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# Community Engagement in Oregon Water Governance: Evaluating a State Water Policy and a Collaborative Q Methodology Research Project

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Community engagement in Oregon water governance: Evaluating a state water policy and a collaborative Q methodology research project

by  
Clare T. McClellan

A thesis submitted in partial fulfillment of the  
requirements for the degree of

Master of Environmental Management

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2021

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## Chapter 1: Introduction

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### Background

Climate change, globalization, and shifting human needs and uses are among the many factors contributing to the increasingly complex nature of water issues worldwide (Vos & Boelens 2018). In the Western United States (US), water has always been contested (Fleck, 2016), but in recent decades the nature of many of the region's water issues has grown so complex that they are now termed "wicked problems" (Beutler, 2016). Water policy and management must juggle the often-opposing needs, values, and perspectives of countless water users while navigating social and physical systems that are constantly in flux. In an attempt to adapt to this challenging environment and as a result of the growing public expectation for transparent and inclusive governance, water management has embraced stakeholder engagement (Akhmouch & Clavreul, 2016).

Stakeholder engagement processes operate in the context of existing power structures and therefore are inherently connected to issues of justice, even if they seek to eschew the status quo power dynamics. Historically, the field of water management has not always adequately attended to the impacts of these dynamics on stakeholder engagement initiatives (Wehn et al., 2018), so although myriad best practices are acknowledged, the questions of power and justice at the core of stakeholder engagement often go unaddressed (Dube & Swatuk, 2002, Lukasiewicz & Baldwin, 2017). Given these issues, water management practitioners and researchers might consider alternative approaches to involving the public, such as community-engaged research from the social science research realm. By being honest about these gaps in stakeholder engagement approaches and exploring potential other methods to address them, the field of water governance could take steps towards more effective, inclusive, and transformational management

processes. This research evaluates both a state policy and a community-engaged research Q methodology project in Oregon to make the case for research that bridges the intersections of water governance, stakeholder engagement, community-engaged research, and environmental justice.

## Purpose of research

This work was primarily conducted by the Oregon Water Stories Project, an interdisciplinary research group at Portland State University, in collaboration with the Willamette Partnership, an environmental non-profit in Portland, and with additional involvement from community partner organizations across the state. The overarching goal of this paper is to explore the challenges and opportunities present at the intersections of water management, stakeholder engagement, community-engaged research, and environmental justice. This study investigates this nexus first through an evaluation of Oregon's 100 Year Water Vision that points to areas for increased integration of environmental justice principles in water policy-making. In the second section of the study we examine the challenges and benefits of a community-engaged research approach to measuring water values in five communities across Oregon as an alternative model for stakeholder engagement in water governance. This case study uses the mixed-methods surveying approach called Q methodology and was adapted to the COVID-19 global pandemic. We describe and analyze this research process through a theoretical framework that compares stakeholder engagement and community-engaged research to draw out key components and broader implications.

Through policy evaluation, literature review, and analysis of the piloted research process this project seeks to answer two primary research questions. First, we ask, "how can water policy and decision-making processes better center environmental justice principles?" The second

research question is “what are the benefits and challenges of a COVID-19-adapted, Q methodology community-engaged research approach as a form of stakeholder engagement in water management?” The findings from these two connected investigations could be applied to water governance processes across the US and may offer new approaches to public engagement in water management that produce effective and inclusive processes and outcomes.

## Chapter 2 Summary: Evaluating Oregon’s 100 Year Water Vision with an Environmental Justice Lens

The first chapter of this thesis provides background for and then presents a policy brief that was written to influence the development of Oregon’s 100 Year Water Vision, an in-progress state policy that ambitiously aims to guide current and future water decisions for sustainable communities, environment, and economy (Oregon’s 100-Year Water Vision, 2020). The first objective of the policy brief was to analyze the Water Vision through an environmental justice lens and illustrate the evaluation with case studies exemplifying the four principles of environmental justice. The second objective was to propose a matrix of questions organized by those four principles that decision makers could apply to evaluate any water-related policy process or outcome. To achieve these objectives, we analyzed case studies drawn from Oregon newspaper articles describing human-water interactions in the state. Additionally, we conducted a meta-linguistic analysis of a database of almost 1,000 such articles to bring out patterns and themes regarding Oregonians’ water priorities and related issues of justice. Based on the case studies, we determined that water policy-making in Oregon, including the Water Vision, had room for improvement in the integration of all four environmental justice principles. In general, we hope that policy makers can use the question matrix tool we devised to help facilitate an understanding of and then action towards addressing the need for a sharper focus on justice and equity in water policy.

### Chapter 3 Summary: Challenges and benefits of measuring water values through community-engaged research during the COVID-19 pandemic as an alternative mode of stakeholder engagement

The second chapter of this thesis presents an evaluation of a Q methodology research project undertaken by a team of researchers and community partners to measure the water values of participants in five Oregon communities. Water governance has increasingly embraced stakeholder engagement to respond to the push for more transparent, inclusive decision-making and to develop innovative solutions for complex water issues. Despite legal requirements to involve the public in water policy decisions, stakeholder engagement processes have been criticized in the scholarly literature for neglecting important voices, reproducing existing power dynamics without interrogation, and tokenizing engagement such that stakeholders have little actual influence on water decisions. To attend to these gaps, some researchers and practitioners are looking to other engagement approaches such as community-engaged research, which emphasizes collaboration and centers community knowledge. Building on this emerging field, this study asks the question “What are the challenges and benefits of a COVID-19 adapted, Q methodology, community-engaged research design as an alternative to stakeholder engagement in water management?” An evaluative framework comparing community-engaged research and stakeholder engagement approaches was developed and applied to analyze the strengths and weaknesses of this project’s research design. Special attention was given to the impact of the COVID-19 pandemic on engagement activities and the project’s corresponding adaptations. The analysis suggests that a community-engaged research approach goes beyond stakeholder engagement by focusing on reciprocity, collaboration, and engaging hard-to-reach constituents. The primary challenges of this research design include collaborating virtually with community partners, guiding stakeholders through an online research process, and working with populations



with limited access to technology. However, the primary benefits of the research design include its abilities to adapt to shifting circumstances during the pandemic, to center and respond to community needs and knowledge, and to produce rich quantitative and qualitative data.

### Importance of this project as a whole

These two chapters represent different but connected research initiatives under the umbrella of Oregon Water Stories (OWS), a project out of Portland State University that aims to explore and interrogate the modern relationship between humans and water, termed “sociohydrology”, in a place-specific and justice-centering way. OWS researchers represent a broad range of academic interests and thus bring a variety of perspectives to the table. Researchers began investigating sociohydrology in Oregon by compiling a database of relevant newspaper articles and running various linguistic analyses to draw out water values themes and focus in on case studies that exemplified moments of environmental (in)justice. This analysis informed the writing of the policy paper that sought to both evaluate a specific policy, Oregon’s 100 Year Water Vision, as well as provide a more broadly applicable tool that can assess environmental justice in water decision making.

After conducting this evaluation, OWS researchers turned towards investigating the water priorities and values of Oregonians’ whose voices might not have been represented as well in the Water Vision’s stakeholder engagement activities. To do so, we developed a community-engaged research project that used the Q methodology surveying approach to measure water values of hard-to-reach stakeholders across the state in collaboration with five community partner organizations. The project had to be adapted on the fly to the COVID-19 pandemic and resulted in a novel research process that combined stakeholder engagement and community-engaged research approaches to assess participant water values and compare them to those put

forth by the state in the Water Vision. This research process warranted evaluation with a framework derived from literature review of the relevant fields, and our analysis highlights the potential for this approach to increase genuine collaboration and incorporate more justice into standard stakeholder engagement in water management.

Although both of the research initiatives described in this thesis were developed in response to a specific water policy and sociohydrologic context in Oregon, our findings can be applied more broadly to water policymaking and stakeholder or community engagement processes in other regions. The evaluative question matrix proposed in Chapter 2 intends to add a pragmatic tool to water decision makers' toolboxes that encourages consideration and incorporation of justice in water policy. Similarly, the comparative conceptual framework developed and tested in Chapter 3 could offer a practical contribution to the stakeholder engagement and community-engaged research literature as both a diagnostic and evaluative tool. The challenges, benefits, and lessons brought forth through an examination of our research process in Chapter 3 could help inform both the emerging scholarship on research during the COVID-19 pandemic as well as future research projects that continue to explore new approaches to engagement in water management.

## Chapter 2: Evaluating Oregon's 100 Year Water Vision with an Environmental Justice Lens

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### Background

It is estimated that Oregon will need a budget of \$6.25 billion over the next 15 years to maintain and upgrade its drinking water and groundwater infrastructure (US EPA Office of Ground Water and Drinking Water, 2018). These investments must be strategic, as studies

predict that by the 2080s, all but one of Oregon’s hydrologic systems will be transitioning to rain-dominant, or mixed rain and snow (Dalton et al., 2017). Additionally, substantial investments will need to be made in wastewater, stormwater, and other natural and built water system infrastructures to equip them for resilience in the face of changing population dynamics and climate change.

To address this need for far-reaching and forward-looking water planning, the state of Oregon began creating a “100 Year Water Vision” in 2018 (may also be referred to as the “Water Vision”). The draft document puts forth the goal of stewarding Oregon’s water resources now and for the future, focusing specifically on the realms of health, safety, economy, and the environment (Oregon Watershed Enhancement Board, 2019). As of 2021, the Oregon Watershed Enhancement Board (OWEB) has held eight “Community Conversations” in locations throughout Oregon to engage water leaders around the 100 Year Water Vision and discuss the water challenges and opportunities facing Oregon.

The state is home to a diversity of water systems and water users, so it is likely that the eight Community Conversations held reflect only part of the full spectrum of Oregonians’ water priorities and values. Continued public support and involvement across diverse constituencies will be critical to the success and reception of the Water Vision. Not only that, if the water priorities of only some Oregonians (i.e. water leaders) influence the Water Vision, Oregon’s water resource management will become more inequitable, less resilient, and will continue to perpetuate existing environmental injustices.

Given this background and the importance of the Water Vision in guiding the state’s water policy future, we wanted to investigate to what degree equity and environmental justice were incorporated into the draft document. The goal of this research was to create and distribute

a policy brief that both specifically recommended ways to further emphasize equity and justice in the Water Vision and more broadly offered a practical framework for evaluating water policy content and processes through an environmental justice lens. The policy paper, which was intended for the audience of Oregon water policy makers and legislators, is presented next with the original formatting to preserve its readability and visual impact. The appendices attached to the policy paper when it was submitted to the OWEB can be found in Appendix I of this paper.

### [Centering Equity in Oregon's 100 Year Water Vision](#)

A student-led policy paper prepared by the Oregon Water Stories team at Portland State University

January 24, 2020

By: Clare McClellan, Sadie Boyers, Victoria Cali de Leon, Tony Cole, Laura Cowley-Martinson, Shersten Finley, Dustin Lanker, Julia Seydel, Aakash Upraity, Janet Cowal, Melissa Haeffner

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#### *Executive Summary*

The purpose of this report is to provide evidence for the need to further intentionally incorporate equity into Oregon's 100 Year Water Vision. Four case studies contextualize this need and highlight the variety of water issues throughout the state, supported by linguistic analyses of local newspapers. As Oregon policy-makers are responsible for ensuring working water systems for all Oregonians, we also suggest implementable criteria for the evaluation of equity in water issues and decision-making. This student-led and interdisciplinary report comes from the Haeffner-Cowal Oregon Water Stories research lab at Portland State University.

#### *Problem Statement*

We all acknowledge the necessity of thoughtfully reimagining Oregon's water future. We also know that Oregon is varied by geography, hydrology, climate, and sociodemographics. This policy paper is intended to put forth water justice language that can promote equity for diverse

stakeholders in Oregon’s 100 Year Water Vision. See Appendix A for a preliminary inventory of the top water issues across the state by region.

The draft of the Water Vision has already begun framing a new approach to Oregon’s water that is focused on stewardship, resilient natural and built water systems, and that centers goals around health, safety, economy, and environment. These goals are far-reaching and forward-looking. Our research team has been examining the social and environmental justice aspects of water in Oregon, and has come to believe that equity should be added as a fifth goal. The ultimate aim is for equity to be incorporated into the foundations of any Oregon water policy. However, it is hard to conduct this fundamental transition in policy, so making it a separate fifth goal would put equity in dialogue with the other four goals and at the forefront of the Water Vision. This water policy for the future needs to explicitly recognize and name historical and systemic reasons for the current inequities in water resource management and access. Using language like “for all” and “for future generations of Oregonians” is inclusive, but not explicit enough to undo harms from racism, sexism, and other types of exclusion based on language, ability, ethnicity, and class. For authentic transformation in policy, we must center restorative language.

We define equity as treating people justly according to their circumstances, and environmental justice (EJ) as working for an equitable distribution of environmental burdens, benefits, and responsibilities. Distributive, procedural, recognition, and representational justice are principles of EJ identified by scholars. Case studies will frame and define each of these principles, and each case study will conclude with example questions Oregon policy-makers could ask to evaluate how that justice principle could be more fully supported. Centering and being explicit about water equity in this Water Vision would be an important first step to (re)building trust and engagement with Oregon publics, and specifically with groups who are often marginalized in decision-making contexts.

### *Representational Justice*

Ontario, located in Malheur County and on the border of Oregon and Idaho, is majority White, with a significant (almost 43%) Hispanic or Latinx community and an increasing population of immigrants and refugees. Ontario’s commuter population during the day is almost six times larger than its nighttime population of 11,080. In our research, we found that the dominant water issues in this area appear to be irrigation, snowpack and drought, and water contaminants such as arsenic and cyanobacteria.

Given the racial, ethnic, and class diversity of the population, it is essential to examine the makeup of water decision-making entities in Ontario to see if they reflect this diversity. This is a case for representational justice, which calls for the sociodemographic range of an area’s citizens to be equitably represented by the sociodemographics of the area’s decision-makers. One example of this equity in action could be determining if Latinx farm workers in Ontario are represented by the area’s agricultural and irrigation decision-making boards.

Ensuring representational justice in any water decision-making context is vital to an equitable Water Vision for the future. Oregon’s diverse people, environments, and economies deserve accurate representation in water policy, and if some relevant viewpoints are not represented, water policies lose out on critical perspectives. In order to make effective, resilient water decisions, all groups who have a stake in that water must be present at the table.

~ Representational justice asks, “Who is at the table?” And, “Are the socio-demographics of the area equitably represented here?” ~

Example questions to evaluate if representational justice criteria are being met:

1. Who is and is not involved in this decision-making, and what are their sociodemographics (gender, ability, language, race, ethnicity, immigration status, etc...)?
2. Does the sociodemographic makeup of the decision-making body adequately represent that of the population that has a stake in this decision?
3. To what extent are representatives of different sociodemographic groups able to participate in and influence the policy in this decision-making context?

### *Procedural Justice*

Located just to the west of the Umatilla Indian Reservation, Pendleton is a medium-sized city with a majority White population and a significant community (11.3%) of people who identify as Hispanic or Latinx. According to our research, the main water issues in Pendleton seem to be water and sewer rate increases, drought and flooding, and water contamination.

The demographics of Pendleton combined with the water issues it is experiencing warrant a review for procedural justice, which can be defined as how equitably people can access, participate in, and contribute meaningfully to policy procedures. One question that could be asked in this case is how much are people in the Hispanic and Latinx community, as well as members of the Confederated Tribes of the Umatilla Indian Reservation, able to influence relevant policy? For example, are materials and meetings in both English and Spanish, and are relevant meetings held both on and off the Umatilla Indian Reservation?

Making procedural justice a reality is another step towards equity and is connected to evaluating for representational justice. For instance, having a sociodemographically representative committee on water rights would be important, but a step further is making sure that this committee has the political or legal clout to truly influence decisions around water rights. Embedding procedural justice in water policy will ensure that the diverse perspectives of Oregon water users are not only represented in decision-making contexts, but also that these perspectives have the ability to actually access and impact decision-making processes.

~ Procedural justice asks, “How equitably can people access, participate in, and contribute meaningfully to policy procedures?” ~

Example questions to evaluate if procedural justice criteria are being met:

1. Who has access to active participation in this decision-making process? Who does not?
2. Can people attend this process, given its time(s), date(s), duration, location(s), and services available, such as food, childcare, and language interpretation for Spanish, ASL, and others?
3. Do the avenues for participation actually give people the power and information needed to create meaningful change?

### *Distributive Justice*

Roseburg, the seat of Douglas County, has a majority White population, more citizens living below the poverty line than the Oregon average, a substantial retired population, and a daytime commuter population that is nearly triple that of its nighttime population. In our research, we found that the main water issues in Roseburg appear to be drought, flooding, water quality and contamination, and water infrastructure.

When issues of water access and quantity, such as boil water notices or drought, are detected in an area, the situation should be evaluated for distributive justice. This means assessing the sociodemographics of the people most impacted, to make sure that those who are already vulnerable or marginalized are not disproportionately burdened. In Roseburg, for example, it would be important to find out if any neighborhoods that received multiple boil water notices are home to a disproportionate percentage of one race, age, or class of residents.

Evaluating for distributive justice is a central tenet of water equity and should be at the forefront of governmental priorities in any situation related to water issues. It is critical that those already experiencing vulnerability or marginalization are not the recipients of a disproportionate amount of environmental impacts, and that these burdens, as well as any environmental benefits, are distributed equitably between all groups.

~ Distributive justice asks, “Who is most impacted by this issue, and are these groups already vulnerable or marginalized?” ~

Example questions to evaluate if distributive justice criteria are being met:

1. Who is vulnerable or already marginalized in this area, and why?
2. How are these communities being affected by environmental issues? Are they disproportionately bearing the weight of environmental burdens?
3. What would an equitable distribution of environmental burdens and benefits look like?

### *Recognition Justice*

Warm Springs is located in Jefferson County on the Warm Springs Indian Reservation, which was created in 1855 when over 10 million acres of land were ceded by treaty to the U.S. The population on average is young, more than a third of the population lives below the poverty line (38.3%), and most people identify as Native American (93%). Our research identified the main water issues in Warm Springs as drought and water shortages, contaminated water, and the effects of these problems on fish populations.

Warm Springs is an example for recognition justice, which can be understood as appropriately recognizing the past and its influence on the present, combined with thinking critically about who has the power to set policy agendas. In this case, the state could consider the history of inequitable treatment of tribes and tribal lands, and how this dynamic might decrease the ability of tribal members to influence water policy relevant to Warm Springs at the state level. The financial and physical resources accessible to the Warm Springs tribes for completing water projects could also be a measure of the community’s ability to set the agenda and act on water issues. In sum, recognition justice can be approached by asking, “Who gets to set the table for this decision-making?” And next, by exploring how the past might affect the ability of various stakeholders to have more or less power to influence the agenda of this decision-making.

Recognition justice is crucial to an equitable Water Vision for Oregonians because it requires policy to acknowledge the past and understand how it is shaping the present. Recognizing past inequities in policy paves the way to avoid reproducing these same inequities in current policy content and process. Further, recognition justice necessitates a thorough evaluation of the power dynamics at play in policy making, which can open the door to new possibilities for addressing water inequity.

~ Recognition justice asks, “Is the past and its influence on the present being appropriately recognized?” And, “Who can ‘set the table’ for this policy?” ~

Example questions to evaluate if recognition justice criteria are being met:

1. Who can “set the table” for this policy, i.e. who has the power to set the agenda at each level of government for this issue? Who does not have this power?
2. How might the history of this location, relationship, or issue be affecting who can and cannot set the agenda? Is this history being recognized appropriately?
3. In what ways can the process and content of the discussion of this issue be made more equitable, given this new understanding of historical inequities and current power dynamics?

### *Recommendations*

Drawing on these four case studies as examples of integrating environmental justice into water policy, we have developed a list of recommendations to promote equity in Oregon’s 100 Year Water Vision.

- Equity could be a fifth goal, and could have a definition such as: “Building from an understanding of historical and systemic reasons for current water inequities in Oregon, provide fair access to water and equitable inclusion in water management processes.”
- The specific aim of striving for distributive, recognition, representation, and procedural water justice, the four principles of environmental justice, could be incorporated into the “Vision” section of the document.
- With recognition justice in mind, the broad reasons for past and systemic water inequities that exist in Oregon today could be stated in the “Problem Statement” section or an appendix. For example: “Without acknowledging Oregon’s history of racism and oppression of people of color, policy-making will not be able to fully address the water issues created by this history.”
- With representational justice in mind, another round of Community Conversations aimed at hearing from groups we know were missed in the last round could be held. For example, Latinx seasonal farmworker communities, people experiencing homelessness, and refugee communities could be particularly invited and could help design the Conversations. These Conversations could be made accessible to the specific group they are aiming to recruit from in a variety of ways. For example, the events could be held in the evening, have childcare and food available, or have Spanish and other language materials and interpretation available.
- With procedural justice in mind, the Water Vision document and web page could be made accessible in Spanish, Chinese, Vietnamese, Russian, and other languages.
- With distributive and procedural justice in mind, the Water Vision draft could be



- published in newspapers and with a solicitation for comments, either online or through Letters to the Editor sections. Our research team’s database of Oregon newspapers could be a resource for this step.

*Conclusion*

The key element of equity needs to be more intentionally emphasized in the Water Vision, and protocols need to be put in place to codify equity evaluations. As the case studies and linguistic analyses of local newspapers throughout the state (Appendix A) indicate, Oregon contains an incredible diversity of water contexts and issues. Because of this diversity, this paper’s ultimate recommendation is for Oregon public officials to create and ask evaluative questions to address the four principles of environmental justice around water systems and policies in Oregon.

*Example questions to evaluate equity in Oregon water policy and issues*

Justice Principle	Evaluative Questions		
Representational	Who is and is not involved in this decision-making, and what are their sociodemographics (gender, ability, language, race, ethnicity, immigration status, etc...)?	Does the sociodemographic makeup of the decision-making body adequately represent that of the population that has a stake in this decision?	To what extent are representatives of different sociodemographic groups able to participate in and influence the policy in this decision-making context?
Procedural	Who has access to active participation in this decision-making process? Who does not?	Can people attend this process, given its time(s), date(s), duration, location(s), and services available, such as food, childcare, and language interpretation for Spanish, ASL, and others?	Do the avenues for participation actually give people the power and information needed to create meaningful change?

Distributive	Who is vulnerable or already marginalized in this area, and why?	How are these communities being affected by environmental issues? Are they disproportionately bearing the weight of environmental burdens?	What would an equitable distribution of environmental burdens and benefits look like?
Recognition	Who can “set the table” for this policy, i.e. who has the power to set the agenda at each level of government for this issue? Who does not have this power?	How might the history of this location, relationship, or issue be affecting who can and cannot set the agenda? Is this history being recognized appropriately?	In what ways can the process and content of the discussion of this issue be made more equitable, given this new understanding of historical inequities and current power dynamics?

*The Oregon Water Stories Team*

The Oregon Water Stories team, who researched and created this policy paper, is an interdisciplinary group of students, research affiliates, and faculty from Portland State University.

- Sadie Boyers received a Bachelor’s degree in Psychology from the University of Puget Sound and an Associates degree in Science (Biology) from Whatcom Community College.
- Victoria Cali de Leon is pursuing a Bachelors degree in the School of Public Health at PSU-OHSU.
- Tony Cole received a MA-TESOL in Applied Linguistics from Portland State University in 2005.
- Janet Cowal is a Senior Instructor II & Adviser in the Department of Applied Linguistics.
- Laura Cowley-Martinson received a Master of Arts in Applied Linguistics at Portland State University in 2019.
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- Clare McClellan is pursuing a Masters of Environmental Management at Portland State University.
- Julia Seydel is pursuing a Bachelors degree in Environmental Science and Management at Portland State University.
- Aakash Upraity received a Masters degree in Environmental Studies at the University of Oregon.

## Chapter 3: Challenges and benefits of measuring water values through community-engaged research during the COVID-19 pandemic as an alternative mode of stakeholder engagement

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### Introduction

Because of the historical and current ways human society has relied on, managed, and affected water, we cannot escape the reality that water management decisions involve moral and political valuations as well as hydrologic ones (Bakker, 2012). In addition, as our shared recognition of the complex political and cultural paradigms surrounding water has increased, so too has our awareness and public critique of water-related injustices. In response to these circumstances, water management processes have come to rely on stakeholder engagement (SE) as a critical, even legally required, aspect of making effective and sustainable water resource decisions (Akhmouch & Clavreul, 2016). Despite the legal requirements and growing expectation for public involvement in water management, SE processes often neglect important voices or fail to genuinely incorporate stakeholder perspectives (Larson & Lach, 2010; Lukasiewicz & Baldwin, 2017; Taylor et al., 2019).

A critical exploration of SE in water management, and more broadly in natural resource management, brings to light the gaps in the field's current practices, principles, and literature, particularly as they relate to social and environmental justice paradigms. One area that warrants special attention is the small, but growing, scholarship at the intersection of water governance and water values. A person's water values reflect both individual conceptualizations and valuations of water as well as broader social attitudes about water, and are inherently linked to the social and environmental conditions of in(justice) that shape that person's life (Jackson & Barber, 2013). Due to the complex and deep-rooted nature of water issues, those individuals and

entities responsible for water management are thus implicitly impacted by their own and others' water values when making decisions (Berry et al., 2018; Mena-Vásquez et al., 2017).

Given the clear influence of individual water values upon decision-making processes in water governance, an environmental justice lens suggests further interrogation of how the water values of those individuals and communities who do not make water management decisions are attended to by those entities in power. Water values are rarely made explicit in water governance (Schulz et al., 2017), so the values that guide policy and management decisions go mostly unnoticed and/or unquestioned. Implicit water values typically both reinforce and rely on dominant systems like colonialism, capitalism, and Eurocentric governance principles (Gibbs, 2010; McLean et al., 2018), while simultaneously disregarding or invalidating certain water values and users, such as Indigenous, rural, and/or poor communities (Berry et al., 2018; Jackson & Barber, 2013).

Although water policy often purports to be objective, scientific, and politically neutral (i.e. when making claims about “efficient allocations” in a water-scarce basin), water management actually operates within a complex network of social, ecological, economic, and political systems, all of which inherently involve valuations of water (Kati & Jari, 2016; McLean et al., 2018). Furthermore, even if water values are acknowledged or stakeholders are engaged, the water management field is ill-equipped to accommodate the full nuance, diversity, and complexity of water values held by individuals, communities, or within a region (Gibbs, 2010; Kati & Jari, 2016; Mena-Vásquez et al., 2017). It is clear from this brief overview that SE processes and water management as a whole have some critical weaknesses in relation to genuinely engaging stakeholders, adequately capturing their water values and perspectives, and integrating these into water decisions. It is the position of this paper that all of these problems

result in SE initiatives often falling short of their full potential for moving towards more just and effective water governance.

Community-engaged research (CER) presents an alternative method to SE for engaging with the public. Although CER as an approach has historically been used almost solely in social science research involving academic researchers and community partners (Israel et al., 1998), in recent years CER has been employed by scholars and practitioners in natural resource management as an innovative method of addressing challenging management questions (i.e., Kliskey et al., 2021; Riley, 2019). Building upon this work, we propose that a CER approach to engaging communities in water policy can move beyond some of the typical pitfalls of SE processes. This paper strives to weave together the conversations around SE and CER to provide insight into the benefits and challenges offered by an interdisciplinary approach to public engagement in water management.

We frame this discussion through a description and analysis of our work with the Oregon Water Stories (OWS) Project's Q Methodology research, which aimed to measure and compare the water values of stakeholders in five hard-to-reach communities across the state. The OWS team wanted to do research together with, rather than on, communities, which in many ways is a conscious departure from the status quo of SE in natural resource management, where stakeholder input is too often tokenized, existing power dynamics are reproduced, or key voices are continuously left out (Lukasiewicz & Baldwin, 2017). To engage these hard-to-reach stakeholders the project's CER design went beyond typical SE approaches by adapting to the specific needs of the five rural and/or vulnerable communities. This project provides an ideal context for examining and comparing SE and CER engagement approaches as its research process primarily reflects CER principles, but the research outcomes are intended to augment

and impact the SE processes of Oregon's 100 Year Water Vision. Policy developers have already engaged a wide array of Oregon water stakeholders (Oregon Watershed Enhancement Board, 2019), but Willamette Partnership staff and researchers with Portland State University's OWS Project wanted to further investigate how well the water values put forth by the policy align with the diverse range of water values across Oregon communities.

In addition to addressing these questions, the project evaluated in this paper also adds to the emerging scholarship on conducting research during the global pandemic. Our work was dramatically altered by the COVID-19 crisis, and other researchers have described the pandemic as creating a "fundamental shift" in how research is conducted (Saber, 2020). The impacts and limitations of this global crisis may have had an even more pronounced impact on social science research, and especially those projects that include engagement or collaboration with community partners. For example, one group studying HIV advocacy organizations during COVID-19 urged researchers to recognize and attend to the needs faced by these organizations as they face, respond to, and continue to do their work within confounding crises (Operario et al., 2020). Thus, in this paper, we aim to bring the conversation on the complexities of conducting research during the pandemic to bear on the fields of water management, CER, and their intersection. We detail our project with the intent of illuminating one way of adapting a research process to the pandemic, and we critically examine the challenges and benefits of the resulting research process.

The purpose of this paper is to describe and then analyze the project's CER process through the lenses of SE and CER practices. The guiding research question is: "What are the challenges and benefits of a COVID-19 adapted, Q methodology, community-engaged research design as an alternative to stakeholder engagement in water management?" First, SE and CER

will be defined as similar but distinct approaches to engagement, and best practices from the literature will be highlighted. Next, the OWS Q Methodology research design will be described and analyzed in terms of key SE and CER best practices. Special attention will be focused on the project's adaptations to the COVID-19 pandemic. Drawing upon this evaluation of our case study, we identify challenges and benefits of key components of the research process and reflect on lessons learned. Finally, we discuss the broader implications of this research and suggest that interdisciplinary projects that address natural resource management questions through a CER approach represent a necessary and exciting emerging field of study.

## Literature Review

### *Introduction*

A review of some of the extensive stakeholder engagement (SE) and community-engaged research (CER) literature will shed light on the key elements of each approach, including their origins, theoretical underpinnings, central players, types of activities, and evaluative frameworks. Gaps and critiques in each field will briefly be discussed, and then SE and CER will be compared to elucidate their similarities and differences. A conceptual framework will structure this comparison and will be later applied as an analytical tool to the case study described in this paper.

### *Stakeholder engagement*

Like many modern political processes, water governance has largely shifted away from top-down approaches towards more democratic decision making (Ricart et al., 2019). This transition has both practical and normative motivations, but ultimately has created frameworks for and the expectation of public involvement in water management (Lukasiewicz & Baldwin,

2017). SE programs, paradigms, and practitioners have evolved in response to this cultural shift in water management. One way to understand SE in water management or governance is as a process in which one or more actor who hold(s) decision-making power engages individuals, groups, or nations who have an interest or stake in the relevant water context in discussion, decision-making activities, and/or implementation (adapted from Akhmouch & Clavreul, 2016).

### *Defining the process*

Because SE typically involves multiple activities across temporal and/or geographic scales, practitioners and scholars have found it useful to develop theoretically grounded processes that encompass and link together this breadth of elements. While a variety of such frameworks have been theorized by countless scholars, an overview of some major trends and a few specific examples in water resource management should be sufficient to reasonably define the key elements of SE processes.

One common framework conceptualizes SE in terms of either formalized processes integrated into management structures or informal engagement/self-governance activities driven by stakeholders. Hassenforder et al. (2019) argue that more formalized SE approaches legitimize stakeholder knowledge and needs, include diverse perspectives in the decision-making process, and have more reliable funding and responsibility for outcomes. In contrast, the authors suggest that spontaneous or bottom-up stakeholder engagement with decision-making can provide more open and community-driven spaces for water management (Hassenforder et al., 2019).

In practice, SE initiatives often combine elements of both formal and informal approaches to achieve an open, collective atmosphere that also has institutional support and accountability (Hassenforder et al., 2019). One such framework is the stakeholder engagement wheel, which revolves around a convener or “bridging organization” that works together with a



stakeholder steering committee to establish both a structure for engagement and create a community-driven working environment (Mott Lacroix & Megdal, 2016). Similarly, the collaborative modeling methodology centers stakeholder perspectives and agency within a framework of facilitated cooperation and shared responsibility for water resources decisions (Beall King & Thornton, 2016). Another study framed SE activities in terms of social learning, the iterative process of diverse stakeholders learning from each other, which they argue can produce novel and more equitable solutions (Balazs & Lubell, 2014).

Although SE processes cannot be uniformly defined, they share some basic elements, as evidenced by this brief review of trends and examples. Engager entities typically convene stakeholders, either physically or figuratively by gathering voices, and sometimes stakeholders come together of their own accord. Stakeholders share perspectives on the water issue through various avenues (discussed in “Defining engagement” below), and engager entities may also share information and perspectives. The process can include dialogue between individual stakeholders, as well as dialogue between stakeholders and the engager entity. Often a facilitator or a designated bridging organization or steering committee is responsible for mediating and prompting the discussion. Ultimately, the activities should result in tangible suggestions, feedback, input, involvement, or ownership from stakeholders on how to deal with the water issue. SE may build community capacity, strengthen (or weaken) relationships, increase stakeholder buy-in and involvement in water management, and/or make engager entities aware of new facets of the water issue or solution.

### *Defining the actors*

There are two main categories of actors in stakeholder engagement: those who do the engaging, and those who are engaged. Some examples of the types of “engagers” in a water

resources SE context include a non-governmental local Watershed Council (Larson & Lach, 2010); researchers with a public land-grant university (Beall King & Thornton, 2016); a state Department of Water Resources and a regional Water Authority (Balazs & Lubell, 2014); and a national government, with funding and impetus from international donor states and institutions (Dube & Swatuk, 2002). These engager entities span a range of affiliations, motivations, and sizes, but all share the attribute of holding decision-making power or responsibility for the water issue(s) of concern.

The breadth of individuals, groups, and nations who are those “engaged” by SE processes may be even wider than that of the engagers because water issues are almost always complex and impact many people. Some examples of the types of stakeholders who might be engaged in a water resources decision-making context include “lay stakeholders”, or individuals who are deeply interested in and may have expertise on the subject (Mott Lacroix & Megdal, 2016); water leaders or professionals, who are paid or volunteer in the field (Oregon Watershed Enhancement Board, 2019); “disadvantaged”, vulnerable, or marginalized communities, which are in one case defined as those with annual median household income (MHI) less than 80% of the statewide MHI (Balazs & Lubell, 2014); and Tribal Nations and Indigenous peoples, who are often engaged as a stakeholder group but should contribute to and be involved in water decisions as sovereign nations (Chief et al., 2016). These examples demonstrate that stakeholders can be almost any individual or entity as long as they are interested in or are impacted by the water issue at hand, and another crucial element is that stakeholders lack the ability to fully make, influence, or implement decisions. Power dynamics, historical and contemporary, and the systems through which they are upheld are inherent in these definitions of stakeholders and those doing SE, and this assumption will be critically examined in a subsequent section.

### *Defining engagement*

In water resources management, the engagement piece of SE is operationalized on both micro and macro scales. On a micro scale, engagement can be defined as the actual activities undertaken by the parties involved. A non-exhaustive list of some of these activities includes surveys, discussions, listening sessions, dialogue, data collection, information dissemination, decision making and implementation, stakeholder representation in and access to decision making arenas, and partnership or collaborative work (Hassenforder et al., 2019). These individual activities come together to inform conceptualization of the macro scale of engagement, which can be defined as the degree to which stakeholders are involved in the decision-making process and able to influence the outcomes. Theoretical frameworks for public engagement abound across disciplines, and one widely utilized international standard is the International Association for Public Participation's (IAP2) Public Participation Spectrum. The spectrum ranges from low to high public impact on decisions and outcomes, and proposes five tiers of engagement: inform, consult, involve, collaborate, empower (IAP2 International Federation, 2014). As defined on the spectrum, public engagement in decision-making processes can be as small as being provided information about the issues to as large as having final decision-making powers.

Akhmouch and Clavreul (2016) have developed a similar typology of the levels of SE that is specifically for application within the context of water resources management. Drawing from SE research done by the Organisation for Economic Co-operation and Development (OECD) the authors contend that there are six main levels of engagement, from least to most involvement: communication, consultation, participation, representation, partnerships, and co-decision and co-production (Akhmouch and Clavreul, 2016). The authors define these levels

with terms similar to those used by the IAP2 Public Participation Spectrum but structure their typology to address the uniquely complex and contentious problems that dominate water resource management conversations. Different levels of SE may be appropriate depending upon the water management goals, main actors, timeframe, and resources, but in general stakeholders increasingly regard higher levels of SE as more preferable (Hassenforder et al., 2019; Ricart et al., 2019).

### *Gaps and critiques within stakeholder engagement*

As seeking stakeholder perspectives and involvement is increasingly codified in water decision making structures, governments or resource managers must be vigilant that their engagement processes do not simply “check the box” of involving stakeholders. Such tokenized SE activities might fall into the first three levels of engagement described by Akhmouch and Clavreul (2016) and are unfortunately common in water governance (Lukasiewicz & Baldwin, 2017). Dube and Swatuk (2002) provide a stark example of this tokenized SE in their analysis of Zimbabwean governmental water reforms, which supposedly aimed to be inclusive, cooperative, and participatory. However, the authors argue that SE was limited to the public being informed about decisions and having representation, though little say, at meetings (Dube & Swatuk, 2002). SE processes like this reap the advantages of positive public perception while offering negligible opportunities or even active barriers for stakeholders to meaningfully influence water outcomes.

The same mechanisms that reduce stakeholder engagement to tokenized communication, consultation, or participation (Akhmouch & Clavreul, 2016) also often function within and/or reproduce existing power dynamics. Those marginalized by dominant groups already get fewer opportunities to impact water decision-making, and too often water managers create SE plans that in fact uphold the status quo and give voice to “the usual suspects” because they do not

directly question historical and current power imbalances that are the underlying context for SE activities (Larson & Lach, 2010; Lukasiewicz & Baldwin, 2017).

Alongside and as an outcome of failing to provide adequate opportunities for representation and engagement, SE in water management often lacks the true diversity of opinion that is its stated goal. The troubled history of governmental water SE attempts with Tribal Nations and Indigenous peoples worldwide exemplifies this shortcoming. A critique of the OECD's 12 Principles on Water Governance reveals that tribal governments and Indigenous peoples were rarely consulted in the development or writing of the principles (Taylor et al., 2019). Additionally, tribal governments are not always engaged as sovereign nations in SE, either in terms of their inherent water and governance rights or their social/cultural legitimacy (Chief et al., 2016). Instead, Tribal Nations are often consulted as one of many "underrepresented stakeholders" (Taylor et. al., 2019), which ignores their legal and cultural standing as sovereign nations.

### *Community-engaged research*

CER can be broadly described as research contexts that include some degree of collaboration and partnership with the community. CER approaches are expanding from their initial area of influence in the social sciences (Israel et al., 1998) into an ever-widening sphere of use, including in water resources management (Riley, 2019). Scholars who theorize CER draw from a diverse array of academic disciplines and fields of practice, such as community organizing, feminism, environmental justice, action research, critical applied linguistics, and education empowerment (Cawal & Leung, 2021; Hacker & Taylor, 2011; McDonald, 2008). Many authors refer to CER theory and principles by a variety of other names and acronyms (such as PAR, CEPR, CEnR... see Israel et al., 1998, p. 175), and offer various interpretations of this

broad concept. For the purposes of this paper, CER can be understood as an approach where researchers collaborate to some degree with community members or organizations to collect data, generate feedback, and create change or solutions for an issue that affects the community and is of interest to the researchers.

### *Defining the approach*

Because CER is a set of theories, practices, and processes and not a rigid methodology (i.e., it can incorporate quantitative, qualitative, and mixed methods) it has been adapted to fit many research types and fields. This malleability makes conceptualizing CER somewhat difficult due to the different forms it can take, but some scholars have recognized the need for a cross-disciplinary examination and definition of the term. An overview of some prominent CER models follows and will endeavor to identify the shared key aspects of this research approach.

A common way to theorize CER is as a continuum that stretches from research having just a few elements of collaboration with the community to research that is completely directed or co-directed by the community in partnership with the research institution. Hyde and Meyer (2004) position CER on an even broader continuum encompassing all research approaches to emphasize that any research can be viewed in terms of its degree of engagement (or non-engagement) with the community. Participatory action research is typically located at one extreme of this continuum, where community involvement in every step of the research directs its trajectory and one of the outcomes is informing politicized action (Hyde & Meyer, 2004; Schwartz, 2010). Conventional research, in which experts design and execute a linear process primarily focused on meeting their scientific needs, constitutes the opposing end of the continuum (*ibid*). In this conceptualization of CER, participatory action research embodies the

ideal, but scholars acknowledge that CER, as it plays out in the real world, often falls somewhere between these two extremes of the continuum (McDonald, 2008).

In an effort to more clearly define what the CER approach is and is not, one group of authors reviewed CER literature from public health and medical fields and identified eight key principles of this type of research (Israel et al., 1998). The principles foreground the iterative nature of CER by recognizing that collaborating, partnering, and co-learning with a community functions as both the foundation and goal throughout the entire CER process (*ibid*). The authors also highlight CER's emphasis on action with the intent of impacting social or political change, as desired by the community, to some degree (Israel et al. 1998). Other scholars articulate this principle as CER's mission to "contribute to the public good" (Schwartz, 2010). Finally, many authors agree that any CER process should be rooted in the belief that community knowledge and needs provide valid and valuable contributions, and the research process should center these strengths while building community capacity (Hacker & Taylor, 2011; Israel et al., 1998).

As previously mentioned, natural resource management scholarship and practice is a relatively recent adopter of CER approaches, but Kliskey et al. (2021) offer a promising conceptual model for community and stakeholder-engaged research specifically in the context of food-energy-water systems. In their framework three iterative and interconnected processes--engagement, technical, and monitoring--function within a culture of collaboration to produce impactful science and community outcomes (Kliskey et al., 2021). The framework emphasizes respect for all partners' values, which is uniquely important in natural resource contexts given the often-contentious nature of these issues. It also underscores the importance of seeking out and integrating a diversity of community or stakeholder perspectives to foster the co-production of knowledge that is truly representative (*ibid*).

Taken together these papers point to a core set of principles at the heart of CER approaches. Although CER can be conducted in a wide range of contexts and describes a continuum of engagement, it is clear that any CER approach must recognize the validity of and ground the research process in community needs and knowledge. From this foundation, CER ideally involves collaboration or community engagement throughout all research steps, and explicitly attends to questions of power sharing and co-production of the research design and products. Finally, CER aims to not only produce innovative science, but also to affect social or political change in accordance with community guidance.

### *Defining the actors*

At first glance it may seem simple to define the actors involved in CER as “the community” and “researchers.” However, both of these terms bear further exploration and explanation as they actually reflect nuanced key aspects of this research approach. The researchers in CER contexts are almost always affiliated with universities or other academic institutions, and may include administrators, faculty, and/or students (Doberneck & Dann, 2019). It must be noted that the histories and legacies of academic institutions can sometimes present a hurdle to establishing trust and credibility with communities, especially Indigenous and communities of color (Chief et al., 2016; Israel et al., 1998), so academic researchers must take extra care to use the opportunities afforded by CER frameworks to foreground just research practices. Finally, the potential role of nonacademic researchers has been ill-described in the CER literature, so it may be fair to assume that affiliates of academic institutions are the primary researchers involved. That said, CER projects often receive government funding and support, and may be conducted in partnership with government agencies with the aim of influencing policies or filling knowledge gaps (Wenger et al., 2012).



The term “community” is often used in research and engagement contexts but rarely explicitly defined (McDonald, 2008), so CER scholars have taken up the project of exploring who exactly is engaged in community-engaged research. A community is defined by some degree of social cohesion or connection and is sometimes, but not always, delineated based on geographic proximity (Hacker & Taylor, 2011). Individuals in a community share defining characteristics, perspectives, or interests, but the CER literature is quick to emphasize that community members should not be viewed as homogenous, even if they do share commonalities (McDonald, 2008). In a slight divergence from this synthesized definition, Kliskey et al. (2021) distinguish between stakeholders and community members in a natural resource engagement context. Stakeholders are those directly impacted by or involved in a natural resource management issue, while community members are those not directly impacted by the issue but whose concerns deserve to be included in research and planning (Kliskey et al., 2021). Finally, CER scholars also note that the community who is engaged in the research can be individuals, representatives from community-based organizations, or a combination of the two involving iterative outreach and input processes (Hacker & Taylor, 2011).

### *Defining engagement*

Engagement forms the core of any CER process and can be conceptualized both through theoretical frameworks and specific research activities. When these two elements are cohesively harnessed in a research project, they can effectively promote the key principles of CER. One formative conception of CER was put forth by Sherry Arnstein in 1969 as the “Ladder of Citizen Participation” and republished in 2019. This theoretical framework draws from observations of both failed and successful public engagement processes undertaken during the 1960’s era of federally-funded alternative anti-poverty programs (Caves, 2005), so the paper does not describe

its subject matter specifically as CER. Nonetheless, Arnstein's ladder has been highly influential in CER scholarship due to its unflinching assessment of the pitfalls and opportunities of public engagement and its provision of a simple evaluative framework.

The ladder consists of eight rungs, from least citizen participation to most: manipulation, therapy, informing, consultation, placation, partnership, delegated power, and citizen control (Arnstein, 2019). The author groups these rungs into three tiers--non-participation, degrees of tokenism, and degrees of power--to further emphasize the structural aspects of power underlying engagement activities in each level. Only those rungs in the degrees of power tier (partnership, delegated power, and citizen control) constitute genuine public engagement activities where community members can impact decision making and/or outcomes, according to the author. In this conceptualization of engagement with communities, Arnstein offers both a powerful critique of the harms caused by disingenuous, manipulative, or under-resourced engagement projects as well as a hopeful view of the transformative power these projects can have when they explicitly center the community and attend to justice.

Many CER scholars since Arnstein's original 1969 paper have theorized various frameworks for the research approach, but few present functional tools for researchers and communities to use in evaluating and monitoring their own CER processes. Doberneck and Dann (2019) propose a "Degree of Collaboration Abacus" as a visual method of accounting for the degree and type of power and responsibility shared at each research step between communities and researchers. The authors describe two case studies of CER projects where partners utilized the abacus tool to evaluate and document the elements of their collaborations, resulting in stronger reflection and rich storytelling when reporting the projects' outcomes. The paper also suggests the use of the abacus throughout the phases of a CER project as a reflexive tool to

scaffold honest discourse between the community and research partners and potentially lead to adaptation of the research process.

A final aspect of engagement in CER that is particularly pertinent to this study is the qualitative practice of “member checking,” which lends trustworthiness and validity in both the data and research relationships (Creswell & Miller, 2000). Essentially, member checking is a process in which the researcher brings the raw or analyzed data back to the community and facilitates dialogue, editing, or negotiation of the data (Carlson, 2010). The goal is to create a space for exchange between the researcher and community that allows for more collaboration during this research phase, which often happens behind closed doors. When we consider the various theoretical and practical tools at the disposal of CER practitioners--including member checking, the abacus of collaboration, and the ladder of participation--it becomes clear that researchers have an array of tools to help operationalize the often-nebulous concept of engagement.

#### *Community-engaged research in natural resource management*

CER is relatively new ground for natural resource management, but there are some examples of projects that incorporate the key aspects of CER, as previously identified in the “Defining the approach” section. For instance, a Michigan State University researcher first interviewed community members on all sides of the state’s aquaculture policy debate, including anglers, aquaculture farmers, commercial fishers, residents, fish wholesalers, regulators, Michigan Tribal affiliates, and tourism industry representatives (Riley, 2019). Then, the researcher presented the interview data to those community members during a workshop so they could collaboratively develop and answer research questions that met their interests and needs, laying the groundwork for stronger working relationships in this contentious issue (*ibid*). By

bringing the data back to the community, making space for the participants to use the data to answer their own questions, and fostering connection among groups who are often at odds, this project embodies the CER principles of community capacity-building, empowerment and social change.

Another example of CER in natural resource science comes from a collaborative project where University of Arizona researchers worked with Hopi resource managers and citizens to design a more locally relevant drought monitoring system (Ferguson et al., 2016). This project followed many of the key principles of CER as previously described, and additionally incorporated all four of the “simple rules” of research engagement with tribes as summarized from Lomawaima (2000) by Chief et al. (2016). Briefly, these rules are: 1) ask about ethics, 2) do more listening, 3) follow tribal protocols, and 4) give back (Chief et al., 2016). For example, in this case study the Hopi Department of Natural Resources contacted university researchers with the initial request for the project, a Hopi community member and researcher was the onsite project lead, research began only after a permit was secured from the Hopi Cultural Preservation Office, and interviews were not recorded as per the agreement outlined in the permit. The drought monitor technology developed as a result of the project also met CER principles by sourcing its data primarily from existing local knowledge and monitoring systems instead of solely from conventional monitoring data, as had been the case before the collaborative research project (Ferguson et al., 2016).

#### *Gaps and critiques within community-engaged research*

Due to the fact that this is a still-developing area of practice and study, the first gap that presents itself is the lack of a breadth and depth of literature at the intersection of CER and natural resource management contexts. Therefore, a comprehensive review of the challenges of

this research approach is not yet possible, but selected critiques can indicate the general types of problems that can occur. Most of the critiques of CER somehow revolve around power because as Arnstein so eloquently puts it, “citizenship participation is a categorical term for citizen power,” (Arnstein, 2019, p. 24).

The ideal CER project would strive for the highest levels of engagement described by Arnstein’s top three ladder rungs and by the participatory action research end of the CER spectrum described in Hyde and Meyer (2004). It would include consistent, intentional, and iterative engagement with the community at all steps of the research, but the bounds of time, funding, and resources often prevent projects from reaching these goals in reality. However, researchers should not gloss over these issues. Instead, partners should undertake a critical appraisal of the research process and outcomes and could use the abacus tool pioneered by Doberneck and Dann (2019) as a way to assess and potentially adjust the power sharing in the project.

Both Arnstein (2019) and McDonald (2008) caution against research that recruits subjects instead of participants and is conducted on a community instead of with them. In particular they critique that this type of research can sometimes be passed off as CER if the involvement of the community is played up. Many tools exist to help contemporary CER projects avoid that undesirable state of affairs, and researchers must bear the responsibility for evaluating their projects to ensure they are not making that mistake. Researchers must also proactively attend to power dynamics inherent in CER, especially when working with communities who have in the past been, or continue to be, harmed by the oppressive structures within which academic institutions typically operate. This challenge becomes specifically pertinent within the context of research engagement with Indigenous communities, which Chief

et al. (2016) address by offering concrete strategies for academic researchers to consider when partnering with tribes. Similarly, Gagnon et al. (2017) suggest that explicitly “flattening power dynamics” in individual engagement activities and the overall project atmosphere can allow counter-narratives, such as those from Indigenous communities, to emerge and influence the research.

### *Comparison of stakeholder engagement and community-engaged research*

#### *Purpose of this comparison*

The approaches of SE and CER have thus far been defined and critiqued separately, but in order to lay the groundwork for the case study and analysis later presented in this paper we must now put these two strands of literature in conversation with one another. However, a challenge immediately presents itself: both SE and CER have field-specific definitions of overlapping terminology (for example, the term “engagement”), and the subtleties contained in the theory and application of these terms in fact point to important similarities and differences between SE and CER approaches. Other scholars doing work at the intersection of these two fields highlight this need for defining shared understandings of terminology through a dialectical approach (Riley, 2019). Grounded in the previous discussions of SE and CER, this paper now aims to contrast the two approaches and formulate a conceptual framework that facilitates this comparison.

#### *Roots and motivations of approaches*

To understand the paradigms that undergird SE and CER approaches it is necessary to explore the contexts in which they began developing. Much of SE in water resource management as we know it today can be traced back to the neoliberalization and expansion of water governance that began in the 20th century (Vos & Boelens, 2018). This evolution simultaneously

concentrated water decision-making power within industries and governments while also attempting (sometimes genuinely and sometimes disingenuously) to democratize aspects of water governance processes (Lukasiewicz & Baldwin, 2017). Thus, SE processes and paradigms developed in a decidedly pragmatic context, for use by government or industry water managers navigating these new expectations for water governance. This origin may help explain the critiques of SE in natural resource management that note the literature's inadequate attention to theorizing and integrating social and environmental justice, but this speculation does not excuse the field of SE in water governance from engaging with this critique. Instead, practitioners and scholars must devote more collective energy to reflexively evaluating SE practices and developing its theoretical underpinnings to center just approaches to engagement.

In contrast, CER is rooted in the social sciences and emphasizes affecting political and cultural change through research and engagement (Israel et al., 1998). For example, many scholars point to Freire's *Pedagogy of the Oppressed*, in which learners are co-creators of knowledge (Freire, 2000), as a foundational concept in CER that foregrounds the dignity and knowledge of non-academic partners (McDonald, 2008). The CER literature also attributes some of the discipline's origins to theories of environmental justice (Hacker & Taylor, 2011), with one example being Fraser's (1998) description of redistribution, recognition, and participation as a pathway to environmental justice. Finally, elements of social action and community organizing theory also form the base of CER (Israel et al., 1998) and orient the research approach towards affecting political and cultural change. Because CER grew primarily out of academic social science contexts heavily saturated with theory, the research approach may have initially been seen as inaccessible or not relevant to natural resource management issues such as water. This challenge can also be attributed to the valuation of quantitative over qualitative methods in

natural resource management fields. Fortunately, interdisciplinary research is being recognized as an innovative and necessary approach in both natural resource management and CER fields (for example, Cowal & Leung, 2021; Riley, 2019), and this evolution may aid researchers and practitioners in overcoming the aforementioned obstacles.

### *Introducing a comparative conceptual framework*

To facilitate comparison and dialogue between the apparent differences in the origins, paradigms, and execution of SE and CER approaches, this section condenses the previous discussions into a comparative conceptual framework. This framework aims to highlight both areas of convergence and divergence and seeks to position SE and CER in a way that is conducive to a generative comparison of the two approaches. Conceptual frameworks such as this one have been shown to play a critical role in interdisciplinary research because they integrate the various strands of knowledge contributed by the project collaborators and act as a starting point for shared understanding (Van der Waldt, 2020). This framework compares SE and CER approaches within the context of natural resource management, and when possible, specifically within water management, across six key elements by describing each element and citing examples from the literature.



**Table 1.** Comparative conceptual framework for stakeholder engagement and community- engaged research in the context of natural resource management, and specifically water resource management when possible. Key elements are listed in the center column, and are bracketed by a description, explanation, and citations for each element in the context of SE on the left and CER on the right.

Stakeholder engagement (SE)			Key element	Community-engaged research (CER)		
<i>A process in which one or more actor who hold(s) decision-making power engages individuals, groups, or nations who have an interest or stake in the relevant water context in discussion, decision-making activities, and/or implementation</i>			<b>Definition</b>	<i>An approach where researchers collaborate to some degree with community members or organizations to collect data, generate feedback, and create change or solutions for an issue that affects the community and is of interest to the researchers</i>		
Citations	Explanation	Description		Description	Explanation	Citations
Lukasiewicz & Baldwin, 2017; Ricart et al., 2019	Traces back to democratization of decision-making and increased expectation of public involvement in governance processes	Resource management and governance	<b>Origins</b>	Social sciences	Has roots in action research, empowerment education, environmental justice, community organizing, and is extensively used in public health	Hacker & Taylor, 2011; McDonald, 2008
Larson & Lach, 2010; Beall King & Thornton, 2016; Balazs & Lubell, 2014; Dube & Swatuk, 2002	Hold decision-making power or responsibility for the water issue(s) of concern; may include local, state, regional, federal, and Tribal government entities, non-governmental organizations	Engager entities	<b>Actors</b>	Researchers	Individuals affiliated with universities or other academic institutions; may include administrators, faculty, and/or students	Doberneck & Dann, 2019
Mott Lacroix & Megdal, 2016; Oregon Watershed Enhancement Board, 2019; Balazs & Lubell, 2014; Chief et al., 2016	Individuals or entities interested in or impacted by the water issue at hand, who also lack the ability to fully make, influence, or implement relevant decisions. May include: lay stakeholders, water leaders or professionals, disadvantaged or vulnerable communities, Tribal Nations*	Stakeholders		Community	Individuals sharing some degree of social cohesion, geographic proximity, defining characteristics, perspectives, or interests; in CER "community" can be individuals, an organization, or a combination of these	Hacker & Taylor, 2011; McDonald, 2008
Wehn et al., 2018	Engage diversity of stakeholders, with special attention to groups underrepresented in relevant water decision-making	Diverse stakeholders	<b>Principles or best practices</b>	Center community needs and knowledge	Recognize the validity of and ground the research process in community needs and knowledge	Cowal & Leung, 2021; Israel et al., 1998
Beall King & Thornton, 2016	Create avenues for genuine engagement or partnership that give stakeholders a voice in decision-making and/or implementation	Voices are heard and have influence		Continuous collaboration	Collaboration or community engagement throughout all research steps and informing process adaptation	Israel et al., 1998

Akhmouch & Clavreul, 2016	Share information and co-produce knowledge and management decisions in a way that empowers stakeholders	Co-produce knowledge and build capacity		Conscious power sharing throughout process	Explicitly attends to questions of power sharing and co-production of the research design and products	Cowal & Leung, 2021; Gagnon et al., 2017
Balazs & Lubell, 2014	Include iterative processes and dialogue that promotes co-learning among stakeholders and engager entities	Iterative and dialogue-driven		Outcomes that affect social change	Produce innovative science/policy solutions, and affect social or political change in accordance with community guidance	Schwartz, 2010; Kliskey et al., 2021
IAP2 International Federation, 2014	5 levels of engagement: inform, consult, involve, collaborate, empower	IAP2 Public Participation Spectrum	<b>Engagement frameworks</b>	Ladder of Citizen Participation	8 rungs and 3 tiers: Non-participation (manipulation, therapy), degrees of tokenization (informing, consultation, placation), and degrees of power (partnership, delegated power, citizen control)	Arnstein, 2019
Akhmouch & Clavreul, 2016	6 tiers of engagement: communication, consultation, participation, representation, partnerships, and co-decision and co-production	OECD levels of engagement in water governance		Degree of Collaboration Abacus	Visual method of accounting for degree of power and responsibility shared at each research step between communities and researchers	Doberneck & Dann, 2019
Hassenforder et al., 2019	Surveys, discussions, listening sessions, data collection, information dissemination, stakeholder representation in decision making, and partnerships or collaborative work	Typical examples	<b>Engagement activities</b>	Typical examples	Interviews (individual or group), member checking, dialogue between collaborators, communication, co-construction of research design and outcomes, community capacity-building, sharing data ownership, giving results back to community	Creswell & Miller, 2000; Carlson, 2010; Israel et al., 1998

*\*While Tribal Nations and Indigenous peoples are often considered and treated as stakeholders in water resource management, this is problematic because it ignores their sovereignty and water rights (Chief et al., 2016; Taylor et al., 2019). This critique has been expanded upon in both “Gaps and critiques” sections above, and elsewhere throughout this paper.*

An appraisal of Table 1 illuminates the areas of overlap and divergence within SE and CER approaches and highlights its potential to act as a reference point for interdisciplinary natural resource management engagement projects seeking a common understanding of terms. At a basic level, the definitions of both approaches center on engagement with some section of the public to address an identified need or issue. However, it is clear that the origins of SE and CER create differing contexts for each approach, and this divergence may help explain why the two disciplines have historically been relatively siloed. A comparison of the actors shows overall similarities: both approaches have one group (engager entities and researchers) that typically holds a position of power going into the project, while the other group (stakeholders and the community) typically are those being engaged. However, SE engager entities encompass a wider range of affiliations than those in CER, who are primarily academic researchers. The distinction between stakeholders and the community is slightly less clear, as the same individual or community could often play either role, but one potential difference is that an SE project typically engages many stakeholders as a best practice while CER projects typically focus on deep engagement with one community, though not always.

A review of the four elements highlighted in the “Principles or best practices” category of Table 1 illustrates that the goals underlying each approach measure success by the tangible impacts made by the collaborative engagement process on the issue at hand as well as on the stakeholders or community. But, the CER approach explicitly defines one of its principles as affecting social or political change while the SE approach usually remains focused on influencing policy or management decisions. Both approaches integrate elements of collaboration, and both literatures essentially agree that more collaboration leads to stronger engagement and better outcomes. The best practices, therefore, are relatively in alignment, but in

reality both SE and CER projects often struggle to meet these principles. It may be argued that CER standards typically set the minimum level of participation higher than what might be termed acceptable in SE, but this might be expected given the differing contexts these two approaches often function within (academic research vs. governance practitioners).

All four engagement frameworks summarized in Table 1 essentially address power sharing, a central concern of each approach. These scholars mostly created similar leveled frameworks to conceptualize how engagement happens on a spectrum, with the exception of Doberneck and Dann's abacus tool. In the leveled frameworks the highest levels--co-production and co-decision, empowerment, and citizen control--may be comparable in their degrees of power sharing. However, the lower levels of both frameworks in SE (inform/consult, communication/consultation) fit into the degrees of tokenization tier of Arnstein's ladder on the CER side. These parallels again bring into relief the differences in what each approach minimally considers to be engagement, and further distinguishes between genuine and tokenized types of engagement, which apparently occur both in SE and CER.

On a more granular level we can see these differences continue to play out in the lists of typical engagement activities for each approach. The activities common in SE are overall more compatible with quantitative data collection than those in CER, but both approaches place heavy emphasis on listening and discussion between project partners. The slightly different goals of SE and CER processes are underscored as well by these activities, with those common in SE clearly aligning with creating solutions to policy or management issues and those common in CER aligning with creating science-based solutions to impact change for the community.

*Application of comparative conceptual framework*

This literature review has given an overview of some current conversations in SE and CER scholarship and practice, and has attempted to define, critique, and compare each of these engagement approaches. The similarities and differences between SE and CER touched on in the previous section and in Table 1 can be employed as a useful analytical tool to both clarify terminology in the individual fields and strengthen the dialogue between them. Interdisciplinary research at the crossroads of SE, CER, and natural and water resource management can provide fruitful, innovative science as well as contributing to more just management solutions. As such, the comparative conceptual framework developed above will be further explored in this paper through its application as an analytical tool on our research, which is a case study of a CER project conducted within a SE context during the COVID-19 pandemic on water issues.

## Methods

### *Case study description: Oregon Water Stories Q Methodology project*

#### *Background*

It is estimated that Oregon will need a budget of \$6.25 billion over the next 15 years to maintain and upgrade its drinking water and groundwater infrastructure (US EPA Office of Ground Water and Drinking Water, 2018). These investments will need to be strategic, as studies predict that by the 2080's, all but one of Oregon's hydrologic systems will be transitioning to rain-dominant, or mixed rain and snow (Dalton et al., 2017). Additionally, substantial investments will need to be made in wastewater, stormwater, and other natural and built water system infrastructures to equip them for resilience in the face of changing population dynamics and climate change.

To address this need for far-reaching and forward-looking water planning, the state of Oregon began creating a "100 Year Water Vision" in 2018 (henceforth referred to as the Water

Vision). The draft document puts forth the goal of stewarding Oregon’s water resources now and for the future, focusing specifically on the realms of health, safety, economy, and the environment (Oregon Watershed Enhancement Board, 2019). As this policy will shape the future of water in Oregon, continued public support and involvement across diverse constituencies will be critical to the success and reception of the Water Vision. The Oregon Watershed Enhancement Board (OWEB) has held eight “Community Conversations” as of 2021 in locations throughout Oregon to engage water leaders around the Water Vision and discuss the challenges and opportunities facing water in Oregon.

The Oregon Water Stories (OWS) Project, an interdisciplinary team of researchers affiliated with Portland State University, and Willamette Partnership, a Portland-based environmental non-profit, wondered if these eight Community Conversations captured the breadth and depth of community water concerns in the state. In particular, they were concerned that the Water Vision’s stakeholder engagement might not have focused enough on communities who usually do not get a seat at the water decision-making table or who perceive a lack of influence over water decisions. In 2019 the OWS team began developing a research project that would measure the water values of Oregon communities who fit into either of those categories and that would compare the resulting community water values with those put forth by the State in the Water Vision. The research questions guiding the project design were: “How do Oregonians’ water values vary by geography, climate, and stakeholder group?” And, “Are these water values represented by the State’s framing of water values in its Water Vision?”

### *Method Selection*

We used a mixed methods research tool, the Q methodology, to integrate quantitative and qualitative measurement of participants’ subjectivities around water and synthesize the key

perspectives that emerge from the sample (Brown, 1996). Environmental and social research has increasingly embraced the Q methodology as a unique approach to capturing the nuances of stakeholder beliefs and motivations surrounding multidimensional issues. Q studies in natural resource management, in particular, use the method to both bring to light perspectives that often get pushed aside and to look for opportunities for compromise and collaboration (i.e., Robbins, 2006; Zabala et. al., 2018). The OWS researchers sought to measure water values of specific hard-to-reach communities and subsequently identify patterns across and within Oregon geographies, climates, and stakeholder groups.

In Q methodology, the researcher creates a set of Q statements from a larger concourse of data, and then asks research participants to sort these Q statements onto a grid according to their own subjectivities around the topic in an activity called a Q sort (Brown, 1996). These individual Q sorts can be compared to produce statistically significant factors that represent the primary “ways of thought” around the topic (Watts & Stenner, 2012). We developed a set of 24 Q statements (see Appendix II) about water based on a concourse of almost 1,000 newspaper articles published in Oregon about human-water interactions. This more democratic technique of Q statement concourse development is just one example of how the Q Methodology supports the CER design of this project particularly well. The statements were extensively workshopped and edited by Portland State University faculty, students, and outside consultants to ensure that the 24 statements represented at least a reasonable swath of Oregonians’ possible water concerns and values. In addition, each Q statement was written such that it would correspond with one of the four priorities put forth in the Water Vision (environment, economy, health, safety) as well as with one of three “justice motivations” (utilitarian, economic-egalitarian, libertarian) as put forth by Amartya Sen in *The Idea of Justice* (2009). By aligning each statement with one state water

priority and one justice motivation, we created a framework for future analysis that will allow us to analyze patterns in water priorities, values, and motivations across geographies.

### *Community Partners*

We selected five community organizations across Oregon (Figure 1) to help develop the project's research design, recruit participants, distribute the Q sorts and accompanying surveys, and disseminate the results. These five communities were chosen as they represent constituent groups who are often hard to reach in typical SE approaches and whose voices are thus more likely to be left out or overshadowed in water decision-making contexts. Four out of the five communities we engaged can be characterized as rural and are located outside the urban population centers of the Willamette Valley while the fifth community represents a hard-to-reach urban population: people experiencing homelessness in Portland. Initially, OWS researchers wanted to work with a community partner (CP) group from each of the five water regions administered by the Oregon Water Resources Department (Figure 1) in order to have representation of the main state geographies and climates. However, the COVID-19 pandemic limited potential community partner bandwidth and made communication challenging, so a community partner group in the North Central water region was not included. The influence of the pandemic on this case study is expanded upon in the next section.





**Figure 1.** A map showing Oregon’s five water regions, as delineated by the Oregon Water Resources Department, and the five locations and names of the project’s community partner organizations (Oregon Water Resources Department, 2017).

As shown in Figure 1 our community partner organization in the East water region was the Harney Community-Based Watershed Planning Group, who works to bring the county’s diverse water stakeholders together to create watershed-wide solutions that comprehensively address the area’s many water challenges (Harney’s Water Future, 2021). In the South Central water region, we partnered with an employee of the Oregon Department of Environmental Quality’s groundwater testing team who was stationed in the Klamath area. For the Southwest water region, the community partner was the Williams Community Forest Project, a citizen group rallying support and protection for the Applegate and Williams Valley’s forests and waterways (Williams Community Forest Project, 2021). Two community partners represented the Northwest water region. The Tillamook Bay Flood Improvement District is a community organization working for flood mitigation and conservation, and Street Roots is an advocacy

organization for homeless individuals and issues and an alternative newspaper-publisher in Portland (Street Roots, 2021).

The Harney and Tillamook County communities were selected because agriculture accounts for 79% of Oregon's water withdrawals (Oregon Environmental Council, 2012) but rural agricultural communities are not homogenous. Tillamook County is home to a coastal dairy farming community characterized by a cooperative economic model, high precipitation, and flooding. Conversely, Harney County hosts a high desert ranching and irrigated agriculture community that experiences low precipitation and relies on groundwater. Aside from the rural nature of both communities, the political climate presents another obstacle for typical SE by water policy makers or researchers, who are often viewed with skepticism by conservative stakeholders. In 2020 less than 25% of Harney County voters and 52% of Tillamook County voters were registered as Democrats (Elections Division of the Oregon Secretary of State, 2020).

In Multnomah County the stakeholder group we selected was the Portland Metro area's homeless community, who we reached with help from Street Roots. Compared to other states, Oregon has one of the highest rates of homelessness with most individuals concentrated in the Portland Metro area (US Department of Housing and Urban Development, 2021). Homeless populations already experience precarious access to clean water and the situation was exacerbated by the COVID-19 closures of public drinking water and sanitation facilities. This community therefore has a unique and crucial perspective on water issues but because individuals lack traditional modes of communication, typical SE approaches (i.e., mailed surveys, online public comment forums) would be inappropriate and ineffectual.

We selected residents of the Williams and Applegate Valleys as the community in Josephine and Jackson County, where pollution from the timber industry has legacy effects on

water. The area's timber economy has decreased by 60% since its height in the 1970's (Lehner, 2017). Resulting shifts in demographics and cultural ideologies have made way for a new water user: the region's growing cannabis industry. Due to the highly contested political and legal nature of both industries, rural citizens who are well users in these counties represent key water perspectives that could be overshadowed in typical SE approaches.

Finally, in the Klamath basin region we also aimed to engage well users, who have historically been hesitant to allow scientists to sample water on their land and to discuss water with outsiders. There is good reason for this caution as water rights in the Klamath basin have become almost explosively contentious in recent years. The Yurok Tribal Council has declared the personhood rights of the Klamath River (Smith, 2019), right-wing extremists have purchased land at the Klamath headwaters to gain control of irrigation, and controversy surrounds the decision to take down four dams. Collecting data on water values amidst this tense situation has become both more risky and more critically important.

As a master's student and research assistant with the OWS Project, I took the lead on communication and collaboration with the community partner organizations, facilitating participant recruitment, and data collection--all of which can collectively be described as the "community partner coordinator" role within the OWS research team. At each community partner organization, the OWS team established a contact with one person in leadership from the organization who acted as the liaison ("community partner liaison") and representative of that community partner throughout the research project.

### *COVID-19 context and impacts*

The initial stages of the OWS Q Methodology project, including community partner selection and piloting the Q method research tools for in person use, were already underway

before the COVID-19 pandemic hit. Then, on March 12th, 2020, Oregon Governor Kate Brown issued an executive order prohibiting gatherings of 250 people or more and closing all K-12 schools in Oregon (Exec. Order No. 20-12, 2020) and Portland State University instituted a moratorium on in person research activities. These shut downs and the rapidly-evolving COVID-19 crisis introduced a variety of problems for the planned research design, which had thus far been developed as five one-day focus groups that would take place at a location in each of the community partner organization communities. Not only were in person research activities prohibited but adjusting to constantly changing limitations and dealing with the emotional and mental toll created by the pandemic impacted the bandwidth of community partner organizations and researchers alike.

However, the OWS research team decided to forge ahead with the project in spite of pandemic limitations, and researchers and community partners spent much of Spring 2020 intensively redesigning and adapting our research process. We began conducting all communication virtually via email, phone, and video conferencing. After discussions with community partner liaisons it was determined that the best way to collect the Q method survey data would be through an online website that hosted information about the project and links to complete the survey, instead of running in person focus groups. We also decided to shift the planned in person presentations of results in the five communities to be deliverables that were virtual, such as a recorded video presentation, a newspaper article, and data reports. The impact of COVID-19 on this case study will be further evident in the following detailed description of our research process.

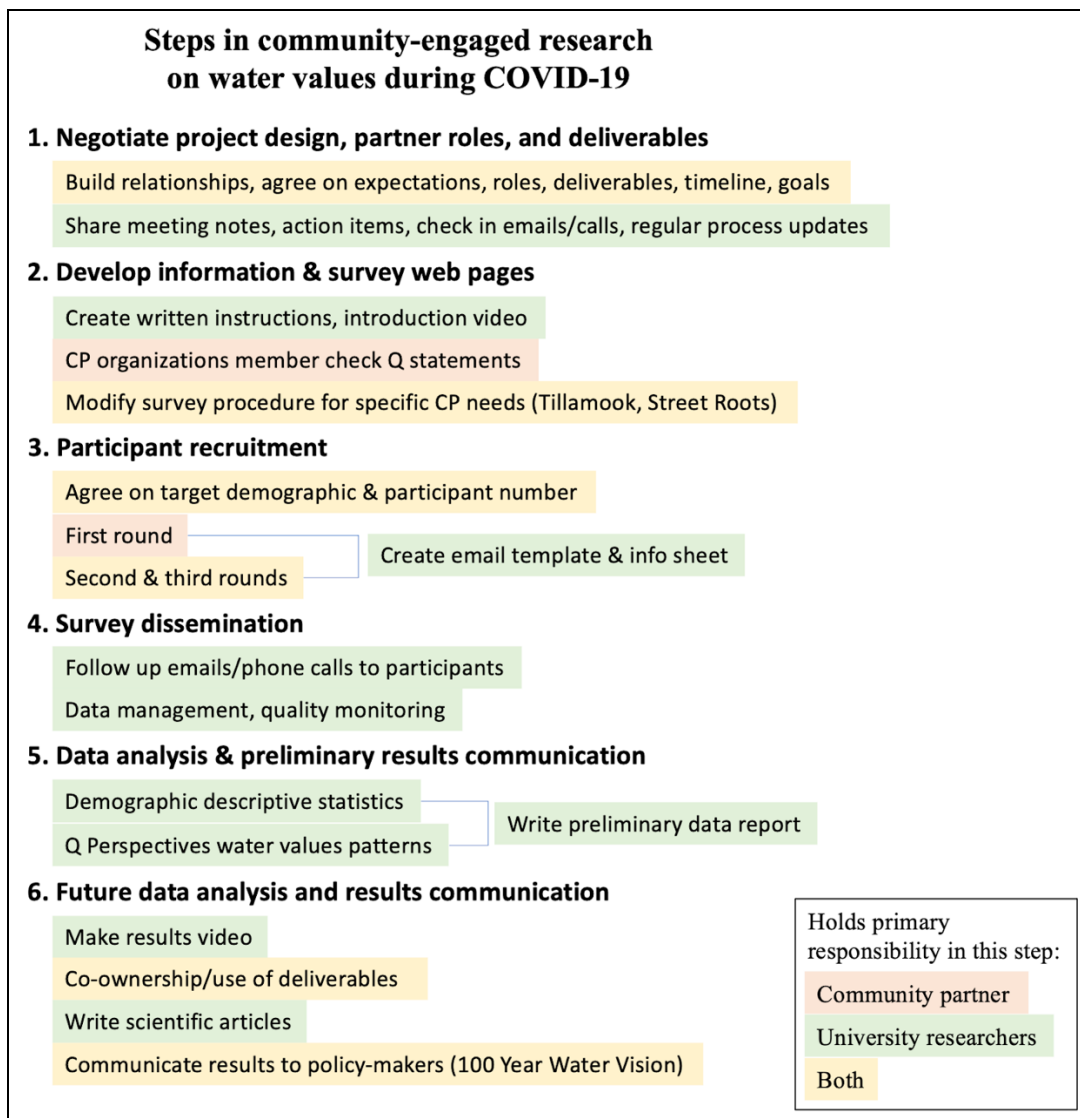
### *Case study research process*

To begin the process of working together with each community partner organization, an informational sheet describing the project's goals, design, and expected commitments and benefits for CP's was emailed to the point person (see Appendix II). Because community partner organizations were located around the state and the COVID-19 pandemic was rapidly developing, an initial meeting to discuss the OWS project collaboration with each community partner liaison was set up over the phone or using the Zoom video conferencing platform. During this meeting the community partner coordinator introduced herself and described the OWS project from the research team's perspective, and the community partner liaison introduced themselves, briefly gave more context about their organization, and highlighted what they would like to get out of and put into this research project (step 1 in Figure 2).

The primary goal of the first few meetings with each community partner liaison was to establish a strong interpersonal and working relationship built on trust, respect, and communication. The community partner coordinator made it a priority to listen to the needs and expectations voiced by each community partner liaison, asked questions to better understand the organization's work, answered questions about the project with transparency, and followed up after meetings with notes and action items. Once community partner liaisons confirmed their ability and desire to be part of the project, the community partner coordinator helped file an invoice with the university to pay the community partner liaison \$100 for their help with participant recruitment and future contributions to the project.

The initial meetings between the OWS community partner coordinator and the community partner liaisons took place throughout the spring and early summer of 2020 as each organization confirmed their collaboration on the project. Due to the pandemic and the virtual research environment the original Q method survey plans had to be completely reimaged as a

virtual process instead of an in-person one. It is crucial to acknowledge that not only did the pandemic change how the research was actually conducted, it also fundamentally shifted the context within which the OWS team members, community partner liaisons, and survey participants were operating. Flexibility, compassion, listening, and communication became even more important given the project’s collaborative nature. In response to the pandemic, the community partner coordinator met again with the community partner liaisons to discuss how a virtual research process could take into consideration the specific needs and abilities of their community.



**Figure 2.** *A visual display of the steps taken in the OWS Q Methodology project. Sub-steps are color-coded to indicate the research partner(s) who took on the majority of responsibility for each task.*

### *COVID-19 challenges, concerns and feedback*

Four out of the five community partners (Tillamook Bay Flood Improvement District, Williams Community Forest Project, Harney Community-Based Watershed Planning group, and Klamath DEQ) shared similar concerns related to a virtual research process. These included: (1) technological capabilities for rural and older members of the community, (2) the time commitment needed to complete the survey, and (3) an option for participants to opt out of the gift card we offered as a thank-you for participants.

The community partner liaison for Street Roots outlined some unique challenges faced by members of the community served by his organization, and primarily highlighted that decreased Street Roots office operating hours due to COVID-19 limited Street Roots vendors' access to the internet. The OWS project community partner coordinator communicated these concerns to the OWS team to inform the creation of the virtual Q method survey collection.

### *Researcher response to community partner feedback*

Before participant recruitment could begin, the OWS team wanted to develop and pilot the online Q method survey platform and research design (step 2 in Figure 2). After discussions with community partner liaisons, it was determined that the best way to collect the Q method data would be through an online website that hosted information about the project and a link to complete the Q sort. The demographic and follow up questions that would have been addressed in the focus groups were converted to virtual pre- and post- Q sort surveys using Qualtrics software. The research team created both a short video introducing the project and the Q methodology as well as a detailed instruction document to help participants navigate the online Q

sort and accompanying surveys. To aid in data management, separate but nearly identical web pages were built for each of the five communities to allow participants to access their site's specific survey links. Four of the survey web pages were hosted on the OregonWaterStories.com project website, and the Tillamook survey page was hosted on the TillamookWatershed.com website. The layout of the Q method survey web pages was carefully designed to be easily navigable for participants (Figure 3). Information about the OWS project team, project goals, and how to contact the principal investigators was placed at the top of the web page, with attention to formatting and readability.



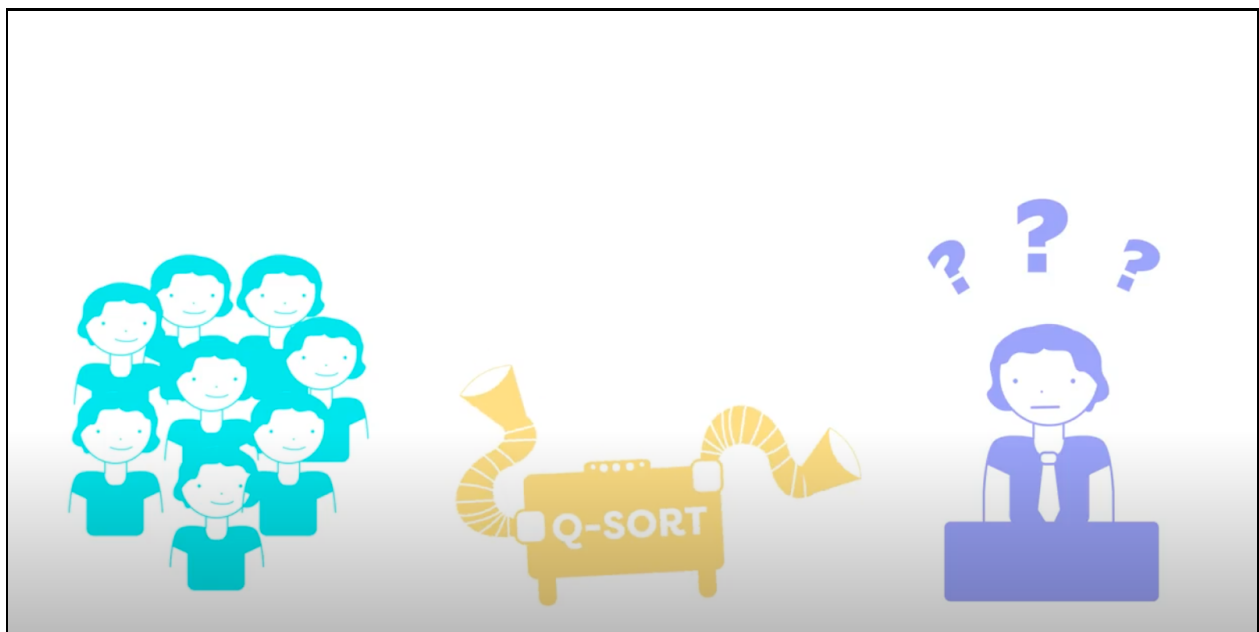
**Figure 3.** The landing page for the Q method surveys hosted on the OregonWaterStories.com project website.

As previously mentioned, because the OWS team could not meet Q method survey participants recruited by community partner liaisons in person, we made a short video to introduce ourselves, the project, and describe the Q methodology to participants. We wanted to put a friendly face to the project and express our gratitude for participants' time and willingness to share their water values. Also, Q methodology utilizes a different theory base and format than more well-known survey techniques, so the OWS team thought it relevant to overview how the



Q method works in the video, both in general and in the context of this project (Figure 4). The graphics and script for the video were extensively workshopped by team members skilled in graphic design and linguistics to ensure the video tone and content would effectively communicate our message to participants. The full video can be found at this address:

<https://youtu.be/GNKlmhLQoJg>.



**Figure 4.** Still from the video created by OWS research team members. In this scene, narrated by a voiceover, the video describes how the Q methodology helps community members' voices be heard by policy makers.

To enhance accessibility, we enabled a live chat function on the website in addition to the email addresses and phone numbers listed for participants to get in touch with the Portland State University research team (Figure 3). We anticipated participants needing tech support to navigate the unfamiliar structure of the Q method surveys, the general issues that come up with multi-step online processes, and the potentially new experience of doing an online survey for some participants. The live chat function was monitored by the community partner coordinator, and any requests for tech help were responded to as soon as they were received. As a final layer of

tech support, we listed tips for the most successful survey experience (i.e. Be sure to access the surveys from a desktop or laptop computer as the interface does not display on a tablet or smartphone).

### *Member checking*

Member checking is an important component of community engaged research. As the website was being developed, the community partner coordinator also solicited feedback and input from the community partner liaisons on the latest draft of the Q statements written by the OWS team for the Q method survey (step 2 in Figure 2). This process was an opportunity for community partner liaisons to member check the 24 Q statements against their intimate knowledge of their communities. To avoid employing offensive or unclear language, we asked community partner liaisons for edits that would enhance readability, and in particular for feedback on the potential community-specific interpretations of important or controversial words and phrases. Community partner liaisons also noted if any Q statements seemed unnecessary or redundant and similarly if there was anything missing from the set of statements, and if so what they might suggest including. After receiving this feedback from four out of the five community partners (as the Klamath DEQ contact was established later than the other contacts), the OWS team under the guidance of our applied linguistics researchers revised the Q statements to reflect community partner edits and suggestions. This updated version of the Q statements was sent to the community partner liaisons for approval.

### *Virtual survey web page development*

Other members of the OWS team led the development of a 3-part integrated virtual survey experience that combined a consent form and demographic questions, the Q sort with the updated Q statements, and a free response follow-up. The demographic and follow-up survey

portions were hosted by Qualtrics® and the Q sort survey portion was hosted by Q Perspectives®. Each participant received a unique participant ID which was internally associated with their email address on a password-protected document shared only among relevant OWS team members. All three survey parts were linked so the participant would be directed from one part to the next, and redundancy was built in by asking the participant at each step to re-enter their assigned participant ID. The final part of the follow-up survey asked participants to enter their emails if they wished to receive the \$50 e-gift card offered as compensation for taking part in this project.

After the Q statements were updated, the surveys linked, and the web pages completed, the community partner liaisons, one community member from the Tillamook area, OWS team members, and a class of Portland State University students did trial runs of the online survey process. This allowed the community partner coordinator to troubleshoot technology issues, edit the website and instructions for clarity, and to practice checking and recording responses in the data management system. While minor edits to the online survey materials and procedure were being made to streamline the research process the community partner coordinator contacted community partner liaisons to begin spreading the word about the survey to their networks and recruiting interested participants.

#### *Sample selection using a community-engaged research design*

Engaging community partner liaisons in the selection of participants for the study sample was important because community partner liaisons have established trust, credibility, and a relationship with the communities they serve, and therefore hold unique and important knowledge about those communities. Liaisons and the community partner coordinator discussed the subset of each community who would be the best fit for this project, given the overlapping

goals of the OWS project and those of the community partner organization. Once this target demographic was agreed upon, the community partner coordinator wrote a brief email template introducing the project, explaining the role of survey participants, and asking community members to email her if interested in participants (step 3 in Figure 2). The email template and project info sheet were created to support community partner liaisons in talking about and promoting the research.

The project used purposive sampling, where community partner liaisons leveraged their knowledge of and connections within their respective networks to email or call potential participants from the target demographics for their community. Each community partner liaison aimed to recruit 15 participants, and this number was negotiated to meet both the necessary Q method sample size and the capacity of community partners to recruit participants. community partner liaisons sent emails or made phone calls to at least 15 people, if not more, during the first round of recruitment. Shortly after this initial outreach, the community partner coordinator would slowly receive responses from interested stakeholders.

#### *Participant recruitment, survey completion, and follow-up outreach*

Once a participant expressed interest in the surveys they would get an email from the community partner coordinator thanking them for their interest and providing them with instructions for accessing and completing the surveys by a specific date (step 4 in Figure 2). Tech help was available for participants via email, phone, or live chat on the survey web pages. The first round of recruitment emails or phone calls by community partner liaisons typically resulted in 5-9 participants signing up and receiving instructions for survey completion. After email responses from interested participants began slowing down, the community partner coordinator asked the community partner liaison to send reminder emails to community members

who had already been contacted and to get in touch with any new potential participants.

Throughout the participant recruitment process the community partner coordinator and community partner liaisons touched base regularly to share updates and plan for the next steps.

After a few weeks, the community partner coordinator sent follow-up emails and/or made phone calls to participants who had initially expressed interest but who had not completed the surveys. To augment the participants directly recruited by the community partner liaison, the community partner coordinator also asked participants who had completed their surveys to refer any friends or family who might like to participate (snowball sampling). The community partner coordinator and liaison politely but consistently followed up with potential participants in order to get survey responses from the target demographic. In some cases, participant recruitment took almost three times as long as anticipated and ultimately for a few of the sites the community partner liaison and coordinator decided to cut the process short at 11 or 12 participants in the interest of project continuation. The community partner coordinator also checked all survey responses for completeness and followed up with participants if key information, such as participant ID, was missing or inconsistently entered. Finally, the community partner coordinator let the principal investigator know when a group of participants had finished the surveys and were ready to receive their emailed gift cards.

### *Challenges and solutions in working with rural and houseless populations during the COVID-19 pandemic*

Participant recruitment in the Tillamook area proved especially challenging due to the limited internet access and capabilities of a largely rural and older population. At the request of the community partner liaison, the community partner coordinator created a paper version of the online Q method survey materials. These survey packets were mailed to a list of addresses provided by the community partner liaison, with return envelopes enclosed in hopes of making it

easier for potential participants to complete the surveys. One participant from the Klamath Basin area also received a mailed paper survey and researchers entered their responses by hand.

The survey procedure for Street Roots participants was slightly modified in consideration of the increased vulnerability of the community and their limited access to the internet. Street Roots staff and vendors recruited participants and facilitated their use of Street Roots computers in the office. Participating Street Roots vendors completed the demographic and Q sort parts of the survey as the other groups had, but in place of a written free response follow-up survey participants were interviewed by a trained member of the OWS team over Zoom. Interviewers followed a script and protocol, and interviews were recorded with the verbal consent of the participant for sole use by the OWS team to transcribe them for qualitative data analysis. An audio transcription protocol was created to standardize that process, and interviewers also followed accepted qualitative data collection practice by writing memos after each interview. Along with administering the follow-up survey verbally, the interviewer provided live tech support for participants if requested as they navigated the entire survey process.

#### *Reciprocity in community-engaged research*

Presenting research results to the community partner organizations was a key element of our CER design, because giving the data and results back to community partners is one way we sought to empower and collaborate with them. When the community partner liaison and community partner coordinator agreed that the participant recruitment and survey distribution process was complete, either because we had received the desired number of responses or because we needed to finish the data collection, the community partner coordinator could begin preliminary data analysis (step 5 in Figure 2). Frequencies and percentages from the demographic data for a community's responses were calculated and displayed in tables or charts,

giving an overview of who specifically took part in the research project. Descriptive statistics of the Q statements that participants most agreed and most disagreed with showed a first glance at the patterns of water values measured by the Q method in that community. In addition, the factor analysis output for a community from the Q Perspectives® tool gave insight into the main water values viewpoints within the participants.

The community partner coordinator wrote a report that included this preliminary data analysis and text descriptions of these results and sent the report to the community partner liaison for review (step 6 in Figure 2). The two parties met virtually to debrief the preliminary data report and discuss next steps for communicating the results. After considering both the needs and expectations of the community partner organization as well as the bandwidth of the OWS team, it was decided that a short video presentation of the aggregate results across all five sites compared with the results from a given site would satisfy all project collaborators. The preliminary data report and video presentation would be usable by the community partner organizations and by the OWS research team. Additionally, two members of the OWS team co-authored an article published in the Street Roots newspaper describing the initial results from Street Roots vendors who participated in the Q methodology study. The OWS team will be conducting more in depth quantitative and qualitative analysis of the data from all five communities and will be continuing to share credit and any scientific or other published results with the community partner organizations.

### *Case study research process analysis*

Data analysis of the results from the OWS Q Methodology survey is still in progress, so the analytical work of this paper is an evaluation of the research process described above and pictured in Figure 2. The comparative conceptual framework developed in the Literature Review

section (Table 1) was used to evaluate the successful elements and areas for improvement within our research process in terms of SE and CER principles. Specifically, the steps in Figure 2 were matched to relevant key elements of both engagement approaches that guided each step. Next, the COVID-19 adaptations to the research process were summarized and similarly matched to key elements described in the conceptual framework to shed light on the theoretical underpinnings of our decision-making. The Degree of Collaboration Abacus developed by Doberneck and Dann (2019) was then applied to the six process steps described in Figure 2 to provide a CER-specific evaluation of the project. Finally, we considered the findings from these evaluative lenses together to identify how the CER design went beyond typical SE approaches and to distill the challenges and benefits of key project components.

## Results

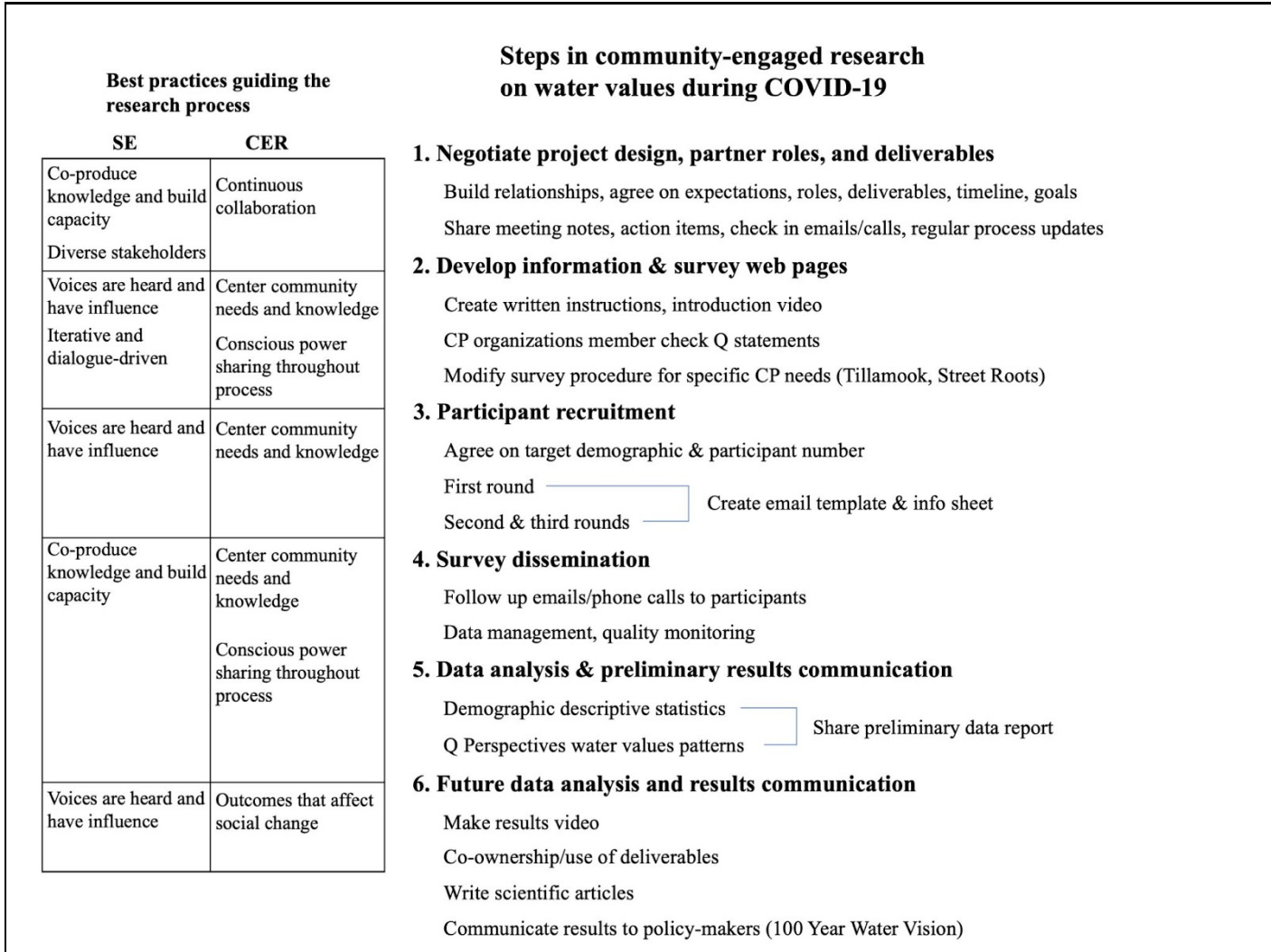
To address this paper's question, the research process described in the "Case study methods" section was analyzed and evaluated from a variety of angles. The figures and tables presented in this section are geared towards aiding further reflection on and critique of this research process.

### *Evaluating the research process with the comparative conceptual framework*

Figure 5 presents an evaluated version of the research process steps previously outlined in Figure 2. Key elements described in the comparative conceptual framework of SE and CER approaches to engagement (Table 1) were matched to each of the 6 broad steps in our research process, with the goal of highlighting how the two approaches guided our actions and decisions. While Figure 2 indicated which research partner(s) held primary responsibility for each sub-step



of the research process, we found that the addition of the key elements from the conceptual framework brought into focus the motivations driving each step.



**Figure 5.** The project’s research design is broken down into six main steps and several sub-steps, which are matched with best practices from the comparative conceptual framework in Table 1. Steps 4 and 5 share table cells as they were found to correspond with similar SE and CER best practices.

The process outlined in Figure 5 was repeated for each of the five study locations where community partner organizations were based. To enhance the clarity of the process for analysis the steps have been organized linearly, but in reality the research process was far more iterative and steps often overlapped. For example, participant recruitment and survey dissemination

occurred concurrently for most of the five study sites due to the flexibility afforded by our virtual survey design. Participants recruited by community partners could sign up for the project and almost immediately receive an email with the survey link and instructions for participation. Meanwhile, the community partner coordinator and community partners were continuing to work together to recruit enough participants. We took advantage of these overlapping steps by asking some participants who had completed the surveys to recommend other potential participants in order to recruit our agreed-upon number of participants.

According to this evaluation, each research step in Figure 5 integrated at least one SE and CER best practice to some degree. The first three steps, during which community partner liaisons and the Oregon Water stories team co-designed the virtual research process and recruited participants, overall show a more robust incorporation of engagement best practices. In steps 4 and 5 researchers took on most of the responsibility for moving the project forward, but communication, consultation, and data sharing with community partner liaisons were still of critical importance to these stages of the process. The final step brought collaboration back to the center of the research partnership, with researchers and community partner liaisons making decisions together about the research products and results communication materials.

### *Evaluating COVID-19 adaptations to the research process*

Because the COVID-19 global pandemic significantly impacted both the research activities we were able to conduct and the context within which this project played out, an evaluation specific to the process of adapting the research to the pandemic circumstances seemed useful. Table 2 presents this evaluation and additionally references the relevant key elements of SE and CER that guided both the initial research step as well as our approach to its adaptation to accommodate COVID-19 limitations.

The presence of some empty cells in the “Guiding key elements” columns is an indication of the compromises and sacrifices that were made in order to continue this project within COVID-19 limitations. Although researchers and community partners strove to reimagine the research project such that the collaboration and the voices of community members participating in the surveys would still be front and center, the adaptation process necessitated some changes that significantly impacted our ability to do so. The largest change was the switch from in person focus groups, which would have taken place in each of the five study locations and would have been co-facilitated by the community partner liaisons, to a virtual survey format, which was described in detail in the “Case study research process” section of the Methods. This change resulted in a decreased amount of empowerment (SE) and delegated power (CER) in relation to the community partner liaison role, as can be seen in the types of guiding key elements highlighted for steps C-I. The change additionally reduced the opportunities for participants to share knowledge with and learn from each other, which would have been a central aspect of the in person focus groups.

**Table 2.** *The initial plans for selected research process steps contrasted with the COVID-19 - adapted steps that ultimately were executed in this project. Specific measures taken by researchers to adapt the process to the pandemic circumstances are also highlighted. Key elements of SE and CER approaches are ascribed to each of the selected steps where relevant, and these key elements guided both the research activity described in that step and the redesign process that led to the adaptations made.*

	Steps in research process		Adaptive techniques	Guiding key elements	
	Initial plans	COVID-adapted		SE	CER
A	Partner with one community organization in each of 5 Oregon Water Regions	Partnered with 5 community organizations in 4 Water Regions (2 community partners in one region)	Partners were flexible and understanding, communicated consistently and openly	Diverse stakeholders	

B	Community partners recruit participants from community both in person and online	Community partners recruit participants from community virtually (emails, phone calls)	Followed up many times over both email and phone with potential participants, used snowball sampling	Voices are heard and have influence	Center community needs and knowledge
C	Researchers introduce project & share info with participants during in person focus groups	Researchers made video introduction to the project & created a website with info and tech help options	Developed video and website to be informative & user friendly, emphasized our gratitude for participants' time given the circumstances	IAP2 spectrum: inform & involve; OECD levels of engagement: communication & consultation	Arnstein's ladder rungs: informing & consultation
D	Offer food & childcare at focus group, and \$25 gift cards or packages of essential survival items	Offer \$50 e-gift cards distributed via email, or in one case as physical gift cards by the CP	Routed money marked for in-person focus group expenses to fund larger virtual gift cards		Center community needs and knowledge: recognize validity of community knowledge
E	Store filled out survey materials in secured file cabinet	Store completed survey info on password-protected Google Drive	Ensured participant surveys were linked but de-identified across online platforms		
F	In person demographic survey	Virtual demographic survey	Carefully considered word choice and response options for maximum clarity and respectfulness	Attention to diverse stakeholders	
G	In person Q sort with physical materials	Virtual Q sort using the Q Perspectives tool	Explained how a Q sort works in the video and provided written instructions with example screenshots	Voices are heard and have influence	
H	In person small group conversations post-Q sort	Virtual follow up written survey, virtual interview format for Street Roots	Created online follow-up survey where participants could freely expand upon any aspect of the Q sort; conducted this survey as Zoom interviews for one participant group to meet community needs	Iterative and dialogue-driven	Center community needs and knowledge
I	Answer questions and aid participants in survey completion during focus groups	Research team offered virtual tech support in variety of ways	Continuously offered tech support for online survey completion via email, phone, and Zoom, and monitored live chat function on survey website		Center community needs and knowledge

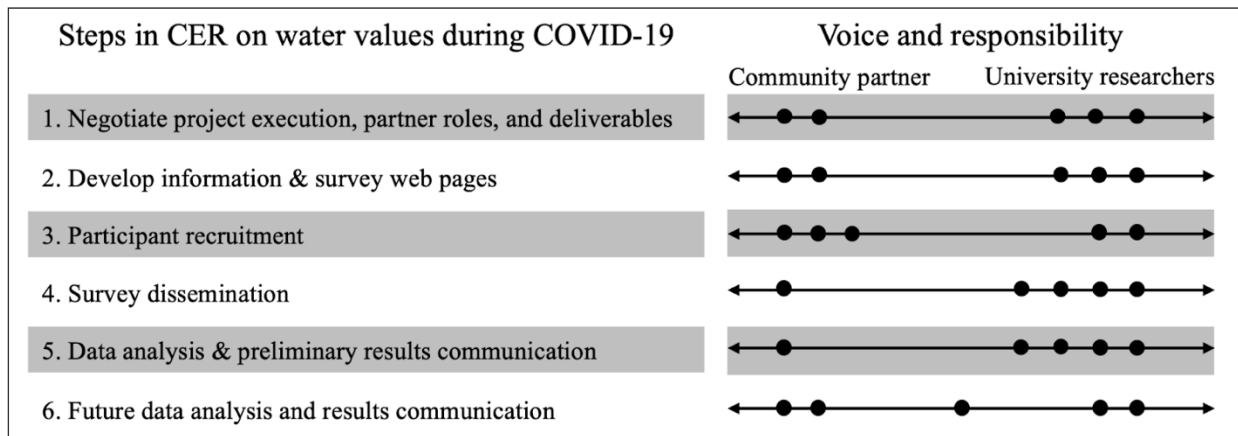
J	Present results in person at community events	Forthcoming recorded results presentation and live virtual Q&A sessions	Results presentation video will be shared with community partners for their use & dissemination, and live Q&A sessions will engage broader communities	Collaboration and capacity- building	Outcomes that affect social change
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When the Oregon Water Stories (OWS) team made the decision to continue with the research project during COVID-19, it was immediately clear that significant changes to the initial research plans would be required. Table 2 aims to elucidate both those initial plans and the research actions that ended up replacing them. The actions and attitudes in the “Adaptive techniques” column describe in detail how researchers, with the help of community partners, redesigned the project to be compatible with the limitations (physical and emotional) brought about by the pandemic. This table shows how these adaptive techniques are linked to some of the key elements of SE and CER approaches from Table 1, and in doing so aims to underscore the purposeful process of redesign that partners went through.

Although Table 2 displays this process as linear and streamlined for better comprehensibility, the reality was far more organic. Due to the ever-evolving and ongoing nature of the COVID-19 crisis, the possibilities and conditions for research were, and still are, continually changing. Thus, we found that meticulously documenting the cycles of adaptation took on far more importance to the study’s contribution to both science and the community partners than had initially been expected. Table 2 is the result of a synthesis of the innumerable memos, emails, phone calls, and brainstorming sessions made by researchers, the community partner liaisons, and survey participants throughout the research process.

*CER-specific evaluation of the research process*

To accompany and expand upon the evaluation of the research process steps in Figure 5 and how they were adapted to the pandemic situation in Table 2, the degree of collaboration abacus tool from Doberneck & Dann (2019) was applied to the six steps described in Figure 5. As the authors outline in their paper, the abacus helps visualize the distribution of power throughout the research process by positioning beads along the arrows to represent which project partner had more voice and responsibility in each step. The abacus comes out of the CER scholarship, and so acts as a CER-specific method of analyzing our process to see how it measures up. In our case the abacus brought to light the extent to which university researchers on the OWS team both took on more responsibility for and had more say in nearly all of the six steps, with the exceptions of steps 3 and 6 (Figure 6). The beads were positioned according to the researcher’s self-reflective evaluation of the six steps and their sub-steps presented in Figure 5, so it must be noted that the community partners’ perspective on the allocation of power was not able to be included in this method of analyzing our research process.



**Figure 6.** A CER-specific evaluation of the research process steps previously outlined in Figure 5 using the Degree of Collaboration Abacus tool developed by Doberneck & Dann (2019). The distribution of beads along the arrows represents the amount of voice and responsibility each partner had in that corresponding step.

*Challenges and benefits within the research process*

The final element of analysis is presented in Table 3 and rounds out our multifaceted approach to evaluating the project’s research design. This table builds upon the previous findings by summarizing the challenges and benefits of five central components that were drawn out from the figures and tables already discussed. These components were identified as pivotal and interconnected aspects of this project’s successful ability to engage 67 total participants from five hard-to-reach communities during a global pandemic. Without the collaboration between liaisons and the community partner coordinator, for example, it would not have been possible to adapt the research process as quickly or insightfully because liaisons provided crucial information about and support for their community members’ needs and abilities (component 1 in Table 3).

**Table 3.** *Challenges and benefits of five central components of the research process described in this study. A description and example from our research of each component serves to contextualize the selected challenges and benefits.*

	<b>Component</b>	<b>Challenges</b>	<b>Benefits</b>
<b>1</b>	Community partner collaboration	Takes time, resources, relied on bandwidth	Strong relationships; relevant & responsive to communities
<b>2</b>	Engaging hard-to-reach communities	Participants had limited access to and/or familiarity with technology	Captured important water perspectives that might otherwise be overshadowed in policy contexts
<b>3</b>	Adaptable Q sort & survey process	Convert Q sort, survey materials, & data management to virtual format	Meet specific community needs; increased accessibility in some ways
<b>4</b>	Dedicated community partner coordinator(s)	Requires time commitment, communication, organization skills	Can manage complex data collection; build trust and consistent communication
<b>5</b>	Q methodology	Unfamiliar research method was hard for participants to navigate virtually	Rich quantitative and qualitative data, authentic and trustworthy

## Discussion

This case study of the Oregon Water Stories Project's Q methodology research on water values used elements of both stakeholder engagement and community-engaged research to adapt and carry out the research process during the COVID-19 pandemic. After evaluating various aspects of this research process through SE, CER, and comparative frameworks, we conclude that the process incorporated elements of both engagement approaches to its benefit but still has room for improvement in many ways. A deeper dive into these evaluations will help measure how well the research process met expectations and will bring forward some central challenges and benefits of our approach. Through this discussion some of the key lessons learned during this research process will be distilled, with the aim of broadening the applicability of both the comparative conceptual framework and the research design itself.

### *Overlapping engagement approaches*

Initially the research project described in this paper was conceived primarily with a CER approach because that is the disciplinary expertise of the university-affiliated researchers from the OWS team. However, the intended application of the research was for a SE context--to influence Oregon's 100 Year Water Vision policy development--so the research process at its inception was already bridging the usual SE-CER divides in favor of a more interdisciplinary approach to the water resources question posed. The comparative conceptual framework (Table 1) outlined in the Literature Review section highlights the many similarities shared by these two engagement approaches, and Figure 5 shows instances of their overlapping nature in the context of our research process.

For example, after applying the conceptual framework to our research steps we found that SE principles of co-production of knowledge and community capacity-building lined up with the



CER principle of collaboration throughout the research process (step 1 in Figure 5). Likewise, step 3 of the same figure lined up with principles in both engagement approaches that described how stakeholder/community voices would guide and fundamentally shape the process.

Alongside bringing out similarities in how SE and CER principles influenced our research, the comparative conceptual framework and the various evaluative lenses we applied to our research process also shed light on the ways in which it fell short of project goals.

### *Impact of COVID-19 adaptations on engagement*

While the initial plans described in Table 2 correspond with relative clarity to SE and CER best practices, the compromises that had to be made when shifting the research process to a virtual format do not integrate these best practices to the same degree. Although researchers and community partner liaisons strove to reimagine the research design such that collaboration and the voices of stakeholders participating in the research would remain front and center, the COVID-19 adaptations necessitated some changes that significantly impacted our ability to do so. For example, the COVID-adapted step H in Table 2 falls short of the CER best practice of affecting social change. This best practice would have been better integrated into the initial plans for the Q methodology focus groups, which would have facilitated conversations about contentious water issues among diverse community members. However, Table 2 also shows that the research design maintained the integrity of the best practices guiding step J by integrating suggestions from community partner liaisons regarding the specific needs of their communities during the pandemic.

Additionally, although our initial aim was to recruit participants representing a diverse range of demographics (step G in Table 2), this project's sample did not include high racial, ethnic, or linguistic diversity. The CER design was, however, able to engage geographically

diverse stakeholder communities who are hard to reach because they lack traditional modes of communication (i.e., unhoused participants from Portland), have limited access to or familiarity with technology (i.e., older stakeholders in rural areas), or are hesitant to engage with outsiders around water (i.e., constituents in the Klamath Basin). Finally, in the initial conception, community partner liaisons would have shared responsibility with Oregon Water Stories researchers for introducing and running the focus groups, interacting with participants, and creating engagement materials (step C of Table 2). Nonetheless, some power was still shared with the liaisons in this pandemic adapted CER design by incorporating their suggestions and feedback into the creation of the video, instructions, and website.

The research design remained driven by the needs and abilities of the five community organizations throughout the process of adaptation, but its virtual nature meant that participants often completed the Q sort and surveys with little interaction and connection with either their community partner liaison or project researchers. In person engagement activities often facilitate what Kliskey et al. (2021) describe as a culture of “sharing values, respect, and trust,” which facilitates the organic exchange of knowledge and social learning among partners (Balazs & Lubell, 2014) that is a foundational aspect of successful SE and CER processes. In addition, face-to-face interactions have been shown to increase the viability and longevity of solutions produced by engagement activities (van Buuren et al., 2019). Although in person research was out of the question for our project given the circumstances of the pandemic, the necessary adaptations (Table 2) did hinder the creation of a collaborative atmosphere and may have resulted in less impactful and long-lasting outcomes for our partner communities.

Another consequence of the adaptations required by COVID-19 is the little amount of time we were able to spend doing engagement activities during the research process. Time is a

key ingredient for success in SE and CER projects (Israel et al., 1998) because establishing trust and respect among research partners and participants does not happen overnight. In fact, Beall King and Thornton (2016) point to consistent engagement across a long time span as the crux of their successful collaborative project with diverse water stakeholders across multiple basins in Idaho and Washington. Other researchers note that short time allocations are often one of the primary mistakes made in SE initiatives and can stunt the formation of the trusting relationships that are so key in both SE and CER projects (Mott Lacroix & Megdal, 2016). Thus, the successful involvement of stakeholders who may have been initially distrustful of this research project underscores the crucial role of the collaboration with community partner organizations, who bridged the potential gaps in trust and encouraged participation in their communities. In addition to these efforts by the community partner liaisons, Oregon Water Stories researchers contributed to the project's element of collaboration by investing time and care into building and tending relationships with liaisons and participants.

Having enough time in engagement spaces can also be considered an issue of justice, as explored by Gagnon et al. (2017) in their paper on a CER project addressing chemical contamination in the Great Lakes. The authors compellingly argue that opening up time and space for dialogue and multi-directional flow of information within the research process can allow important community counter-narratives to emerge that would otherwise have remained hidden. This time and space is especially critical when engaging with Indigenous communities (Gagnon et al., 2017; Taylor et al., 2019) and with communities who may be justifiably distrustful of engaging with institutions or agencies that perpetuate legacies of oppression (Chief et al., 2016). An application of this critical lens to our research process, as it is outlined in Figure 5, exposes how the shift to a virtual format limited our project's ability to create this kind of

transformative time and space in our engagement with both the community partner liaisons and the community participants. As a result, the outcomes of the research process may fall short of the (admittedly somewhat ambitious) CER best practice of affecting social or political change (Table 1).

Evaluating our research process with Doberneck and Dann's Degree of Collaboration Abacus (Figure 6) also helped shine a light on the impact of our COVID-19 adaptations upon power dynamics in our project. In four out of the six research steps there were more beads representing voice and responsibility allocated to the university researcher side than the community partner side. The importance of balancing power between partners in a CER approach that achieves high engagement levels is underscored by many authors (Arnstein, 2019; Ferguson et al., 2016; Lukasiewicz & Baldwin, 2017). While voice and responsibility do not need to and, in fact, should not be distributed equally at every step in order to capitalize on each research partner's strengths (Doberneck & Dann, 2019), the overall balance of power would ideally be relatively equal, or even fall more on the community partner side.

In the case of our research, however, the lack of community partner responsibility for steps 1, 2, 4, and 5 (Figures 5 and 6) was a conscious choice made to support community partners who were already operating at decreased capacity due to COVID-19. If OWS researchers had not taken on the bulk of responsibility for the study in these steps, community partners would not have had the bandwidth to collaborate given the extra stress and challenges posed by virtual research. While we made these decisions mainly out of necessity and not praxis, we had already initially planned on delegating data management and analysis to the university research team because we had expertise and resources for those tasks. Overall, while the pandemic did impact the engagement and collaboration aspects of the research design negatively

in some ways, as seen in the evaluations provided by Figure 5 and Table 2, the research process successfully remained responsive and relevant to our community partners.

### *Challenges, benefits, and lessons learned*

After analyzing the project's research design through a variety of evaluative lenses, a clear picture emerges of the obstacles created by the COVID-19 pandemic as well as limitations inherent in the research design. Despite these challenges, there were several components central to our research (Table 3) that allowed the project to successfully engage a geographically diverse range of hard-to-reach stakeholders and to maintain the integrity of some CER and SE principles even as we adapted the process to a virtual format. While collaborating with community organizations (component 1) did present some logistical challenges and required significant time and resources, it is clear from our evaluation that these collaborations were key to this project's capacity for centering and being responsive to community needs. Similarly, our use of the Q methodology (component 5) created challenges for participants navigating the unfamiliar and virtual survey process, but also benefited the research partners by being adaptable to an online format while continuing to provide authentic and trustworthy data on participants' water values.

From this discussion of challenges and benefits we hope to crystallize suggestions for improving our research process as well as some more broadly applicable lessons learned. First, we found that adapting our definition of success in our research project was a critical step towards creating a viable project during the COVID-19 pandemic. Alongside adjusting the actual research activities we would undertake, the OWS researchers and community partner liaisons had to collaboratively reimagine what a successful research process and outcome would look like. These conversations required honest communication about resources, bandwidth, and expectations. Negotiating these aspects of the research up front has helped to prevent unexpected

surprises and align project partners' goals. However, evaluations of the adapted research process (Table 2 and Figure 6) and a comparison of our actions with the best practices highlighted in the SE/CER comparative conceptual framework (Table 1) help us see that engagement gaps still remain. For example, a more explicit attention to power-sharing dynamics throughout the research process might have helped remedy some of the voice and responsibility imbalances previously noted (Doberneck & Dann, 2019; Gagnon et al., 2017).

Another recommendation for future projects in similarly unpredictable circumstances is to begin the research or engagement process with clearly defined theoretical and/or methodological underpinnings. Being able to return to and ground the research process in these frameworks is key to maintaining the project's focus as it organically evolves and responds to the research context (component 3 in Table 3). Our project had a solid foundation in the Q methodology, which remained a guiding force throughout the iterations of research design. Additionally, although we drew heavily upon CER theory and praxis as we went through the research process, in retrospect we might have benefited from a more fully fleshed out theoretical framework around engagement, such as Table 1. Integrating a framework such as this one into our work might have facilitated more opportunities for reflection on and evaluation of the research process, which could have helped us clarify and document the justifications for our decisions as we redesigned the project. Van der Waldt (2020) and Riley (2019) both underscore the utility of a conceptual framework as a way to create shared understanding and a launching place for dialogue when working in interdisciplinary research teams.

Finally, we cannot overstate the importance of having a dedicated community partner coordinator (component 4 in Table 3), especially in a CER project such as ours where research processes occurred simultaneously at different spatial and temporal scales. The community

partner coordinator should prioritize being available to community partners liaisons and participants, communicating consistently, keeping organized records of the data and process, listening more than talking (Chief et al. 2016), and approaching the partnership with diplomacy. This role, as it functioned in our research process, may bear some similarities to the bridging organization described in a SE context by Mott Lacroix and Megdal (2016). Both entities attend to the not-insignificant logistical and accompanying social aspects of the research process, and therefore have a key part to play in establishing the culture of collaboration.

### *Impacts of this research on partners*

While the primary phases of partnerships and data collection have been completed in this research, the Portland State University members of the OWS Project team continue to analyze the data qualitatively and quantitatively, and will soon be sharing results with community partners, policy makers, and scientific audiences. The research team also hopes to refine the methods piloted here and apply them to future partnerships with more community partners that address other aspects of water in Oregon. In addition, the partnerships described in this paper could lay the groundwork for continued future partnerships with the same community partner organizations. The five community partner organizations who worked with us have received preliminary data reports and will also work with the community partner coordinator to plan and then disseminate the forthcoming results communication video. Willamette Partnership, the community partner for this master's work, will be able to apply our findings to their policy and advocacy work.

### *Broader implications*

This analysis of the research process conducted by Portland State University's Oregon Water Stories Project and our community partner organizations has shown that an engagement

approach that crosses the boundaries of natural resource management, stakeholder engagement, and community-engaged research can provide both rich data and productive collaborative processes. Our work can be situated within this burgeoning interdisciplinary field of scholarship and practice and represents one out of many potential new approaches to answering old questions (i.e. how can we manage water sustainably and equitably?). One example of another approach is put forth by Balazs and Lubell (2014), who propose integrating the concept of multi-loop social learning into water SE contexts to scaffold deeper learning via iterative exchanges of information among water stakeholders. Ferguson et al. (2016) showcase how a collaborative research model, essentially founded on CER principles, can be used by university researchers and tribal agencies to produce mutually beneficial research and practical outcomes, which in their case study meant locally relevant drought monitoring systems. As a last example, Riley (2019) explores the potential of the Q method paired with a CER design to facilitate productive, respectful conversation among diverse stakeholders in Michigan's contentious aquaculture debate.

Research and engagement efforts such as these examples are indicative of the growing and necessary role interdisciplinary research is playing within natural resource management fields such as water. While these studies exemplify how research can break out of siloed disciplines and produce more relevant, integrative engagement processes, the unfortunate reality is that management discussions rarely adequately attend to the full complexity of the human dimension of water issues. Therefore, water management researchers and professionals have an obligation to explicitly incorporate engagement best practices into their work.

## Conclusion

According to this evaluation of our CER approach to engaging hard-to-reach populations in water values research, the project design went beyond typical SE activities by centering and



adapting to community needs, leveraging community knowledge and networks, and engaging in reciprocity throughout the project. The key challenges of the COVID adapted approach were the conversion of research tools to a virtual format, participants' lack of access to or familiarity with technology, and a significant investment of time and resources. The key benefits included the project's ability to capture hard-to-reach stakeholders' voices, the Q method's rich quantitative and qualitative data, and the CER design's adaptability to a dynamic research context.

As the world emerges from the COVID-19 pandemic, virtual research and community engagement may remain commonplace. These emerging areas of study require a solid methodological and theoretical foundation to establish best practices and scholarly standards. We position our project within this nascent field of work and hope that our critical process evaluations and recommendations can highlight opportunities for improving the research approach. Future research at other universities or in other states could explore a variety of natural resource management questions by modeling new Q method CER processes off this project.

## Chapter 4: Conclusion

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In this project, we investigated and evaluated public engagement in state water governance through the lenses of environmental justice, stakeholder engagement, and community-engaged research. The first stage of this study produced a paper aimed at policy makers that analyzed the water values presented in the state's 100 Year Water Vision and its public engagement processes through an environmental justice analysis of a dataset of water-related Oregon newspaper articles. The findings from this research led the OWS project team to devise a research design using the Q methodology and a CER approach to investigate the water

values of participants in five communities across Oregon as an alternative method of stakeholder engagement in water policy. Taken together, these research initiatives can offer some broadly applicable tools and lessons for researchers, engagement practitioners, policy makers, and water managers embarking upon similar projects at the intersection of these diverse fields.

### *Findings*

In Chapter 2 of this thesis, it was found that the 100 Year Water Vision's engagement processes had room for improvement and that the water values put forth by the state did not fully represent those of all stakeholders. The case studies and question matrix highlighted how environmental justice principles could have been more integrated into both the process and outcomes of the Water Vision's stakeholder engagement initiatives. Policy makers have many considerations to juggle, especially when it comes to wicked problems such as water management, but this analysis made it clear that equity and justice should be more of a focus in water policy making. Otherwise, water governance runs the risk of reproducing existing environmental injustices and missing the full benefits of stakeholder engagement.

After evaluating the research process of the OWS Q Methodology project described in Chapter 3, we found that even with the pandemic adaptations the project was able to maintain the integrity of several key guiding principles drawn from SE and CER literature. However, it was also clear that the interdisciplinary research approach could use further refinement to achieve even more collaborative levels of engagement. While there is a substantial body of literature in natural resource management fields, like water governance, that focuses on SE practice and theory, it is less common for scholarship to bridge the disciplinary divide with CER. Our project demonstrates that the two engagement approaches in fact share many similarities and that

combining them in interdisciplinary research has the potential to produce both processes and outcomes that are more sustainable and inclusive.

### *Why this research matters*

Public engagement in water policy and management processes has broad ramifications. Whose voices are represented in decision making arenas, whose input gets to have actual impacts, and who influences what gets to be part of the conversation are just a few of the opportunities public engagement can present for moving water governance towards more just and effective solutions. Our research first explored how well current engagement initiatives address these questions by applying an environmental justice lens to Oregon's 100 Year Water Vision. While our recommendations are specific to this developing policy, the critique and proposed evaluative tool are widely applicable to water policy making processes in the US. If policy makers used these and other tools to assess their engagement processes and policy outcomes, the extensive need for further integrating environmental justice might become clearer and more urgent.

Building off these initial findings, the second phase of our research sought to test out and evaluate an alternative engagement process based on the Water Vision that combined elements of SE and CER and that ultimately was adapted to COVID-19 limitations. As the world emerges out of the global pandemic, virtual research and community engagement may become more commonplace. Thus, at a basic level, this research is important because it provides proof that virtual community engagement and collaborative processes that incorporate best practices are possible to develop. In addition, the evaluation of our research design provides insight into both what it takes to successfully conduct this research process and also highlights areas for improvement. We hope our work can act as a roadmap for future collaborative engagement

initiatives undertaken by the OWS team, as well as be more broadly applicable for engagement researchers and practitioners.

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## Appendices

### Appendix I - Appendices attached to the policy paper “Centering Equity in Oregon’s 100 Year Water Vision”

#### *Water Issues Inventory*

This inventory is derived from the Oregon Water Stories team’s research on water issues in Oregon as reported in newspaper articles from local publications. We compiled a statewide database of newspaper articles related to human- water interactions in Oregon, organized by newspaper and that newspaper’s location within Oregon’s five Water Regions. Part of the team used corpus linguistics, a linguistic analysis method, to determine which words were most common and unique to each of Oregon’s five Water Regions in a subset of these articles, as a proxy for defining each Region’s key water issues. The results point to a preliminary, but still limited and in progress, inventory of water issues as organized by Oregon Water Region. Even these early-stage results indicate a large array of water issues statewide, as well as significant differences and similarities between regions and possible emerging Regional water issue patterns. A more detailed description of the data collection and analysis methods can be found at the end of this Appendix.

#### *Publications used for analysis in each Oregon Water Region*

Table 1: This table shows the publications that were used in the linguistic analysis for each of Oregon’s five Water Regions. Each Region was represented by 30 newspaper articles from 2018 drawn from the publications shown in this table, and for each Region, at least three different counties are represented.

<b>North West</b>	<b>South West</b>	<b>South Central</b>	<b>North Central</b>	<b>East</b>
Daily Astorian	Curry Coastal Pilot (Brookings)	Bend Bulletin	The Dalles Chronicle	Argus Observer (Ontario)
Newport News	Medford Mail Tribune	Herald and News (Klamath Falls)	East Oregonian (Pendleton)	Burns Times-Herald
Statesman Journal (Salem)	Roseburg News Review	Nugget News (Sisters)	Hood River News	La Grande Observer
Street Roots (Portland)		Spilyay Tymoo (Warm Springs)		Malheur Enterprise (Vale)
Tillamook Headlight Herald		Warm Springs News		
Willamette Weekly (Portland)				



The following tables (Table 2-6) present the most common water-related words found through linguistic analysis for each of the five Water Regions. The frequencies reported are the raw number of total occurrences of each word in the group of articles from publications in that Region.

Most common water-related words in the North West Water Region

Word	Frequency
River	41
Fish	31
Oil	21
Timber	21
Drilling	20
Lake	20
Ocean	20
Quality	20
Samples	18
Beach	17
Crab	17

Table 2: This table shows the most common water-related words pulled by linguistic analysis from articles from publications in Oregon’s North West Water Region.

Most common water-related words in the South West Water Region

Word	Frequency
River	71
Salmon	48
Fish	47
Chinook	41
Creek	34
Port	34
Fire	31
Basin	27
Rivers	24
Rain	23
Anglers	18

Table 3: This table shows the most common water-related words pulled by linguistic analysis from articles from publications in Oregon’s South West Water Region.

Most common water-related words in the South Central Water Region

Word	Frequency
River	87
Fish	84

Salmon	46
Basin	42
Reservoir	33
Dam	30
Hatchery	28
Rivers	23
Irrigation	19
Trout	17
Redband (Trout)	16
Lake	16

Table 4: This table shows the most common water-related words pulled by linguistic analysis from articles from publications in Oregon’s South Central Water Region.

Most common water-related words in the North Central Water Region

Word	Frequency
River	60
Fish	37
Irrigation	32
Wells	30
Drought	21
Sewer	20
Salmon	16
Reservoir	13
Snow	13
Temperatures	13

Table 5: This table shows the most common water-related words pulled by linguistic analysis from articles from publications in Oregon’s North Central Water Region.

Most common water-related words in the East Water Region

Word	Frequency
Arsenic	53
Drought	47
Irrigation	42
Watershed	37
Fish	29
Snowpack	29
Treatment	29
Basin	26
Drinking	26

Reservoir	21
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Table 6: This table shows the most common water-related words pulled by linguistic analysis from articles from publications in Oregon’s East Water Region.

The following tables (Table 7-11) present the keywords identified for each Region as sorted by “keyness,” which is a statistical measure of the frequency of a keyword within a smaller group of texts (all articles from that Region) as compared to a larger group of texts (all articles from all five Regions). Keyness can indicate the uniqueness of the importance of that word to that water Region relative to the other four Regions.

#### North West Water Region Keywords

Word	Keyness	Frequency
Crab	+51.76	17
Permit	+49.23	35
Seafood	+48.72	16
Offshore	+45.67	15
Timber	+43.93	21
Drilling	+41.24	20
Oil	+38.29	21
Processors	+33.49	11
Chloride	+27.4	9
Dungeness	+24.36	8
Magnesium	+24.36	8
Estuaries	+21.31	7
Lumber	+21.31	7
Acidification	+20.62	10

Table 7: This table shows the keywords pulled by linguistic analysis for Oregon’s North West Water Region, as organized by each word’s keyness.

#### South West Water Region Keywords

Word	Keyness	Frequency
Chinook	+76.5	41
Mining	+45.06	17
Creek	+36.91	34
Anglers	+33.62	18
Sewage	+32.65	13
Fire	+31.85	31
Solar	+26.83	8
Rise	+26.7	13
Drains	+26.56	11
Wetlands	+26.56	11
Pipe	+24.71	16

Suction	+23.47	7
Rivers	+18.72	27

Table 8: This table shows the keywords pulled by linguistic analysis for Oregon’s South West Water Region, as organized by each word’s keyness.

#### South Central Water Region Keywords

Word	Keyness	Frequency
Tribes	+100.55	48
Tribal	+67.23	31
Hatchery	+60.8	28
Fish	+49.83	84
Landfill	+45.7	13
Utilities	+37.91	14
Basin	+30.19	42
Dam	+28.15	30
Trout	+27.95	17
Trash	+27.05	14
Redband (Trout)	+25.38	16
River	+22.59	87
Reservoir	+22.15	33
Spill	+20.4	13
Rivers	+18.92	23

Table 9: This table shows the keywords pulled by linguistic analysis for Oregon’s South Central Water Region, as organized by each word’s keyness.

#### North Central Water Region Keywords

Word	Keyness	Frequency
Wells	+51.26	30
Rate	+48.32	21
Rates	+45.5	18
Usage	+37.6	11
Treaty	+35.32	19
Residential	+33.45	13
Users	+32.21	23
Aquifers	+30.76	9
Commingling	+27.34	8
Plaintiffs	+24.25	11
Patrons	+23.92	7
Employers	+20.51	6

Table 10: This table shows the keywords pulled by linguistic analysis for Oregon’s North Central Water Region, as organized by each word’s keyness.

East Water Region Keywords

Word	Keyness	Frequency
Arsenic	+141.5	53
Juniper	+48.38	17
Cyanotoxins	+45.54	16
Streamflow	+42.69	15
Watershed	+42.48	37
Drought	+33.85	47
Algae	+32.57	18
Snowpack	+31.31	29
Bentgrass	+31.3	11
Water	+29.06	293
Carp	+27.65	12
Refuge	+27.65	12

Table 11: This table shows the keywords pulled by linguistic analysis for Oregon’s East Water Region, as organized by each word’s keyness.

*Detailed Methods: Corpus Linguistic Analysis*

Purpose of study

The purpose of this study was to discover, compile, and analyze salient words from periodicals in each of Oregon's five water regions, using methods of corpus linguistics. Corpus linguistics is the study of language through a collection of texts, or corpus.

By determining which words were most common in each region, in both comparative and non-comparative analyses, the intent was to determine which water issues are most important to the people of each region, and which issues are most unique to that region, compared to the rest of the state.

Procedure

This corpus was compiled from 30 newspaper articles from each of the five Oregon water regions (150 total). Articles were found and selected based on the criteria that they included the word "water" and were published in the year 2018. Periodicals from at least three different counties within each region were used, and similar numbers of articles were used from each town, locality, or city.

All corpus analyses were conducted using the concordance program AntConc.

For each region, a word list was generated, and salient water-related and environmental

terms were culled, and ordered by frequency (in this case, the raw number of total occurrences). Tables 1-5 show the results of this investigation.

Additionally, a keyword search was conducted, specifically the variety associated with corpus linguistics, in which a smaller "target corpus" is compared to a larger body of texts, or "reference corpus," to determine which words are more likely to occur in (or are more "key" to) the smaller body of text than the whole. A target corpus, comprised of the files from one region, was compared to the combined remaining four corpora. This process was repeated for each region.

Results were culled for relevance, and ordered by keyness (see tables 6-10). Keyness is the statistical measure of the frequency of a keyword in a corpus relative to the reference corpus (WordSmith Tools); AntConc calculates keywords through a loglinear statistical test by comparing word frequencies of the target text to those of the reference corpus. "The threshold for significance is conventionally at  $LL=6.63$ . So tokens [keywords] with keyness values above that threshold would be considered significant" (AntConc Walkthrough).

AntConc Walkthrough. (n.d.). Retrieved from <http://www.thegrammarlab.com/?nor-portfolio=antconc-walk-through>.

WordSmith Tools Manual. (n.d.). Retrieved from [https://lexically.net/downloads/version7/HTML/keyness\\_definition.html](https://lexically.net/downloads/version7/HTML/keyness_definition.html).

## Appendix II - Oregon Water Stories Project Q Statements

1. We should invest in water systems that keep people healthy.
2. Having reliable access to clean water is worth paying for.
3. Tribal nations have sovereign rights to protect the health of rivers.
4. I care about the health of our water because of my religious or spiritual beliefs.
5. Landowners are capable of keeping water healthy on their own land.
6. If you aren't sure about the health of your water, it is your responsibility to get a water filter.
7. It's okay to limit public comment for stream restoration projects if it keeps costs down.
8. A good use of rivers is having large dams to create electricity.
9. Lakes should be maintained in their natural state for the good of all.
10. Businesses need to focus on keeping river systems clean for the good of all.
11. It is more important to protect water for farmers than for fish.
12. Environmental regulations do more harm than good.
13. The government should make sure public water supplies come first in a crisis.

14. Cities should raise taxes to protect their water safety.
15. Cities should invest in better infrastructure to keep all homes safe during floods.
16. The impacts of climate change on access to water for all people concerns me.
17. I should be able to control my water use to keep me safe during a drought.
18. Government money should not be spent on flood aid.
19. We should save money by making current water systems better instead of building new ones.
20. It is worth it for industries to pollute water sometimes if they provide good jobs.
21. All people, no matter their income, should have equal access to drinking water.
22. We should make sure water is affordable for everyone.
23. Private owners are better at regulating fishing than the government.
24. I shouldn't have to pay the government for my water.

### Appendix III - OWS Project Q Method Pilot Information Sheet

#### **Oregon Water Stories Project: Water Values Q-Sort** Participant Information Sheet, June 2020

Thank you for your interest in taking part in the PSU Oregon Water Stories research project, the Water Values Q-Sort! We appreciate your time so much, especially during these uncertain and extra stressful times. Below you will find more information about who we are, what we're doing and why, and how we hope you can be involved in this research.

**Who:** The Oregon Water Stories (OWS) Project at Portland State University is an interdisciplinary team of undergraduate students, graduate students, and faculty researching Oregonians' attitudes and beliefs around water. We want to know what peoples' water values and priorities are around Oregon. In collaboration with 4 community organizations around the state, we are asking groups of people who are impacted by water issues but who may have limited access to state decision-making to participate in our research project. More info on the background and scope of the whole OWS Project at our website:

*<https://www.oregonwaterstories.com/>*

**What:** We aim to have 15 participants from your community complete the study online. Participants will receive a link that takes them to a consent form. After agreeing to the consent form, they will be asked a few sociodemographic questions. Then, they will watch a 6-minute video about how to use the survey tool we designed, called a Q-sort. The Q-sort consists of ranking 24 statements about water by agree/disagree. At the end, they will type in their thoughts about their selections. We estimate that it will take 20-45 minutes to complete. Participants will be compensated \$50 via an emailed gift card for their time.

How: We are using the Q methodology in our research, which allows us to collect quantitative data on peoples’ attitudes and beliefs about a topic through the survey activity called a Q-sort. During the Q-sort, participants sort and rank a set of statements about water in Oregon, according to their perspectives. We are pairing the quantitative data from this activity with qualitative data from the written follow up responses in order to get a deeper insight into participants’ water perspectives. We will take every possible measure to ensure that your information is private. Only the research team will have access to email addresses so we can send the Q-sort and gift certificate.

Why: Participants will be helping elevate their and their community’s water priorities, and will be bringing their voices to the state policy table. One of the goals of our research is to help influence decision-makers to create more equitable water policy that incorporates the broad range of Oregonians’ needs. We are particularly focused on impacting Oregon’s 100 Year Water Vision policy, which is currently being developed. Another primary goal of our research is to create a deliverable that is useful to you and your community from our results.

Deliverables: This research will allow us to write a scientific article as well as a report for Oregon water policy-makers in charge of the state’s 100 Year Water Vision. After the data has been collected, the community organizations and the participants will receive a report of the findings from their community. We will send all of the reports to the Governor to encourage her to design water infrastructure policy that is informed by communities across Oregon. We will also draft a blog post, report, newspaper article, or make a short video if your community’s organization would like to share the results more broadly.

Thank you for your time! Please direct questions or responses to Clare McClellan: [clmcc2@pdx.edu](mailto:clmcc2@pdx.edu).

## Appendix IV - OWS Project Q Method Pilot: Preliminary Data Report Example

### Harney Basin Preliminary Data Report Oregon Water Stories Project: Q-Sort 12/14/20

#### Sociodemographics

##### Age

The sample primarily included participants over the age of 50 (87.5%), with 10 people, or a majority of participants, between the ages of 60-79. As seen in Table 1, almost all of the age ranges were represented in the age distribution of participants, except for the 18-29 years old range.

Age	18-29	30-39	40-49	50-59	60-69	70-79	80 and older
Frequency	0	1	1	3	6	4	1
Percentage	0.00%	6.25%	6.25%	18.75%	37.50%	25.00%	6.25%

**Table 1:** Sociodemographic statistics on the ages of participants.



Language

As seen in Table 2, all survey participants input English when asked about the primary language(s) they use, with no participants reporting using additional primary languages.

<b>Language</b>	<b>English</b>
<b>Frequency</b>	16
<b>Percentage</b>	100.00%

**Table 2:** Sociodemographic statistics on the primary language(s) used by participants.

Occupation/Job

Participants varied in their answers to the question that asked “What is/are your occupation(s)/job(s), if any?” While each participant entered a unique response, three broad patterns that appeared among quite a few participants were jobs related to ranching, wildlife, and being retired, as seen in Table 3. Those who said they were involved in ranching varied in their self-descriptions; “ranch manager,” “rancher,” “cattle rancher,” and “retired rancher” were some of the ways they reported their occupation. Five people mentioned that they were retired, with 3 participants specifying what field they were retired from. Three participants said they were involved in wildlife biology or conservation, and one specifically mentioned their affiliation with the Malheur National Wildlife Refuge. Four participants reported more than one occupation, which explains why the numbers in Table 3 add up to more than 100% of participants. Four participants’ occupations were grouped into the “Other” category, along with 3 responses from people with multiple jobs (these included real estate agent, librarian, and IT tech, for example).

<b>Occupation</b>	<b>Ranching</b>	<b>Retired</b>	<b>Wildlife</b>	<b>Other</b>
<b>Frequency</b>	6	5	3	7
<b>Percentage</b>	37.50%	31.25%	18.75%	43.75%

**Table 3:** General categories of participants’ self-entered occupations, with multiple participants reporting more than one occupation which were grouped into more than one category.

Highest grade level

As seen in Table 4, when participants were asked to choose their highest grade level, “Vocational school, some college, or associate degree” was the most common response, with 7 participants or about 44% selecting that choice. The remaining 9 participants reported their highest grade level as either “Bachelor’s degree” (25%) or “Advanced college degree” (~31%), with an almost equal split between these two choices. No participants reported a highest grade level lower than some college or vocational school.

<b>Highest Grade Level</b>	<b>No schooling completed</b>	<b>Grades 1-12, no diploma received</b>	<b>High school diploma, GED, or</b>	<b>Vocational school, some college, or</b>	<b>Bachelor's Degree</b>	<b>Advanced College Degree</b>	<b>Prefer not to say</b>
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			<b>alternative credential</b>	<b>associate degree</b>			
<b>Frequency</b>	0	0	0	7	4	5	0
<b>Percentage</b>	0.00%	0.00%	0.00%	43.75%	25.00%	31.25%	0.00%

**Table 4:** Sociodemographic statistics on the highest grade level achieved by participants.

Hispanic/Latinx/Spanish origin

One participant answered yes to the question “Are you of Hispanic, Latinx, or Spanish origin?” This participant did not specify further, and the other 15 participants, or about 94%, answered no.

<b>Hispanic/Latinx/Spanish origin</b>	<b>Yes</b>	<b>No</b>
<b>Frequency</b>	1	15
<b>Percentage</b>	6.25%	93.75%

**Table 5:** Sociodemographic statistics on the Hispanic/Latinx/Spanish origin of participants.

Race

Our survey asked participants to choose all the race(s) they identified with, which explains why the totals in Table 6 add up to more than 100%. The majority of participants, 14 people, chose “White” as their only race, and two participants chose “American Indian/Alaska Native,” with one of these two also choosing “White.” The two tribal affiliations specified were “Oneida” and “Round Valley Indian Tribes.” No participants identified with “Asian,” “Black or African American,” “Native Hawaiian or Pacific Islander,” or “South Asian.”

<b>Race(s) identified with</b>	<b>American Indian/Alaska Native</b>	<b>Asian</b>	<b>Black or African American</b>	<b>Native Hawaiian or Pacific Islander</b>	<b>South Asian</b>	<b>White</b>	<b>Prefer not to say</b>	<b>Other</b>
<b>Frequency</b>	2	0	0	0	0	15	0	0
<b>Percentage</b>	12.50%	0.00%	0.00%	0.00%	0.00%	93.75%	0.00%	0.00%

**Table 6:** Sociodemographic statistics on the race(s) participants identified with.

Gender

When asked to select their gender from the survey options, 10 people or about 62% of participants identified as “Female.” A little less than 40%, or 6 participants, identified as “Male.”

<b>Gender</b>	<b>Female</b>	<b>Male</b>	<b>Non-binary, Third gender, Two-spirit</b>	<b>Prefer not to say</b>

<b>Frequency</b>	10	6	0	0
<b>Percentage</b>	62.50%	37.50%	0.00%	0.00%

**Table 7:** Sociodemographic statistics on the gender participants identified with.

Water Quality and Needs

To get a better understanding of participants’ drinking water quality and water needs situations, participants were asked to rate how strongly they agreed or disagreed with the statements in Tables 8 and 9. Six participants, or 37.5%, either strongly or somewhat disagreed that the quality of their drinking water overall is good. A slight majority of 8 people somewhat or strongly agreed that they had good quality drinking water. One person felt neutral, and one person marked that they were not sure how to respond to this statement. This distribution indicates that there is a fairly significant concern about water quality in the area, although it also appears that many residents feel confident about their drinking

Table 9 shows a smaller distribution of responses across the categories of agreement with the statement about the state government doing a good job meeting participants’ water needs. Only one person marked an agreement response, 5 participants felt neutral, and a majority (10 people) disagreed somewhat or strongly with this statement. This concentration of more negative responses could indicate an area of tension in the watershed basin, and it is clear that a majority of water users in this survey feel at least somewhat dissatisfied with the state government’s ability to meet their water needs.

Overall, the quality of my drinking water is good.						
	<b>Strongly disagree</b>	<b>Somewhat disagree</b>	<b>Neither agree nor disagree</b>	<b>Somewhat agree</b>	<b>Strongly agree</b>	<b>I'm not sure</b>
<b>Frequency</b>	5	1	1	2	6	1
<b>Percentage</b>	31.25%	6.25%	6.25%	12.50%	37.50%	6.25%

**Table 8:** Sociodemographic statistics on how strongly participants agreed or disagreed with the statement “Overall, the quality of my drinking water is good.”

Overall, the state government is doing a good job meeting my water needs.						
	<b>Strongly disagree</b>	<b>Somewhat disagree</b>	<b>Neither agree nor disagree</b>	<b>Somewhat agree</b>	<b>Strongly agree</b>	<b>I'm not sure</b>
<b>Frequency</b>	4	6	5	1	0	0
<b>Percentage</b>	25.00%	37.50%	31.25%	6.25%	0.00%	0.00%

**Table 9:** Sociodemographic statistics on how strongly participants agreed or disagreed with the statement “Overall, the state government is doing a good job meeting my water needs.”

Water Availability and Uses

To gain a better understanding of the kinds of water situations participants were coming from, they were asked to choose all of the options from Table 10 that applied to their situation. The most common option, selected by all but one participant, was “I have my own well that I use regularly.” Thirteen participants, or a little over 80%, also marked that they have running water

in their homes with few or no disruptions. Nine participants, or about 56%, also indicated that they have water rights for irrigation. Three participants, or about 19%, also reported mostly using bottled water.

Check all that apply to your situation							
	I have running water in my home with few or no disruptions to my service.	I have running water in my home but I have frequent disruptions to my service (e.g., shutoffs, boil orders, etc.).	I do not have regular access to running water.	I have water rights for irrigation.	I have my own well that I use regularly.	I mostly use bottled water.	None of the above applies to me.
<b>Frequency</b>	13	0	0	9	15	3	0
<b>Percentage</b>	81.25%	0.00%	0.00%	56.25%	93.75%	18.75%	0.00%

**Table 10:** Sociodemographic statistics on the availability of water to participants and their uses of water. Participants could choose as many options as applied to them.

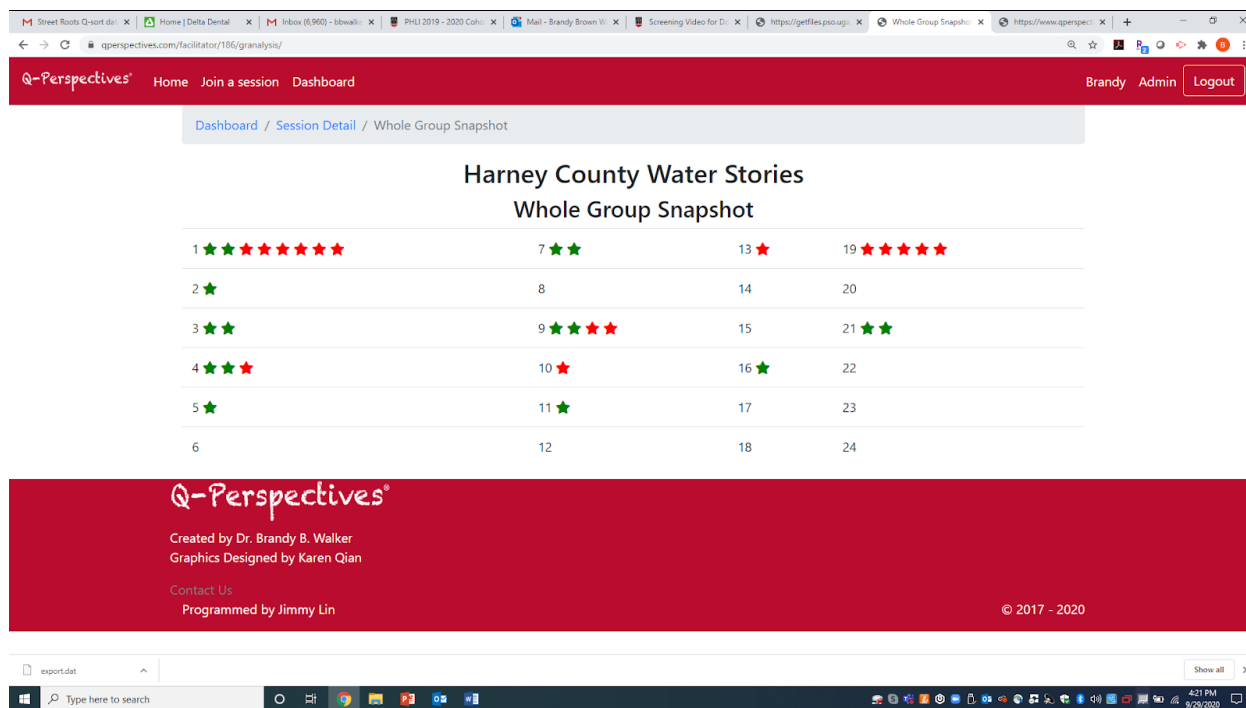
**Q-Sort Statements: Frequencies and Percentages**

Within the responses to the Q-sort by the 16 participants from the Harney watershed basin, a few patterns emerge around the statements participants placed in the “most agree” and “most disagree” slots on the Q-sort grid. The most pronounced pattern, as seen in Figure 1, is that almost all participants placed either statement 1 or statement 19 in the “most disagree” slot on the grid (refer to Appendix I for the full text of statements). Statement 19 had to do with industries polluting water but creating jobs, and 5 participants put this statement into the “most disagree” slot. Statement 1 is about the connection between religious or spiritual beliefs and water health, and 6 participants or 37.5% (see Table 11) placed this statement into the “most disagree” slot. Interestingly, 2 people put statement 1 in the “most agree” slot, so the content of this statement could potentially be a point of divergence within the community surveyed. Statement 9, that environmental regulations do more harm than good, presents a similar situation of opposite opinions. Two participants put this statement in the “most disagree” slot, and two put it in the “most agree” slot. This equal split between the two extremes of agreement indicates that the issue of environmental regulations is an important one in this area.

Compared to the most disagreed-with statements, there was more variation in the statements that participants most agreed with. The largest number of participants who most agreed with the same statement was only 2. Statements 1, 3, 4, 7, 9, and 21 each were placed in the “most agree” slot by two participants, or 12.5% or participants. Four participants most agreed with unique statements. This wide dispersal of the statements participants most agreed with indicates that people felt strongly about a variety of water issues, and tended to not converge around any one specific issue. See Appendix 1 for the full text of the statements.

In general, these results allow us to theorize that this group of people from the Harney watershed basin cares about issues related to environmental regulations, the connection between

religious/spiritual beliefs and water health, and how the government should be involved in regulating and distributing water.



**Figure 1:** The Q-statements that each participant most agreed with (green stars) and most disagreed with (red stars). Refer to Appendix I for full text of Q-statements.

Statement #	Frequency		Percentage	
	Most disagree	Most agree	Most disagree	Most agree
1	6	2	37.50%	12.50%
2	0	1	0.00%	6.25%
3	0	2	0.00%	12.50%
4	1	2	6.25%	12.50%
5	0	1	0.00%	6.25%
6	0	0	0.00%	0.00%
7	0	2	0.00%	12.50%
8	0	0	0.00%	0.00%
9	2	2	12.50%	12.50%
10	1	0	6.25%	0.00%

11	0	1	0.00%	<b>6.25%</b>
12	0	0	0.00%	0.00%
13	1	0	<b>6.25%</b>	0.00%
14	0	0	0.00%	0.00%
15	0	0	0.00%	0.00%
16	0	1	0.00%	<b>6.25%</b>
17	0	0	0.00%	0.00%
18	0	0	0.00%	0.00%
19	5	0	<b>31.25%</b>	0.00%
20	0	0	0.00%	0.00%
21	0	2	0.00%	<b>12.50%</b>
22	0	0	0.00%	0.00%
23	0	0	0.00%	0.00%
24	0	0	0.00%	0.00%

**Table 11:** Frequencies and percentages of statements placed in the “Most agree” and “Most disagree” slots by participants in the Q-sort.

### **Within-Group Participant Q-Sort Clusters**

The Q-sort analysis tool (Q-Perspectives) found five significant factors, or clusters of participants, based on how participants sorted statements. The first cluster, Group 1, included 7 of the 16 participants, and is distinguished by the group’s tendencies to agree more with statement 3, that the government should prioritize public water supplies during crises, and to most disagree with statement 9, about environmental regulations doing more harm than good. Compared to other groups, Group 1 is set apart by their overall low ranking of statement 10, which is about protecting water for farmers over fish, and by their neutral-to-slightly positive ranking of statement 1, about the connection between religious/spiritual beliefs and water health. One person in Group 1 overall cared about the same statements as other group members, but represents a nearly opposite point of view. So, this participant would be likely to disagree that the government should prioritize public water supplies during crises and would be likely to agree that environmental regulations do more harm than good. While participants in Group 1 did not create identical Q-sorts, they clustered together significantly by overall agreeing with the statement about prioritizing public water supplies, and by overall disagreeing with statements that have more negative orientations towards environmental regulation.

The second cluster, Group 2, included 3 of the 16 participants, and is distinguished by group members’ tendencies to agree more with statement 21, that hydroelectric dams are a good use of rivers, and to disagree most with statement 13, about tribal nations having sovereign rights to protect river health. This group’s perspective is set apart by its relatively strong disagreement with statement 7, about all people regardless of income being able to equally access drinking

water, a statement which the other groups felt more positively about. Overall, this group's perspective can be characterized by their support for hydroelectric dams and their concern about the breadth of rights that should be afforded to different groups in terms of water health.

Group 3 included 2 of the 16 participants, and is set apart by their positive rankings of statement 7 (about all people having equal access to drinking water regardless of income), and by their negative rankings of statement 1 (about the religious/spiritual and water health connection). In comparison to the other groups, participants in Group 3 tended to agree more with statement 21 about dams being a good use of rivers. In general, Group 3 members can be characterized by sharing concerns about equal access to drinking water and a positive orientation towards hydroelectricity.

Group 4 was also made up of 2 out of the 16 participants, who can be distinguished by their tendency to most agree with statement 5, that landowners can keep water on their land healthy, and to most disagree with statement 19, about industry polluting water for good jobs. Members of this group were more likely to agree with statement 11 (private owners are better at regulating fishing than the government) than members of other groups, and felt more neutrally about statement 7 (equal access to drinking water regardless of income) than people in other groups, who disagreed or agreed with it more strongly. Overall, this group tended to agree with statements about private citizens (landowners) being better at taking care of natural resources (water, fish) than the government, and tended to disagree with the statement about all people having equal access to water and about industry being allowed to pollute for good jobs.

The final cluster, Group 5, included 2 out of 16 participants. This group in general most agreed with statement 12, about reliable clean water being worth paying for, and tended to most disagree with statement 1, about religious/spiritual beliefs and water health. There were no other significant distinguishing features of this group when compared to other groups, although they did tend to agree with statement 7 about equal access to drinking water and to disagree that private owners are better at regulating fishing than the government.