations
195 dedicated to securing safe, clean, and affordable drinking water for San Joaquin Valley and Central Coast communities.

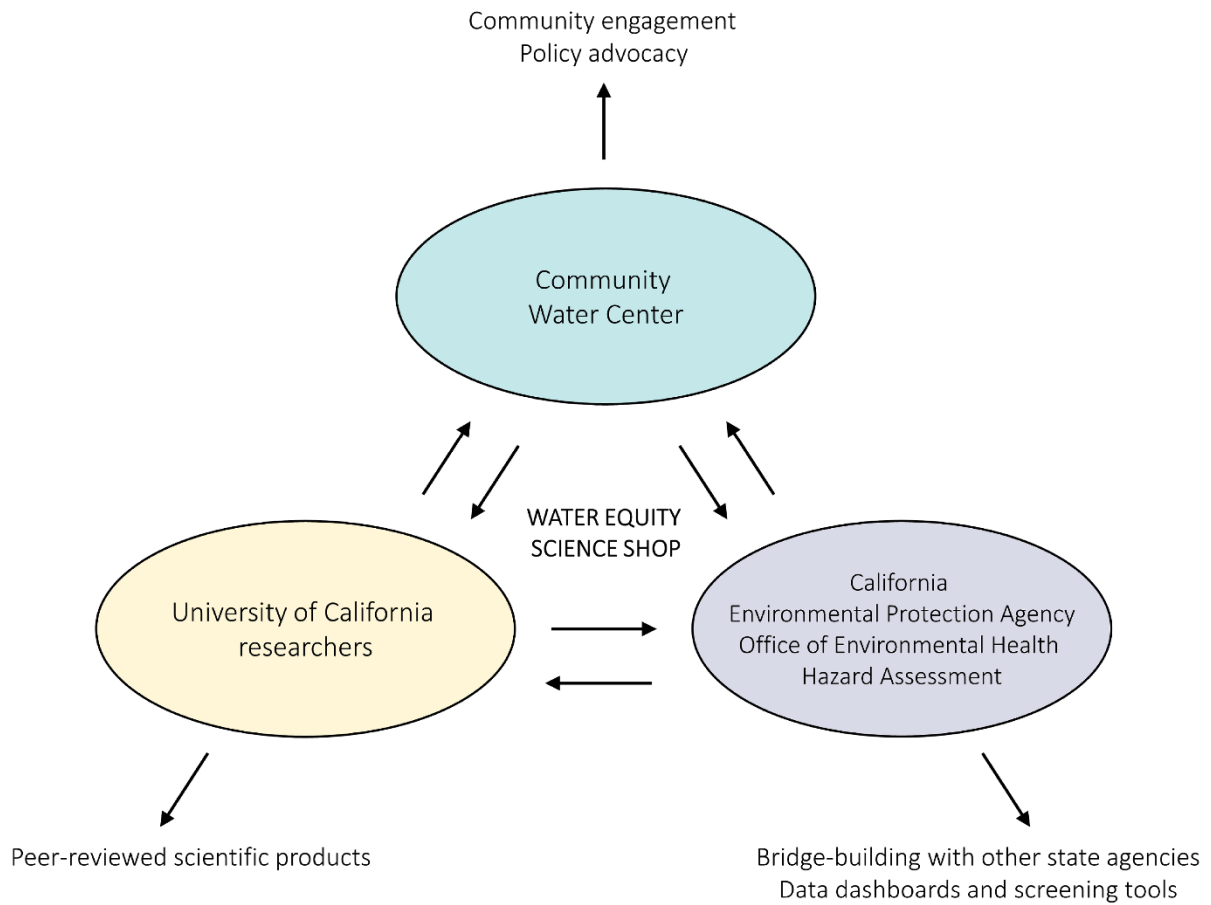
196 Disclosures and conflicts of interest

197 Authors have no conflicts of interest to report.

198 Funding

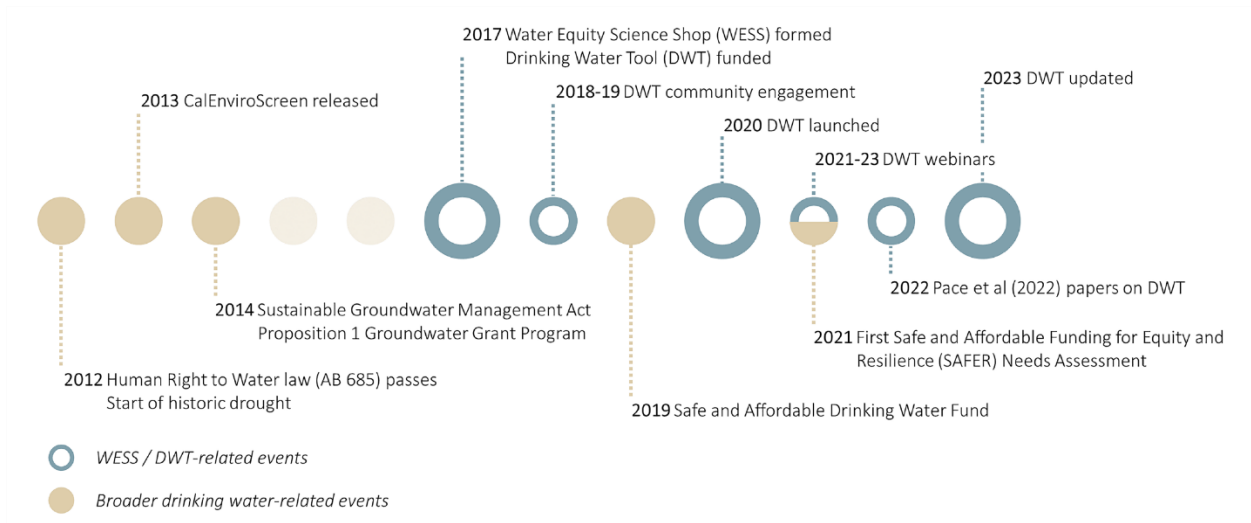
199 This project was supported by the National Institute of Environmental Health Sciences (award #P42ES004705) and
200 the Water Quality, Supply, and Infrastructure Improvement Act of 2014 through an agreement with the State
201 Department of Water Resources (award #4600012684).

202



203

204 *Figure 1: Water Equity Science Shop. Collaboration outputs are listed next to their primary agents.*



205

206

207

Figure 2: Timeline of the Water Equity Science Shop's (WESS) development, the evolution of its Drinking Water Tool (DWT), and the broader landscape of California drinking water policy.

208 *Table 1: Structural asymmetries in power and positionality in community-engaged environmental justice research, and its*
 209 *implications for WESS*

Broad challenges and inequities among the institutions typically represented in environmental justice (EJ) research collaboratives (community-based organizations, universities and state agencies):	
<ul style="list-style-type: none"> - Overcoming distrust due to legacies of extractive academic research in marginalized communities (e.g., “helicopter” research) - Dismantling historical and ongoing racism in environmental decision-making - Addressing institutional racism in STEM fields and the lack of scientists who are from the communities involved in research collaborations - Navigating stark differences among partner institutions in salary, staff, and infrastructure support - Being mindful that collaboratives may not reflect the full range of aspirations and needs of EJ communities in a given region of study - Taking action to ensure community expertise is elevated alongside scientific expertise in forging research priorities and informing policy and regulatory decision-making 	
Power and privilege asymmetries facing the Water Equity Science Shop (WESS)	
Science Team (University of California, Berkeley and Los Angeles)	Cal-EPA’s Office of Environmental Health Hazard Assessment (OEHHA)
<ul style="list-style-type: none"> - The water injustices WESS addresses are not part of the lived experiences of all researchers, although some may be from EJ communities. - Bureaucratic conditions imposed by universities related to the management of grants can prioritize researchers over community partners (e.g., high indirect costs on grants) - It falls on the research team to ensure that community expertise is elevated in research priorities and conversations with agency decision-makers. 	<ul style="list-style-type: none"> - Although OEHHA is a non-regulatory science arm of the California EPA, the fact that it is a state agency carries significant influence in EJ spaces. - OEHHA may be beholden to state or federal-level directives and regulations that may be at odds with the goals or priorities of CWC or AGUA. - On the flip side, OEHHA is in a unique position to empower or advocate for community interests and advance EJ goals through its generation of scientific evidence and tools that inform decision-making.
Community Water Center (CWC)	AGUA Coalition
<ul style="list-style-type: none"> - CWC plays a primary role in directing WESS’ agenda and functioning as an intermediary at the interface of WESS, EJ communities, and grassroots organizations (i.e. AGUA). - CWC’s reputation as an established and well-connected EJ organization comes with power and privilege, especially relative to other EJ organizations and/or residents who are not as well-connected or established. 	<ul style="list-style-type: none"> - As a large grassroots group run by a council of representatives from each community who vote on campaign activities, events, governance, and finances, AGUA (la Asociación de Gente Unida por el Agua) is subject to its own set of politics and differences in power among its diverse members.