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Elevating community voices through inclusive science communication: a case study of the We are Water program in the Southwestern United States

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Science communication plays a pivotal role in cultural engagement and life-long science learning. However, historically marginalized communities remain undervalued in these efforts due to practices that prioritize specific individuals, such as those who are affluent, college-educated, able-bodied, and already scientifically engaged. Science communicators can avoid these practices by acknowledging the intersecting historical and cultural dimensions surrounding science beyond those of the majority culture and practicing inclusive science communication efforts. Here, we define and describe the importance of inclusive science communication and outline how we use an asset-based community engagement framework in a place-based education program's communication practices with rural communities in the Southwestern United States. We describe how we designed our communication spaces, found our voice, and effectively communicate with non-English speaking and bilingual communities. We provide examples from the We are Water program, demonstrating how we utilize inclusive science communication practices to engage more widely with diverse communities and create space for community voices to be heard and shared. We conclude that the use of inclusive science communication strategies and an asset-based community engagement framework has allowed the We are Water program to connect with rural communities while communicating in a way that elevates historically marginalized voices, creates space for communities to share their own experiences through memories and stories, and honors diverse perspectives and ways of knowing.

KEYWORDS

science communication, asset-based community engagement, cultural responsiveness, inclusive science communication, place-based education, equity, inclusion, public engagement

1 Introduction

Inclusive science communication is grounded in asset-based community engagement, a framework built on the recognition that all communities are asset-rich, in contrast with traditional forms of needs-based community engagement that uphold structures of hierarchy and power (Garoutte and McCarthy-Gilmore, 2014). Findings show that asset-based community engagement centered around the gifts, passions, and strengths of communities, rather than deficiencies, resulted in positive community outcomes (Hamerlinck et al., 2014) and expanded STEAM ecosystems. Adding important experiences and diverse

perspectives to knowledge production leads to a more comprehensive understanding of the community and the topic (University of Memphis, n.d.). Inclusive science communication (1) intentionally defines the audience while considering how historically marginalized individuals and communities will be represented and supported in the process of communication, (2) recognizes historical oppressions, discrimination, and inequities within audiences and addresses them through equal partnerships that center the voices, knowledge, and experiences of underserved individuals and communities, and (3) continuously reflects on communicators' explicit and implicit biases and examines how multiple identities interact and affect audiences engagement with science, technology, engineering, art, and math (STEAM) fields (Canfield and Menezes, 2020). Inclusive science communication can create space for voices historically excluded by science communicators and Western science to share their experiences and allows a move beyond unidirectional conversation by recognizing the need for "being with, rather than doing for" (Dostilio et al., 2012). Thus, ensuring co-created benefit for communities that honors multiple ways of knowing from individuals with different educational backgrounds and lived experiences (Canfield and Menezes, 2020). Inclusive science communication that honors multiple ways of knowing and includes Indigenous and traditional ecological knowledge (ITEK) in science learning allows science communicators to explore natural phenomena through observations, oral histories, and storytelling that reflect thousands of years of collective knowledge and experiences (Mazzocchi, 2006; Rongstad Strong et al., 2023).

1.1 The We are Water program

We are Water is a place-based education program, grounded in asset-based community engagement practices, with the goal of creating a place for people who live in the Four Corners Region of the Southwestern United States to connect about water. Water is critical and scarce in the region, and it is a topic that connects communities through shared place, experiences, and unique stories. Born from a collaboration between local library staff, community organizations, scientists, Indigenous science educators, learning researchers, informal educators, and teachers, We are Water brings a traveling exhibition and interactive education programs about regional and local water topics to libraries in rural, Indigenous, and Latinx communities. The We are Water exhibit centers community voices, with opportunities for visitors to share and listen to stories about what water means to people living in the region and explore diverse experiences and perspectives of those who live where water is scarce. The project design achieves a key trait of inclusive science communication, which considers community goals, not just the science communicator's definition of goals (Canfield and Menezes, 2020) by focusing on water science topics relevant to communities in the Southwestern U.S. Input collected at the beginning of the program from diverse community members serve as the foundation of the We are Water exhibition and are incorporated into the design and implementation of community-specific programming. Community members were asked (1) What water topics are of concern in your region? (2) Who would you be interested in

hearing water perspectives from? (3) What does water mean to you and your community? and (4) What would you want people to know about water in your community? The four main themes that emerged from community interviews are: (1) Water and Life, (2) Water Use, Water Rights, (3) Water in the Landscape, and (4) Water and Our Community. Within these themes, science topics such as wildfire, climate change, agriculture, public health, mining and industrial use, plants, landforms, and weather events are all incorporated into exhibit displays and featured in water stories from community members.

At each host location, We are Water partners with trusted community members to record new stories from diverse members of the community about topics that are locally relevant, adding new perspectives and stories about water to the exhibition and featuring stories from scientists, water managers, and community members. These stories are shared with the community through the exhibit's story wall and online through the We are Water website and social media. The exhibit also provides avenues for patrons to share stories through artwork, reflection prompts or contributions to different water story offerings (e.g., storytelling workshop, photo contest). Community stories include locally relevant water topics such as the impacts of mining in Navajo Nation, living and working with water in farming and ranching communities, fishing and recreation, water access and rights disputes, as well as community water memories.

In addition to sharing stories and experiences from local communities, We are Water facilitates conversations about the complexities of water with local voices at the forefront of events hosted at our rural partner libraries. Through our programming and communication, other local cultural organizations, citizen alliances, heritage societies, and science experts connect with communities by offering Indigenous water storytelling, mini film festivals, flyfishing training, art offerings, and speaker panels. We are Water recognizes the different knowledge and experiences communities bring to our collaboration and practices reciprocity through community co-creation and educational research activities that include meaning maps, talk story interviews, and transformative experience and interest in ways of knowing surveys. Feedback from community members and library staff confirms that We are Water successfully offers opportunities to highlight local knowledge, community voices, and regional experts around water issues.

We are Water translates the exhibit component and storytelling focus into communication products through three primary channels of online communication: social media, community newsletters, and the program website. Through these avenues, the program aims to broaden the reach of the exhibit content and stories, facilitate connections between community members through their common and unique experiences with water in the region, provide additional pathways to share community memories and stories about water, and start conversations about the importance of water. Communication strategies we use in this context are:

1. We are Water shares two original posts a week in both English and Spanish on our social media accounts (Facebook, Instagram, and Twitter) with eye-catching imagery. Communication through our social media channels is

- focused on sharing (1) We are Water's key messages about the historical and cultural significance of water to communities in the region, (2) community water stories, (3) water focused activities and resources, (4) community events, and (5) the learning experiences the program creates.
2. The bilingual We are Water community newsletter is sent quarterly and includes (1) an introduction with an invitation to share a water story with us, (2) updates on the We are Water Traveling Exhibit in the form of a short overview of the most recent opening day celebration at a rural library in the Southwestern U.S., (3) featured water stories from community members or community partner highlights, (4) upcoming events from our program or partner libraries, and (5) a final call to action to share perspectives on water with us.
 3. The We are Water program website shares (1) information about the program and our partners, (2) community stories about water, (3) water focused activities and resources, (4) community events about water in the Southwestern U.S., and (5) updates about the We are Water Traveling Exhibit. We share water stories in both Spanish and English in a video format that can be experienced visually or audibly. Visitors to our website can also experience the We are Water Traveling Exhibit virtually in written or recorded formats in Navajo, Spanish, or English.

In this paper, we assert the importance of inclusive science communication that elevates diverse community voices and experiences. We present the We are Water program's communication strategies that broaden community engagement through the program's exhibit and storytelling and outline how we use an asset-based approach to community engagement, with a specific focus on communication with rural, Indigenous, and Latinx communities in the Southwestern U.S. We describe inclusive science communication in practice and provide examples of how the We are Water program elevates diverse perspectives and creates space for community voices to be heard and shared.

2 The importance of inclusive science communication

Science communication plays a pivotal role in cultural engagement and life-long science learning (Banks et al., 2007) and interest in the field has grown (Chilvers, 2013; Dudo and Besley, 2016). However, historically marginalized individuals and communities remain undervalued in science communication efforts (Dawson, 2014a; Feinstein and Meshoulam, 2014; Streicher et al., 2014). Research has pointed to the tendency of science communicators' prioritizing specific (e.g., affluent, college-educated, able-bodied) individuals with many examples of devaluation, erasure, and co-opted perspective of underserved peoples and communities in the media (Ash and Lombana, 2013; Dawson, 2014b; Medin and Bang, 2014; Salinas, 2014; Judkis, 2017; Taylor, 2018). Inclusive science communication that is viewed as a process of cultural exchange and acknowledges the history and diverse perspectives surrounding science beyond that of the majority culture, such as traditional ecological knowledge from Indigenous communities, produces engagement with more

understanding, mutualism, and equity (Bevan et al., 2020; Landis et al., 2020).

Inclusive science communication redefines what counts as "science" and who counts as a "scientist", recognizing thus the different knowledge and experiences communities bring to a conversation or collaboration. This inclusion supports ways of knowing and identities that have been historically excluded from STEAM (Canfield and Menezes, 2020). Making visible connections between science and society that serve broad segments of the public, especially groups that are underserved by social position (e.g., race, class, gender, etc.), can provide an essential point of access for these communities to engage with science (Polk and Diver, 2020). Fostering the connection between science communicators and diverse communities through inclusive science communication and asset-based community engagement benefits all people. By honoring and elevating additional experiences and perspectives into knowledge production, inclusive and community-based approaches increase the social relevance of scientific findings, encourage a more nuanced understanding of scientific concepts, and lead to greater trust in knowledge production and a more informed society (Polk and Diver, 2020).

3 Inclusive science communication in practice

The We are Water program utilizes an asset-based community engagement framework and incorporates best practices of inclusive science communication into the development and implementation of the following communication strategies.

3.1 Designing our communication spaces

Science communication efforts are often designed for individuals already interested in and comfortable with science due to engagement conducted on the terms, and in the language, the majority culture finds impactful, resulting in further deepening disparities in access to and interaction with scientific engagement opportunities (Feinstein and Meshoulam, 2014; Bevan et al., 2020). Alternatively, inclusive science communication efforts are designed to center communities to best serve their interests, needs, and values. This involves intentionally considering how science is defined in the communication spaces built and how historically marginalized communities are, and have been, represented and supported in engagement activities and communication efforts (Canfield and Menezes, 2020).

In order to avoid communicating with only those who are already scientifically engaged, the We are Water team intentionally defined and divided the program's communication spaces into three distinct categories that promote collaboration and co-creation. Due to the reciprocal nature of our work, we avoid the term audience, instead using communication space to describe the community members we seek to engage.

1. We are Water's primary communication space is made up of community members, defined as anyone who lives in rural, Indigenous, and Latinx communities in the Southwestern

U.S., including youth, parents, teachers, local officials, and local organizations. When writing for this space, we focus on sharing community stories about water, starting conversations about water within the communities, inviting community members to events, and sharing water-focused activities available at community libraries and on our website.

2. We are Water’s secondary communication space is made up of library staff from our partner libraries and libraries across the region; they are important partners, local champions, and facilitators of the program’s work. Communication with library staff focuses on opportunities for connection with STEAM networks, water-focused STEAM activities that can be used in libraries and communities, and invited participation in hosting educational services and events for their communities.
3. We are Water’s tertiary communication space includes educators, scientists, researchers, and leaders broadly interested in water topics in the Southwestern U.S. When communicating within this space, we focus on storylines that expand STEAM learning ecosystems, share inclusive community engagement ideas, and highlight relationships with rural communities and libraries while amplifying diverse community voices and honoring multiple ways of knowing.

3.2 Finding our voice

In We are Water’s work, we recognize that the culture and language of science is embedded in traditional Western worldviews (Herbers, 2007). In our communication, we avoid jargon from science, education research, and university settings that could potentially lead to a voice that is didactic, academic, detached, political, Western, colonial, or alienating. Our activities and programs serve youth, families, and multigenerational communities and community voices serve as the foundation for the program’s key messages and science communication goals. We want all content to be family-friendly and easy to read for youth and adults alike and write in a conversational tone at a 6th-grade reading level.

To find an inclusive and accessible voice, we write content with a person in mind—it could be a neighbor, caregiver, or friend, with the goal of science communication that is welcoming, fun, family-friendly, driven by curiosity, and inclusive of cultures and ways of knowing. Feedback from personal communication with rural library staff in the Southwestern U.S. informed the program team that We are Water successfully engages intergenerational groups, “has appeal to lots of different groups”, and provided “the best simplified education they have had about the resource of something so special” (Aztec New Mexico Library Staff, 2022).

When writing content and choosing images, we consciously and continuously reflect on how our communication choices might be perceived by individuals and communities. When writing for each of our communication spaces, we reference Kraehe et al. (2016)’s “Six Lenses of Educational Equity” framework and ask ourselves questions such as: are we recognizing diversity in our images and stories? How is our practice affecting

underserved communities? What effects will this story have on a subject or community? (Kraehe et al., 2016; University of Washington, n.d.). We review all communication products for words, phrases, and common sayings that are insensitive, hurtful, or exclusionary to people and communities when used in communication. We use culturally inclusive language and avoid idioms, expressions, and humor that have histories based in bigotry, colonialism, and sexism. Table 1 shows examples from the guide that we use for internal consistency and review.

3.3 Communicating with non-English speaking and bilingual communities

English is the international language of science (Gordin, 2015) and facilitates knowledge transfer across national and cultural boundaries but also acts as a gatekeeper to scientific communication, creating barriers for non-fluent audiences (Tardy, 2004; Márquez and Porras, 2020). Communicating in the primary language of the target audience ensures that science communication is inclusive of the cultures and perspectives of non-English speaking communities, yields greater engagement with STEAM concepts, leads to stronger cultural connections to concepts in the native culture, and reaches more diverse audiences (Gibbs, 1995; Canagarajah, 1996, 2002; Kachru, 1997; Manzini, 2000; Márquez and Porras, 2020). Inclusive science communication intentionally recognizes and accounts for community’s history of inequity and participants’ lived experiences, prioritizes cultural relevance, and emphasizes multi-directional, dialogue-based models of engagement (Canfield and Menezes, 2020).

We are Water incorporates Navajo, Spanish, and English language into our science communication products to better engage rural communities in the Southwestern U.S., invite diverse participation in STEAM, and promote deeper learning about water in the region. We partner with local experts, educators, scientists, and communication specialists to share

TABLE 1 Words or phrases to use or avoid in inclusive science communication.

Use these words or phrases	Avoid these words or phrases
Let’s meet/We’re meeting	Let’s have a pow wow/We’re having a pow wow
Kindred spirit	Spirit animal
Interested persons, interested parties, patron (for libraries)	Stakeholder
Dedicated	War path
Hoping for rain	Rain dance
English as a primary language/English as a secondary language	Native speaker/non-native speaker
Hierarchy	Totem Pole

stories and selected content in Navajo on the program website and provide Spanish language communication products through our social media channels and community newsletters. Many more people understand spoken Navajo than are able to read the language; therefore, we provide Navajo and Spanish translations in written and audible formats to ensure that all community members are able to engage regardless of location, primary language, or ability to read or listen to their primary language.

Feedback from personal communication with staff in We are Water's partner libraries reported that the program used multiple languages of relevance to community members with one library staff member stating "you don't see Diné very often in print. I thought that was a really cool thing to be able to see. It's an interesting one because Indigenous languages traditionally aren't written down. But it was really nice to actually see that and have that written out. And there were a number of times we had questions around that" (Montrose Colorado Library Staff, 2023).

3.4 Culturally responsive engagement

The human social context is shaped by intersecting cultural dimensions, such as race, class, gender, ability, religion, and nationality (Neeley et al., 2020), and the acknowledgment that people interpret the world through these frames strengthens science communication outcomes (Carlisle, 2020). The We are Water team recognizes cultural intersectionality by honoring multiple ways of knowing, elevating and valuing diverse perspectives, and creating a space for communities to share personal experiences and stories about water through science communication. Water distribution in the Four Corners Region follows an order defined by prior appropriation. Under this system, people who claimed water rights earlier get to access their water before people with rights that were claimed more recently. Laws that determine who gets water, and how much, often ignore more senior Tribal rights held by Indigenous communities causing ongoing conflict about water use in the region. In utilitarian Western views, water is treated as a commodity that can be traded and owned, while in Indigenous worldviews, water is a sacred and integral part of life. To honor multiple ways of knowing, we elevate all perspectives equally but avoid framing water as a resource, in recognition of cultural differences. We share stories and experiences from Indigenous and Latinx individuals in the Southwestern U.S. whose communities and traditions have shaped their perspectives on water and focus on the historical, local, and cultural significance of water that connects communities in the Southwestern U.S. through shared place and unique stories. These stories highlight how life, culture, and water intersect with climate change and water usage in the Southwestern U.S., how family and traditions shape our views on water, and how we can respect and honor water in our everyday lives. Feedback from personal communication with community members and rural library staff reported that the program focuses on critical and important issues in the community, creates opportunities for dialogue about water issues, and is "bringing awareness to the community on how important water is" (Navajo Nation Library Staff, 2022).

Section three outlines the strategies We are Water uses to utilize an asset-based community engagement framework and honor our commitment to inclusive science communication practices. We describe how to intentionally design communication spaces for communities who have been historically excluded from scientific engagement and best practices for communicating within these spaces using a voice that is welcoming, accessible to multigenerational communities, and inclusive of cultures and ways of knowing. We assert the importance of conscious and continuous reflection of communication choices and give examples of our reflection strategies, including reviewing communication products for exclusionary words or phrases and referencing Kraehe et al. (2016)'s educational equity framework. We explain how honoring multiple ways of knowing elevates diverse perspectives and creates space for communities to share their own unique experiences with water and how we incorporate communication in the primary languages of communities in the Southwestern U.S. to promote deeper learning and more inclusive science communication. The above strategies for inclusive science communication were combined to create a communication guide to be referenced and followed by the We are Water program team. The guide has been a helpful resource as the team grows and evolves with the program. We are able to share it with new members and partners as a guiding document for how We are Water approaches communication with diverse individuals and communities. There have been challenges related to making sure the large team considers and follows the guide, but we have found that having our inclusive communication strategies and commitments in one place has allowed us to more successfully ensure that We are Water's communication consistently aligns with the program's key messaging. Sharing the communication guide with our partners and collaborators within the larger team as a working document with room to grow and adapt has encouraged its prioritization. Table 2 provides an overview of the inclusive science communication strategies included in our communication guide and gives examples of how it is used by We are Water.

4 The We are Water photo contest: an example of two-way community engagement

In 2022, We are Water hosted a photo contest to showcase water and communities in the Southwestern U.S. and inspire two-way dialogue between community members in the region. Those who live in, are from, or have spent time in the Southwestern U.S. were invited to submit photographs of Southwestern U.S. communities and life, landscapes, wildlife, vegetation, and weather. When submitting a photo, participants were given the option to share a water reflection about a memory, experience, or perspective they associate with water in their community, or share how their submission exemplifies what water means to them. Facilitated by the We are Water team and our community partners, photographers were able to share how connections to water play an important role in shaping what people see in the environment and how people interact and learn from the natural world with other community members in the Southwestern U.S., enabling

TABLE 2 Inclusive science communication strategies and examples overview.

Strategies	We are Water Program Examples
Design Your Communication Spaces	
<p>Design your communication spaces, dividing them into segments as needed. Decide on the key messages you want to focus on for each communication space.</p> <p>Ask yourself these questions:</p> <ul style="list-style-type: none"> Who do we want to engage with? Which individuals and/or communities do we wish to serve with our science communication practices? Are they already scientifically engaged? What key messages and story lines do we want to share within each communication space? 	<p>Community Member Message Lines:</p> <ol style="list-style-type: none"> Share a story or join a conversation about water Come to our event about water Check out an activity about water at your library or on our website <p>Library Staff Message Lines:</p> <ol style="list-style-type: none"> Learn more about STEAM in libraries Use this STEAM resource in your library and/or community Participate in, or host, educational opportunities and events at your library <p>Interested Members in STEAM Message Lines:</p> <ol style="list-style-type: none"> See what rural libraries are doing for STEAM learning Hear diverse community voices and experiences with water that honor multiple ways of knowing
Find Your Voice	
<p>Reflect on potential biases within science communication and how your communication may be perceived by different communities. Decide what tone is appropriate for communicating within your communication space(s). Review words, phrases, and common sayings that may be insensitive, hurtful, or exclusionary (Table 1). Avoid language and terminology that could be potentially alienating to individuals or communities.</p> <p>Ask yourself these questions:</p> <ul style="list-style-type: none"> Are we recognizing diversity in our images and stories? How is our practice affecting underserved communities? What effects will this story have on a subject or community? 	<ol style="list-style-type: none"> Our activities and programs serve youth, families, and multigenerational communities; we want all content to be family friendly and easy to read for kids and adults alike and write in a conversational tone at a 6th grade reading level. To find an inclusive and accessible voice we write with a person in mind, it could be a neighbor, caregiver, or friend; with the goal of science communication that is welcoming, fun, family friendly, driven by curiosity, and inclusive of cultures and ways of knowing. We avoid jargon from science, education research, and university settings that could potentially lead to a voice that is didactic, academic, detached, political, western, colonial, or alienating. We review all of our communication products for words, phrases, and common sayings that might be insensitive, hurtful or exclusionary to individuals or communities when used in communication. We use culturally inclusive language and avoid idioms, expressions, and humor that have histories based in bigotry, colonialism and sexism.
Decide How to Communicate	

(Continued)

TABLE 2 (Continued)

Strategies	We are Water Program Examples
<p>Consider the individuals and communities you wish to communicate with and decide in what languages and formats your communication will be most inclusive of different cultures and ways of knowing.</p> <p>Ask yourself these questions:</p> <ul style="list-style-type: none"> What is the primary language of the communities we wish to serve? Is our chosen communication language creating barriers for entry to certain individuals or communities? Is our communication inclusive of the cultures and perspectives of non-English speaking communities? Is our communication encouraging engagement with STEAM concepts from communities historically underserved in STEAM? 	<ol style="list-style-type: none"> We are Water incorporates Navajo, Spanish and English language into our science communication products to better engage rural communities in the Southwestern U.S. Many more people understand spoken Navajo than are able to read the language, therefore we share stories and selected content on the program website in both written and audible formats. We partner with scientists, educators, and communication specialists to provide Spanish and English language communication through our social media channels and community newsletters.
Practice Culturally Responsive Communication	
<p>Acknowledge the intersecting cultural dimensions and frames communities might interpret your communication through. Honor multiple ways of knowing. Value and elevate diverse perspectives. Create space for individuals and communities to share personal experiences and stories.</p> <p>Ask yourself these questions:</p> <ul style="list-style-type: none"> Are we honoring multiple ways of knowing? How can we elevate diverse perspectives through our science communication practice? Are we creating space for individuals and communities to share personal experiences and stories? 	<ol style="list-style-type: none"> We highlight stories and experiences from Indigenous and Latinx individuals in the Southwestern U.S. whose communities and traditions have shaped their perspectives on water. We share opportunities for communities to come together to explore topics such as water security, climate change, the politics of water access, Indigenous knowledge, and the human impact of drought and flood. We invite community members to participate in two-way communication with We are Water by sharing their thoughts and experiences about water through written reflections, oral histories, and photographs.

communities to participate in STEAM learning in a way that honors multiple ways of knowing.

The We are Water 2022 Photo Contest received 28 submissions total—21 photographs and 7 water reflections. Photographs represented each of the suggested themes of life, landscapes, wildlife, vegetation, and weather, showcasing the diversity of water and communities in the Southwestern U.S. Ninety percent of submissions were from community members from within the Southwestern U.S. and 10 percent were from visitors to the region. We did not collect census level data from participants of the photo contest so we cannot speak to the precise demographics of those who submitted photos and reflections. To ensure our submissions were reflective of the community we intentionally worked closely with community partners and leaders, rural library staff, and Indigenous resilience and water research centers in the Four Corners to promote the contest to a diverse range of community

members. All submissions became part of the larger We are Water story and communication spaces. The team shared the submissions through both We are Water communication channels and local partners. Table 3 shares images and water reflections from the We are Water 2022 Photo Contest.

The photo contest was successful in engaging both previously engaged communities and new communities in the Southwestern U.S. Submissions to the photo contest from the areas surrounding Durango extended our engagement in La Plata County and included multiple ways of knowing about water in the area with submissions showcasing several bodies of water in the area including Vallecito Lake, Lemon Reservoir, Haviland Lake, and a waterfall on Church Camp Trail in Durango. Community members expressed their appreciation for water as it relates to recreational value and mentioned hiking in the area, as well as a father-daughter fishing trip in accompanying photo captions and reflections.

We received photo submissions from community members in Aztec, New Mexico, where the We are Water exhibition was located earlier in the year, and engaged with the neighboring communities of Bloomfield, Inca, and Cedar Hill. Submissions from this region showcased the blessing of irrigation in the region and highlighted community greenhouses, ranches, and farms.

We received photo contest submissions from two communities just north of the Ute Mountain Ute Reservation, Cortez and Dolores, showcasing different weather and climates in the region, including monsoonal rains, snow, and drought. Submissions from these areas built upon formerly established engagement in the area. We previously recorded and shared a water story from a Ute Mountain Ute community member who shared knowledge learned from their family on how water can be respected and honored as a part of everyday life. The inclusion of additional perspectives and experiences with water in these communities has allowed us to promote a deeper and more diverse understanding of water through visual and oral storytelling.

The We are Water photo contest engaged with entirely new communities in Utah, New Mexico, and Colorado, enabling us to facilitate conversations between familiar and new communities in the Southwestern U.S.

5 Discussion




Inclusive science communication grounded in asset-based community engagement (1) elevates voices from diverse community members, (2) creates space for communities to share their own valuable experiences about water, and (3) communicates in ways that honor diverse perspectives and ways of knowing. We are Water uses inclusive science communication strategies to consider how historically marginalized communities are participating in communication and supported throughout different communication spaces, find a voice that is both welcoming and accessible, communicate in languages that encourage engagement from diverse communities in STEAM, and recognize intersecting cultural dimensions to better address them through culturally responsive engagement. By communicating in an inclusive and accessible voice, in languages relevant to the communities we are engaging with, we better serve multigenerational, multilingual communities, thus yielding

greater engagement, stronger cultural connections, and deeper learning about water in the region. Relying on community input to determine the program's themes and storylines ensures that communication is locally relevant and including water stories from a diversity of community perspectives allows us to connect more closely with communities in the Southwestern U.S. Centering community voices has allowed us to shape We are Water based on the communities we seek to engage and continuously adding new perspectives on what water means to individuals in the region allows the program to evolve alongside community experiences with water. We are Water's communication practices engage individuals, families, and communities so they may connect with neighbors through their common and unique experiences with water in the region.

Adopting an asset-based mode of engagement expands We are Water's impact beyond the walls of libraries into local communities. Coupling an asset-based community engagement framework with inclusive science communication strategies has allowed us to engage communities in knowledge production and add a wider diversity of experiences and perspectives to the STEAM learning ecosystem in rural communities in the Southwestern U.S. By partnering with local experts, educators, scientists, and communication specialists: we are able to offer a variety of opportunities for community members to engage in ways they find meaningful, promoting greater participation in the STEAM learning environment and facilitating conversations outside of the rural libraries we partner with. Utilizing an asset-based community engagement framework focused on community strengths allows We are Water to elevate and honor diverse perspectives and ways of knowing in all areas of our science communication. Using this framework has created space for individuals to explore regionally important, water-focused topics with their communities, learn from local experts, hear community voices, share what water means to them, and imagine a more sustainable future with their communities.




Water has meaning for individuals, families, and communities that can be expressed by honoring multiple ways of knowing. Compared to traditional Western worldviews that approach science as an evidence-based argumentation, exploring natural phenomena through observations, oral histories, and storytelling includes additional experiences and perspectives into knowledge production and promotes deeper learning about water in the region. We are Water shares stories about what water means to people living in the Southwestern U.S. that honor Indigenous and traditional ecological knowledge and explore diverse experiences and perspectives of those who live where water is scarce, raising mutual awareness and inspiring dialogue. By including Indigenous and traditional knowledge in science communication we honor multiple ways of knowing outside of Western worldviews and engage in communication that is a process of cultural exchange. As such, We are Water's communication strategies elevate community voices whose traditions have shaped their perspectives on water, highlighting how water is a sacred and integral part of life in the Southwestern U.S. Inclusive science communication that adopts an asset-based community engagement framework and honors multiple ways of knowing allows us to share, learn from, and elevate memories and stories within the communities we seek to engage and beyond.

TABLE 3 We are Water photo contest example photographs and water reflections.

Photo submission	Water reflection
<p>Sunrise at cutter dam reservoir</p> 	<p>“I have the utmost respect for water and feel that our community is blessed to have the water resources we have in the Four Corners region. Water is Life, the process by which energy and resources are transformed. Cutter dam is part of that transformation. It is beautiful and quiet in its own little part of San Juan County. In all of it’s stillness it provides water to one of the largest irrigated farms in the United States. I am honored to enjoy this hidden lake that is like a gem in the middle of New Mexico’s high desert.” Caption: <i>The reservoir is located south of Blanco and east of Largo Canyon. Photo was taken July 3,2021 at sunrise. Great little getaway gem for fishing and hiking. The lake is part of the main stream of water for the Navajo Agricultural Products Industry.</i></p>
<p>Misty Wheel Lines</p> 	<p>“Though these irrigation wheel lines sleep during winter, they rely on lots of snowpack which brings them to life with the much needed water to our fields during the summer months.” Caption: <i>Sanpete County, Utah, December 29, 2021.</i></p>
<p>After the storm</p> 	<p>“In Montezuma County, Colorado, we were very fortunate to receive decent abundant monsoonal rains in 2022. Although severe drought conditions still exist in the Four Corners region, it has been beautiful to see the area flourish with the moisture we have received.” Caption: <i>This juvenile Cooper’s Hawk was photographed in my yard in Cortez, Colorado, August, 2022, after a downpour during our monsoon.</i></p>


(Continued)

TABLE 3 (Continued)

Photo submission	Water reflection
<p data-bbox="145 309 288 333">Spring on display</p> 	<p data-bbox="863 309 1294 378">“Because of the blessings of irrigation, my yard in central Aztec is rich with color and sheltering trees, a true urban forest filled with the songs of birds.”</p> <p data-bbox="863 380 1302 427">Caption: <i>Aztec yard filled with spring color, trees and royal wicker chairs.</i></p>
<p data-bbox="145 853 448 878">Ready to Set Sail on the Animas River</p> 	<p data-bbox="863 853 1310 900">“I have lived in the valleys of the Animas River for 35 years. The river and her valleys are my home and place.”</p> <p data-bbox="863 902 1318 972">Caption: <i>In the beautiful Animas River Valley, west of Aztec, is the home of a herd of cows. Feeling restless and bored with winter, Shirley imagines setting sail for greener pastures.</i></p>
<p data-bbox="145 1467 440 1491">Below the bluffs of the San Juan river</p> 	<p data-bbox="863 1467 1318 1536">“Our rivers, the San Juan, Animas and La Plata, nourish and makes our arid high desert bloom, and nurtures us in greenery.”</p> <p data-bbox="863 1538 1318 1630">Caption: <i>Fall 2021 southside of Farmington, just north of the San Juan River. In amongst trailer parks, subdivisions, is a reminder of the farming past of Farmington, once called Farmingtown.</i></p>

(Continued)

TABLE 3 (Continued)

Photo submission	Water reflection
<p data-bbox="148 309 515 331">Misty October morning. West Hammond farm</p> 	<p data-bbox="863 309 1278 353">“From cracked dry land to underwater. Our small farm survives all seasons by the San Juan River.”</p> <p data-bbox="863 356 1318 425">Caption: <i>Goatvalley Farms on a Misty morning after a heavy rain. Flooding occurs during the monsoon season. One house down from the San Juan River. Bloomfield, New Mexico.</i></p>

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

Ethical approval was not required for the study involving human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants in accordance with the national legislation and the institutional requirements.

Author contributions

CM: Writing—original draft, Writing—review & editing, Conceptualization. AG: Writing—review & editing, Conceptualization, Funding acquisition. BS: Writing—review & editing, Conceptualization, Project administration. All authors contributed to the article and approved the submitted version.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fcomm.2023.1214105/full#supplementary-material>

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