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Water Meaning Maps in We are Water Exhibit Evaluation

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Abstract

Water Meaning Maps engaged rural and Tribal library visitors in the Four Corners region in an evaluation activity for a traveling exhibit about water topics (We are Water) and supported them diving deeper into what water means in their communities. The adaptation of a meaning mapping activity used in informal education evaluation for the WaW context is one example of how collaboration among WaW project partners (a team of informal educators, scientists, Indigenous educators, library staff, and evaluators) influenced exhibit evaluation methods. Here we share lessons learned using Water Meaning Maps as an evaluation tool for the exhibit and describe how the processes of reflection on and revision of our approach to the meaning map activity aimed to re-center visitors' own meaning-making in the analysis.

About the We are Water (WaW) Exhibit and Evaluation

We are Water (WaW) is an exhibit traveling to seven rural and Tribal libraries in the Four Corners Region of the Southwest U.S. to engage multi-generational audiences in exploring the science and cultural aspects of water in their communities and the region (https://wearewater.colorado.edu/). The exhibit and associated programs were designed around the big idea that *Water, critical and scarce in the Four Corners Region, connects diverse communities through our shared place and unique stories*. Four interactive exhibit components highlight four themes about water in the Southwest: Visitors can play a life-size Connect Four-style game to learn about *Water and Life* in the local ecosystem; build topographical features in the Augmented Reality (AR) sandbox to learn about *Water in the Landscape*; make decisions about water allocation in a Plinko-style game about *Water Use, Water Rights*; and listen to other community members' stories about water or contribute their own stories and art through the *Water and Our Community* story wall. Accompanying WaW library programs engage library visitors in STEAM activities that aim to deepen understanding of local water topics and inspire conversations about personal or cultural connections with water.

Life-size Connect Four
Theme: Water and Life

Plinko Game
Theme: Water Use, Water Rights

Augmented Reality Sandbox
Theme: Water in the Landscape

Story Wall with Artwork & Stories
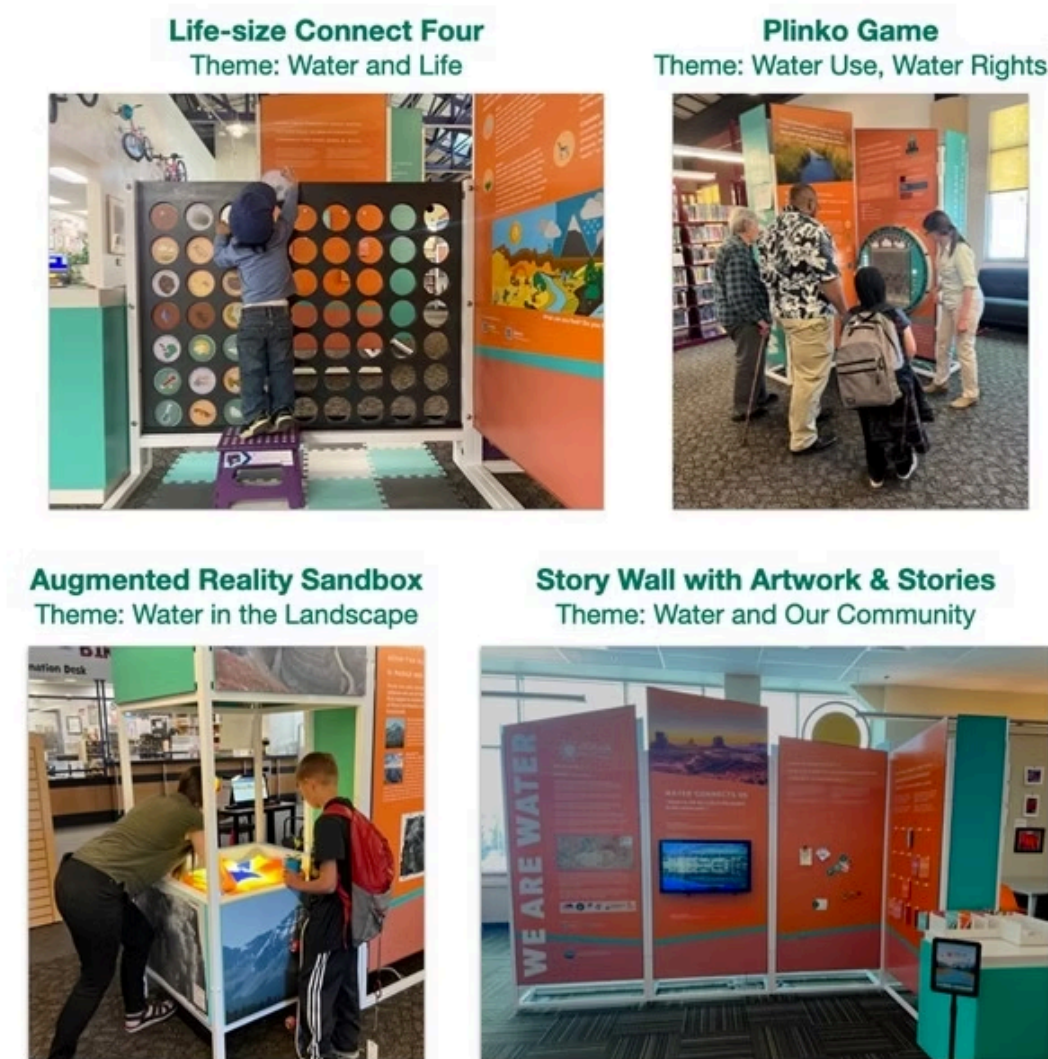Theme: Water and Our Community

Photo 1: The four interactive components of the We are Water exhibit.

The WaW exhibit was developed by a team of informal educators, scientists, Indigenous educators, library staff, internal evaluators, and Indigenous and community-centered external evaluators (project storytellers). In the early stages of development, the team paused to reflect on and reimagine the project's logic model, taking time to transform it from a linear progression of inputs, activities, and outcomes into an Indigenous-inspired logic model represented by the Yucca plant (Gold et al., under review). The revised Yucca model centered rural communities in the WaW project, reminded the team of the importance of engaging in the cyclical process of reflection and revision at all phases of the project, and guided our evaluation work. The water meaning map activity described here is one example of how the WaW Yucca logic model influenced exhibit evaluation conducted by the internal evaluators, our process of reflection on and revision of our methods, and the lessons learned along the way.

Purpose of Water Meaning Maps in WaW Evaluation

Evaluation of the WaW exhibit aimed to use a variety of culturally responsive approaches to learn more about the perspectives of library visitors on water in their communities and how they related to the exhibit themes. Here we describe the evolution of our approach to using Water Meaning Maps, designed to engage library visitors of all ages in WaW exhibit evaluation. The water meaning map activity was initially inspired by Personal Meaning Maps (PMM) used in informal education settings to assess visitor learning, typically as a pre/post activity in which visitors write or draw their conceptual map of a certain topic in advance of a learning experience and then are asked to add to, modify, or expand on their map afterward (Falk et al., 1998; Adams et al., 2003). In the WaW context, we reconceptualized the meaning map activity within a multi-faceted model of visitor experiences (Packer & Ballantyne, 2016), in which experiences can be characterized or appreciated in terms of physical, social, emotional, spiritual, and cognitive facets. Rather than measure specific learning gains, we sought to understand how the project inspired visitors to think about water topics in new ways; see themselves, their community, or

culture reflected in the WaW activities and exhibit; and share their stories about water. The Water Meaning Maps were then implemented as a one-time activity that prompted visitors to reflect on what water means in their communities (eliciting an introspective experience) and engage with other visitors and WaW team members as they shared their Water Meaning Maps (a relational or social experience).

Methods for Water Meaning Maps in WaW Evaluation

We invited visitors to create Water Meaning Maps during WaW community events at the library, such as the exhibit opening day celebrations and scheduled youth group visits to the exhibit (school groups or scouts). During the opening day events, WaW team members, library staff, and local community organizations facilitated STEAM learning activities about the science of water, local water resources, and related arts or cultural activities. Water meaning mapping was embedded in the opening day event as one of the activity booths and facilitated by WaW team members. We used an open-ended prompt printed on a blank page in English on one side and in Spanish on the other side that asked visitors to *Draw, write, or share ideas about water in your community*. Visitors were also invited to elaborate on their maps in a conversation with the WaW team members, who took notes about these conversations.

Photo 2: Hoop dancers from Red Heritage perform at WaW Opening Day at the Page Public Library, Page, AZ.
Photo credit: Annemarie Schaecher

During youth group visits to the exhibition, visitors participated in water-themed STEAM activities facilitated by library staff and WaW team members. For example, during a Girl Scout Day at one library host site, after touring the exhibit, the scouts played the game *Be a Water Ecosystem Hero*, made water bead bracelets, and weaved baskets. The water meaning map activity was embedded in the reflection survey at the end of the visit. Youth group participants were prompted to *Draw a picture of water in your community* and asked to briefly elaborate in writing on what they had drawn and why.

Our approach to analyzing the water meaning map activity was also adapted and revised, guided by the Yucca model and our commitment to continuous reflection on our practices (Gold et al., under review). We began coding the Water Meaning Maps using a content analysis approach (Krippendorf, 2018) as originally planned. To start, four WaW team members met to code the maps from one library host community (n=26) based on the content of the drawings and/or text, as well as facilitator notes from the conversations. After the team came to a consensus on codes, one of the WaW team members continued coding maps from the remaining library host

communities. At this point, the team paused to reflect on this approach to the analysis. Guided by the Yucca model, we discussed how we could better center visitors' own meaning-making from the activity in the analysis and decided to include only the Water Meaning Maps that contained text or labels describing the content of the maps, and/or facilitator notes from conversations with visitors who created them.
This refocused the analysis on visitors' words and descriptions, rather than relying on evaluators' interpretations of drawings, a much more arts-based evaluation approach to the analysis (Lefkowich, 2023). Therefore, findings presented here are based on maps that included visitors' written text or conversation with facilitators; maps that contained only drawings without any further elaboration were counted in the total number but not included in the analysis.

During the exhibit's initial run from 2022 to 2024, seven rural and Tribal libraries in Arizona, Colorado, and New Mexico hosted the exhibit. A total of 81 Water Meaning Maps were created by library visitors at four of these host library sites (three rural libraries and one Tribal library); 64 of those visitors had attended an opening day celebration and 17 visited with their youth group. Fifty-five maps included text or conversation notes that described the content and/or meaning of the maps and therefore were included in the analysis. The remaining twenty-six maps were created as drawings only, without further text or elaboration, and therefore were not included in the analysis.

Photo 3: WaW Opening Day at Ignacio Community Library, Ignacio, CO.

Exploring Water Meaning Maps in Relation to the WaW Exhibit Themes

Visitor water meaning maps are described here in relation to the four exhibit themes (see the list of exhibit themes and related codes in the table below). Many visitors chose to represent water features such as rivers, lakes, rain, or snow in their maps. (See examples of Water Meaning Maps in the online visitor gallery: https://wearewater.colorado.edu/exhibit). These depictions related to the exhibit theme of *Water in the Landscape* demonstrated by the AR sandbox. For example, two young children who were siblings each drew their version of a waterfall in the mountains. During the conversation that followed, the children and their mother told the story of a recent family road trip they took through the mountains while heading to an event, and they described the lake and waterfall they saw along the way. In this example, the story is a social experience. In another example, a young visitor drew a landscape including water, clouds, and rain with arrows connecting them, and elaborated on how water moves through the water cycle. This visitor connected his map to what he had learned about water and the popular AR sandbox activity, in which visitors can simulate rain in the landscape.

Photo 4: Visitors reach their hands out to make it "rain" in the AR Sandbox. Photo credit: Aaliyah Henderson

Some visitors chose to reference a specific local water feature in their landscape maps by name, coded during analysis as a local place which related to the theme *Water and Community*. For example, in a Tribal library community, a youth group visitor elaborated that they chose to draw their local river because it was "beautiful", while a peer expressed that to them their local river "represents peace". In another rural library host community, there was a prevalence of a local river park in many of the maps, where families went for fun and recreation. In each of these communities, library visitors made strong place-based connections with water and their respective local rivers, even though their relationship with the river and how they interacted with water differed.

Other visitors' maps reflected aspects of the theme *Water Use, Water Rights* with activities like swimming, rafting, fishing, or skipping stones. In one vibrant example, a young visitor described their water meaning map as representing a fishing trip with their dad, depicting a large fish as well as the dams on the river. In this case, their reflection on water included a family activity and also an awareness of the infrastructure that controls the water flow in the river. In another case, an adult library visitor created a detailed and labeled map of their property to show how they access water, including the well that supplies water to the house, the irrigation ditches running nearby, and the pump that brings water to the garden hose in summer. During the conversation that followed, the visitor elaborated on how they get the water that they use every day and the importance of this water in their life, sharing their personal perspective on the contentious issue of water access and rights in the region.

Finally, some visitors' Water Meaning Maps related to aspects of the theme *Water and Life,* representing the importance of water in everyday life for own health and hygiene, for all creatures who live there, and for survival of all. For example, some maps depicted things like people drinking from cups, water splashing from a drinking fountain, or water filling a bathtub. Others showed animals, such as ducks, deer, or fish, swimming or drinking from ponds or lakes. In a few cases, visitors took a bigger-picture view, representing water as essential for all life on Earth. For example, one young visitor chose to represent two images of the Earth: one drawn in color with blue water, green land, a figure of a person, and labeled "life", and the other showing an empty Earth drawn in black

and white labeled "no life". A similar sentiment was shared by an adult visitor who translated an "old Spanish proverb" in their map: "¡Sin agua, no hay vida!" meaning without water, there is no life.

Table: Codes for visitor Water Meaning Maps, examples, and related exhibit themes.

Code:	Examples from Water Meaning Maps:	Related exhibit theme:
Water in the landscape	Described water features such as rivers, lakes, waterfalls, rain, snow, or the water cycle	Water in the Landscape
Local place	Also referenced the name of a specific water feature in their community (e.g., the name of the river).	Water and Community
Access to water/ infrastructure	Diagrams or explanations of how water gets to them or their community, including things like dams, water tanks, irrigation ditches, hoses, pipes	Water Use, Water Rights
Activities or recreation on the water	Examples of what they do or how they use water, such as swimming, fishing, rafting, skipping stones	Water Use, Water Rights
Water for health and hygiene, survival	Examples of water as essential for drinking and hygiene or reference to water as necessary for life and survival	Water Use, Water Rights; Water and Life
Animals	Also included reference to animals as part of the ecosystem	Water and Life

Lessons Learned

We encountered logistical challenges when implementing the Water Meaning Map activity at the first two rural and Tribal library host sites due to a shortage of time for school groups who visited on opening day to complete the activity, a shortage of staff to facilitate the activity, or low attendance at the event. This led to changes in the way we implemented the activity at the subsequent library host sites. First, our team created opening day event passports in which visitors collected stamps for each activity completed, which included Water Meaning Maps. Also, we planned for youth groups to visit on a designated day other than the opening day to allow them more focused time with the exhibit and activities. In addition, we employed and trained local college students as WaW assistants who attended events in person and could facilitate the Water Meaning Map activity (Littrell et al., 2023). These changes increased the number of Water Meaning Maps created at the next four library host sites that were presented here.

Another challenge we encountered was facilitating conversations in the moment that might lead to deeper meaning-making about water amid all of the other activities and excitement at these events, especially with children. As a result, there were visitors at opening day events who created maps without conversation or reflection with the WaW team, which limited our analysis.

Conclusion

Overall, the Water Meaning Maps engaged a multigenerational audience in WaW exhibition evaluation and facilitated reflection, connection, and discussion about water in the community and the region, and the themes from the exhibit. Conversations with library visitors were an important component of the water meaning map activity, allowing visitors to share what water means in their communities with each other and with the WaW team.

For future sites, we will continue to explore how to best balance engagement in WaW events with time and space for deeper reflection about the Water Meaning Maps.

Author Attribution

Christine Okochi, Megan K. Littrell, Kathryn J. Boyd, and Anne U. Gold are members of the WaW collaborative team and are based at the CIRES Center for Education, Engagement, and Evaluation (CEEE) at the University of Colorado Boulder. Correspondence about this article can be addressed to: christine.okochi@colorado.edu.

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∨   Additional Resources

Explore the full We are Water exhibit with text and audio in English, Spanish, or Navajo. https://wearewater.colorado.edu/exhibit

Hear stories from the WaW story wall that explore the broad experiences and perspectives of those who live where water is scarce. https://wearewater.colorado.edu/stories

Download and engage in hands-on STEAM activities from home to explore and learn about water in your community (English and Spanish). https://wearewater.colorado.edu/engage/library-kit

Create a short stop-motion animation of your water story. https://wearewater.colorado.edu/engage/stop-motion-animation-workshop

Bring people together to begin a dialogue about shared experiences with water in your community, (English and Spanish): https://wearewater.colorado.edu/conversation-guides

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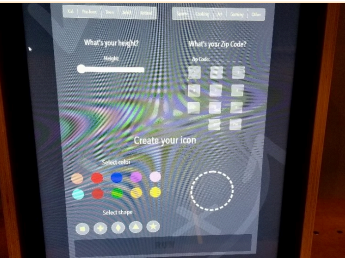
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