ISSUE 23: SPRING 2023 / FEATURE (PEER REVIEW)

THE SCIENCE IN INDIGENOUS WATER STORIES, INDIGENOUS WOMEN'S CONNECTION TO WATER

By Wendy F. K'ah Skáahluwáa Todd, Arianna V. Northbird, and Chessaly E. Towne

Editor's note: This feature article has been peer reviewed.

Water is life. It is a familiar phrase, frequently spoken today. Even so, little thought goes into what this simple phrase means. We exist in water throughout our lives, dependent on it from conception, surrounded in water in our mother's womb, until our last water vapor breath. Water is so common, we are so accustomed to our submergence in it that we fail to notice how vital it is and fail to recognize our dependence on it, taking for granted the water vapor-laden environment we exist in every moment of every day. Taking our fragile dependence on water into consideration, one would think we would have policies and practices to protect water and respect the beinghood of water that humans feel entitled to. However, mainstream society considers water to be a commodity, disregarded and taken for granted; the importance of water does not afford it protections to maintain healthy environments or to ensure healthy food and water resources. Traditional Ecological Knowledge (TEK) is a combination of qualitative, quantitative, and spiritual knowledge that uses the same rigor as western science and represents knowledge of place, history, and spiritual/cultural philosophies about terrestrial and aquatic ecosystems (Smythe et al. 2020). TEK is a collection of historical knowledge of place, providing in-depth knowledge about the intricate ecological relationships between the environment and all things through a spectrum of beliefs, values, and perceptions, developed using local natural phenomena (Smythe and Peele 2021; Smythe et al. 2020)

We will consider the relationship three Indigenous women have with water and the cultural responsibility they bear as caretakers of water. We will examine the historical connections and worldviews each author (Todd and Towne as Alaska Native Haida, and Northbird as Fond du Lac Ojibwe) and their tribal community have with this sacred being. Here we discuss the importance of water to the Haida and Ojibwe peoples, demonstrate the importance of cross-cultural knowledge sharing, and present three educational activities to preserve and pass on TEK to the next generation.

Historical Cultural Connections to Water

Alaska Native Haida Connection to Water

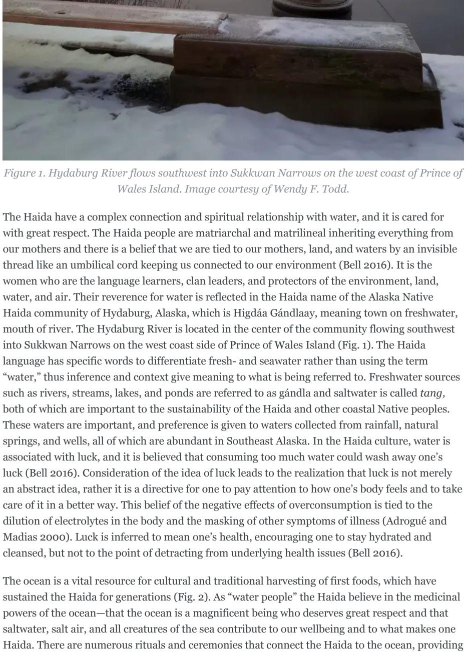

Figure 1. Hydaburg River flows southwest into Sukkwan Narrows on the west coast of Prince of Wales Island. Image courtesy of Wendy F. Todd.

The Haida have a complex connection and spiritual relationship with water, and it is cared for with great respect. The Haida people are matriarchal and matrilineal inheriting everything from our mothers and there is a belief that we are tied to our mothers, land, and waters by an invisible thread like an umbilical cord keeping us connected to our environment (Bell 2016). It is the women who are the language learners, clan leaders, and protectors of the environment, land, water, and air. Their reverence for water is reflected in the Haida name of the Alaska Native Haida community of Hydaburg, Alaska, which is Higdáa Gándlaay, meaning town on freshwater, mouth of river. The Hydaburg River is located in the center of the community flowing southwest into Sukkwan Narrows on the west coast side of Prince of Wales Island (Fig. 1). The Haida language has specific words to differentiate fresh- and seawater rather than using the term "water," thus inference and context give meaning to what is being referred to. Freshwater sources such as rivers, streams, lakes, and ponds are referred to as gándla and saltwater is called *tang,* both of which are important to the sustainability of the Haida and other coastal Native peoples. These waters are important, and preference is given to waters collected from rainfall, natural springs, and wells, all of which are abundant in Southeast Alaska. In the Haida culture, water is associated with luck, and it is believed that consuming too much water could wash away one's luck (Bell 2016). Consideration of the idea of luck leads to the realization that luck is not merely an abstract idea, rather it is a directive for one to pay attention to how one's body feels and to take care of it in a better way. This belief of the negative effects of overconsumption is tied to the dilution of electrolytes in the body and the masking of other symptoms of illness (Adrogué and Madias 2000). Luck is inferred to mean one's health, encouraging one to stay hydrated and cleansed, but not to the point of detracting from underlying health issues (Bell 2016).

The ocean is a vital resource for cultural and traditional harvesting of first foods, which have sustained the Haida for generations (Fig. 2). As "water people" the Haida believe in the medicinal powers of the ocean—that the ocean is a magnificent being who deserves great respect and that saltwater, salt air, and all creatures of the sea contribute to our wellbeing and to what makes one Haida. There are numerous rituals and ceremonies that connect the Haida to the ocean, providing strength and purifying of spirit and mind by submerging into the ocean to cleanse, body, mind, and spirit, and to pray (Bell 2016). Ocean cleansing is a powerful way of connecting with water and the Haida culture, reminding us we were born from water and remain immersed in its many forms throughout our lives. This practice provides infinite health benefits from the vitamin-rich sea waters, and builds physical strength and endurance, all of which result in increased immunity, mental clarity, wellness, and emotional healing (McIsaac 2020).

A wide variety of traditional foods are harvested, such as various fish species, shellfish, seabirds and eggs, sea greens, sea cucumber, seaweed, and crab species, and make up the bulk of the Haida diet (Fig. 3). As a seafaring culture, the Haida honor the power of the ocean and use it as a bountiful resource that provides life with each tide.

Figure 2. The ocean waters of Sukkwan Narrows on the west side of Prince of Wales Island. Image courtesy of Wendy F. Todd.

Figure 3a. Traditional Haida foods from the ocean: sea greens (sea asparagus) (Figure 3a), spotted shrimp (Figure 3b), and seal oil (Figure 3c). Image courtesy of Wendy F. Todd.

Figure 3b. Traditional Haida foods from the ocean: sea greens (sea asparagus) (Figure 3a), spotted shrimp (Figure 3b), and seal oil (Figure 3c). Image courtesy of Wendy F. Todd.

Figure 3c. Traditional Haida foods from the ocean: sea greens (sea asparagus) (Figure 3a), spotted shrimp (Figure 3b), and seal oil (Figure 3c). Image courtesy of Wendy F. Todd.

Ojibwe Connection to Water

To the Ojibwe, water (nibi) is a sacred spirit, considered to be a living and moving being. Water is life and carries stories and connection; it is the center of all things and is a part of traditional Ojibwe creation stories where Turtle Island was created from a large flooding event that purified Mother Earth. The Anishinaabe, or the "original people," carry many teachings about how to live with purpose and in harmony alongside all living and nonliving beings. Stories were told in the wintertime through the experiences of Waynaboozhoo, a spiritual being who had all the power in life to do and be anything he wanted. He was all-powerful. Even so, he carried the responsibility to guide and care for humankind, teaching lessons about respecting nature and not to use it to attain selfish desires. He taught us how to be teachable and to care for one another in a good way, honoring the reciprocal relationship that exists between all things. Many of his experiences intersected with teachings from animals both on land and in water. The Anishinaabe carry their strengths in their animal clan systems, which is the establishment of their leadership, each harboring unique gifts given by Gitchi Manitou (The Creator).

Since the beginning of time, the Ojibwe, originally from the East Coast of Turtle Island, followed lakes, rivers, and streams that guided their survival. There was a prophecy given to the Ojibwe people which spoke of other people (Europeans) coming to create disruption to all cultures, affecting their foundations of knowledge and ways of life. This prophecy started the migration of Ojibwe people westward to find the "*sacred food that grows on water*" (Fig. 4). Over many generations of traveling, the Ojibwe had seven major migration stops along what is known today as the Great Lakes. Wild rice (manoomin) was the food that brought Ojibwe people to Gichigamiing, which means "*the great water*." Gichi Gumee (Lake Superior) is where the final stop of the migration occurred at Madeline Island (Mooningwaanikaaning). This place is a reminder to Ojibwe people of the last spritual stop before spreading across the vast northern region of Gichi Gumi. Among other tribal nations, the Ojibwe have always been fluid in movement as they continue on the story of cross-cultural interactions and sharing of valuable resources. Core teachings of caring for Mother Earth are the sharing of knowledge and maintaining connections across the landscape.

Figure 4. Perch Lake "Aatewemegokokaaning," Fond du Lac Band of Lake Superior Chippewa Reservation with wild rice growing out of the water. Image courtesy of Arianna Northbird.

Water (nibi) will always be relevant to Ojibwe people, reflecting their origin and adaptation to harvest cycles, which is the epitome of who they are. Ojibwe ancestors carried oral knowledge systems that continue to sustain future generations of relationships to the land and water through prayer, ceremony, and song. Relationships are respected and honored to restore balance in the natural way of life. Passing on the resources given by Creator is known as "gaa-miininangwaa ganawenjigen," which refers to the Ojibwe creation stories and gifts that must be taken care of. Currently, tribal leadership and community activism play an important role in protecting water quality and to reclaim spaces. Water is considered a gift, and it is the responsibility of the people to understand the reciprocal relationship with water that will ensure a future for not only the Anishinaabe, but for all. Mino Bimaadiziwin means "*to live a good life,*" and that is returning to the teachings from the ancestors and knowing what they stood for (Fig. 5). Understanding the relationship to creation defines the roles in which the Ojibwe must take care of the land, water, animals, and people.

Figure 5. Ojibwe woman dancing on the shore of Lake Superior. Image courtesy of Krista Gardner.

Methodologies to Indigenous Women in Water Science

While cultural connection to water and formation of traditional knowledge may be different between our two cultures, there are some key cornerstone concepts that each culture has in common: (1) water is a sacred being that must be cared for and respected, (2) it is our cultural responsibility to be the caretakers of water, and in return, (3) water is the caretaker of us with our very lives depending on her. We present three examples of water science activities carried out in both Haida and Ojibwe communities by Native women from these communities, to demonstrate how to use TEK and Western science to teach science lessons and highlight the transferability of TEK from two very different tribal communities through cross-cultural knowledge exchange.

Activity 1: Translating A Haida Story

The story of Raven stealing freshwater from Eagle was recorded in the winter and spring of 1900 by John R. Swanton, an American anthropologist and linguist, when he visited the Haida villages of Masset on the northern coast of Haida Gwaii and three villages in Southeast Alaska (Swanton 1908). The orthography recorded is no longer current nor actively taught. The first step in reclaiming the knowledge in this water story was done by collaborating with a Haida linguist and language learners to transcribe the story into the current Northern Haida orthography. This activity presented language learners an opportunity to learn a new orthography, thereby granting access to a plethora of recorded stories and ancient knowledge that could be translated and given to the community in an act of reciprocity. Recording of this story was done according to cultural protocols and practices considering the ethical use of intellectual property of the Haida people. Mr. Swanton sought and was granted permission by the nation to record these stories and acted with reciprocity by returning these recorded stories to the tribal nation.

Raven Steals Fresh Water from Eagle in Haida

Gám awáahl tlag ḵeenggaa'aangaan. 'Wáadluu gin ts'úujuutl'aagaan. Síigaay sg̱ún uu ijáan. 'Wáagyaan ahljíi unggw 'll ḵ'áwaayaanii. "ḵ'wiyáa'iihldaa" hin 'll súudaayaanii. 'Wáagyaan 'll ḵ'wiyáa'eelaan. 'Wáagyaan ḵwáaneelaanii. 'Wáagyaan gud g̱aad 'll tlaadáanii. 'Wáagyaan gud x̱ánhlaa-aa 'll x̱asdlagaayaan. Áasgaay ḵ'wiyáay uu 'll gáwdaayaan, 'wáagyaan in-gúusdgaay tl'áa uu ḵwáandaayaan. Áasgaay ḵ'wiyáay 'll gáwdaayaan ahl uu gwáayaay i xajúugang. Áa uu tlagáay 'll g̱íihlgiidaayaan.

'Wáagyaan, háwsan sda 'll ḵáaydaan. G̱úud náas-an ḵáatl'aagaan. 'Wáagyaan g̱úudaay g̱ándl da'áayaan. 'Wáagyaan 'wáa kunáasd gám gán tl' ḵíiy'anggaangaan. 'Wáagyaan gándlaay 'láangaa xutl'ayáay-d 'll gudánggaangaan. 'Wáagyaan g̱úudaay 'láa-g̱ áangaa ḵuyáadgaangaan. Jíingaa 'láangaa xutl'ayáay-d 'll gudáangaan. 'Wáagyaan 'láa-sd-san 'll ḵáaydaan, g̱ándlaay 'láa 'll xutl' xaayd gíigaanaay-sd aa.

Áajii g̱handlaay 'll k'udidsii dluu, Jihlḵáad 'll k'udasdl tláagaangaan. 'Láa 'll k'udusdláas dluu, gáawaan kwaayáang jíing'anggandaan k'yáalaanii. Ahljíi-ahl 'll gudangáay st'igáanii. 'Wáagyaan háw-san 'wáa t'alg 'láa 'll k'udusdláayaan. 'Wáadluu, kwah hlgisdatl'aagáan. Ahljíigaay-san k'yáalaan. 'Wáadluu háw-san 'wáa t'alg g̱áagwaay 'll k'udusdláayaan. 'Ll k'udusdláasii ḵáahliyaan gut-g 'láa 'll gi k'usgadáan. 'Wáagyaan 'láa 'll tla skáyswaaneelaan. 'Wáagyaan tláan 'll kwah k'yáalaan. Gut-g 'láa 'll gi k'usgadáan ahl uu, g̱ándl 'wáadluwaan gám k'íl̲gang'anggang, sáng 'wáadluwaan kwaayáangsii k'yaanan aa.

Raven Steals Fresh Water from Eagle in English

Not long ago, no land was to be seen. There was a little thing on the ocean, all water was from the sea, and Raven sat upon it. Raven said, "*Become dust,*" and everything became Earth. He divided Earth and put it into the ocean on each side of him. The piece of Earth he was on was small and the rest of the Earth was large. Raven was off again, when he went to where Eagle lived and saw that Eagle owned freshwater. Raven had no water, he only had seawater, he wanted to drink the water of Eagle. However, Eagle did not want to give his freshwater to Raven. For a long time, Raven wanted the water to drink, but Eagle refused. So, Raven went to the owner of freshwater, Eagle, and drank the water in secret and went off with the stolen water. After Raven had taken the water, he carried it in his bill and he let a drop fall, first to make the Chilkat River. When Raven spit it out, all of the water soon flowed away. The ground became dry. His mind was sick on account of this. Then he spit out more. That, too, flowed down and dried up. At that time, he let still more drop. As soon as he had let it drop, he bent it together and made a circle out of it. Then it stopped running off. Because he bent it together, all streams keep on running, although they run every day.

Cultural Interpretation of the Water Story

For the Haida and many other Native cultures from the Pacific Northwest, Raven is a central figure in many stories and lessons, described as a trickster, hero, creator, and knowledge bearer, and is thought to reflect one's own self (Fig. 6). He is the most powerful and mythical creature that spiritually and physically wanders both in the tangible and spirit world and can shape-shift to both living and nonliving objects. He symbolizes the unknown and shows us how to see the world in a different way, through a different lens. This story explains where fresh water came from, how sneaky and smart Raven is, an understanding of the chemical differences between water resources, and how vast the world is.

Figure 6. Raven dropping water creating rivers and stream. Image courtesy of Amanda Phingbodhipakkiya (findingsproject.com).

Activity 2: Deconstructing A Traditional Haida Story

Deconstructing traditional stories is a method used to discern hidden meaning in the story and should only be done with the informed consent of the tribal nation, elders, cultural practitioners, and/or the knowledge bearer sharing TEK. Here we discuss the development of culturally relevant water science curriculum using TEK guided by the authors' tribal partners. It is of utmost importance to not only have permissions to use TEK, but also to develop a meaningful long-term relationship with tribal partners in order to understand how and why knowledge was developed, why it was deemed important enough to preserve in a story, and to understand the worldview of the community in which the knowledge came from for correct meaning making to correctly interpret knowledge through the lens of the tribe. For example, the rhetorical style of the Haida is to relay knowledge in a facetious way by saying the opposite of what is meant. There is no way to know or understand this, unless one has a deep understanding of Haida culture, and takes care not to apply one's own worldview filtered through a Western lens of knowing or religion. This emphasizes the importance of developing long-term relationships with tribal communities. Let us consider the traditional Haida story about Raven stealing water and then deconstructing it into its constituent parts to reinterpret it into Western science lessons. Keep in mind deconstruction is done only with permission and guidance from the tribal partners.

Deconstructing the Water Story for Curriculum Development

Deconstructing this story to create Western science curriculum requires close and thoughtful examination of the words chosen to tell the story, and knowledge of the Haida culture in order to infer appropriate meaning making in the context relevant to the Haida worldview. There are concepts of Western science disciplines expressed in this one story, from social behavior to an expression of knowledge revealing a complex understanding of the world and of natural phenomena. We will provide examples of geology, geography, and environmental science.

Geology and Geography

This story begins discussing the formation of land, descriptions of the size of land masses, and an understanding of landforms and natural features. This story was created in a small tribal community on the island of Haida Gwaii, which is part of an archipelago off the northern Pacific coast of Canada. The knowledge of land size was likely gathered by those who traveled the region in traditional dugout cedar canoes. The Haida were known for their seamanship and for their ability to travel great distances around the Pacific Ocean, which allowed them to develop and acquire knowledge of the vastness of the ocean. This knowledge is referred to in the beginning of the story when it states that "*Raven could only see the ocean*." From the perspective of someone who had never left Haida Gwaii it would seem that only the ocean existed. It is likely that those who traveled the ocean returned to Haida Gwaii and shared stories of other land masses, noting location, distance, and the varying sizes of these land masses. This knowledge is described in the story through the discussion of "*He divided Earth,*" demonstrating an understanding of distinct land masses not part of Haida Gwaii. Reference to the size of land masses: "*The piece he was on was small and the rest of the Earth was large,*" refer to the island of Haida Gwaii in relation to the large land mass of the North American continent to the east.

The Water Cycle

The water cycle describes the continuous movement of water from one reservoir to another through the physical processes of evaporation, condensation, and precipitation. The description acknowledges the transfer of heat to or from an environment. The flow of liquid water and ice shapes our planet by providing nutrients released through the chemical and physical weathering of rocks and minerals, thereby mobilizing nutrient pools into aquatic ecosystems, by carving out large swaths of the landscape, and by impacting global climate patterns.

In this story, Raven steals fresh water, demonstrating an understanding of the water cycle by the Haida people long before Western science credited its "discovery" to Bernard Palissy in 1546. The act of ignoring TEK emphasizes the widespread blatant disregard and erasure of TEK developed by cultural practitioners in favor of knowledge generated by Western science.

Raven steals water and "*spits it out on the land*" and "*the water soon flowed away*" describes precipitation and the flowing of rivers. The story describes rivers becoming dry during cycles of drought and how Raven's mind was sick because of this. This part of the story is a reference to regional climate impacts at a time when precipitation was low, hence rivers were low. The sickness signifies stress communities experience from decreased food security in periods of drought. The story ends with Raven "*bending water into a circle*" so that it always flows, demonstrating an understanding and awareness of the water cycle (Table 1, Fig. 7).

Re-imagining how science is taught, acknowledging the importance of using various knowledge systems—TEK and Western—benefits students, teachers, and scientific innovation by developing and improving critical thinking skills.

Figure 7. A re-imaged water cycle representing both TEK and Western knowledge systems. The model depicts the transfer of energy and heat around the planet through the processes of evaporation, condensation, and precipitation, as well as local natural phenomena. The image depicts the impacts of the water cycle on rivers, oceans, and animals; here it shows impacts on the salmon life cycle and importance of water and climate impacts on salmon. Image courtesy of Wendy F. Todd; illustrated by Lauren F. R. Smythe.

Traditional Story	Deconstructed Interpretation	Discipline
"He (Raven) divided Earth." *"The piece he was on was small and the rest of the Earth was large."* *"There was a little thing on the ocean. All water was from sea, and Raven sat upon it."*	Referring to an understanding that there are distinct land masses and islands.	Geology: science of the Earth's physical structure, substance, history, and processes acting on it. Geography: study of physical features of Earth, its atmosphere and human activity as it affects and is affected.
"Raven was off again; he went to where Eagle lived and saw… freshwater. Raven had no water, he only had seawater, he wanted to drink the water of Eagle."	Exhibiting an understanding the different sizes of land masses. Haida Gwaii is a small island and the landmass to the east is the North American Continent.	Earth science: study of Earth's structure, properties, processes, and four and a half billion years of biotic evolution
		Limnology: study of biological,

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ISSN 2471-190X

"When Raven spit it out, all of the water soon flowed away. The ground became dry."	Understanding of the difference between fresh- and saltwater, emphasizing that only freshwater is suitable for consumption.	chemical, and physical features of lakes and bodies of freshwater. Oceanography: study of oceans.
"When Raven spit it out, all of the water soon flowed away. The ground became dry." *"Spits it out on the land"* and *"the water soon flowed away."*	Understanding of the difference between fresh- and saltwater, emphasizing that only freshwater is suitable for consumption. Describing precipitation and the flowing of rivers, followed by a description of rivers becoming dry during cycles of drought.	Hydrology: science concerned with the properties of Earth's water, especially its movement in relation to land.
"His mind was sick on account of this."	The statement *"his mind was sick"* reflects stress that communities experience during times of decreased food and water security due to drought impacts on fishery resources.	Psychology: study of mind and behavior.
"As soon as he had let it drop, he bent it together and made a circle out of it. Then it stopped running off. Because he bent it together, all streams keep on running, although they run every day."	The story ends with Raven bending the water into a circle so that it always flows, one can argue that this refers to the understanding and awareness of the water cycle.	Environmental science: interdisciplinary academic field that integrates physics, biology, and geography to the study of the environment and the solution of environmental problems.

Table 1. Examination and deconstructed interpretation of the Haida water story.

Activity 3: Ojibwe curriculum

The lakes and rivers will always be a valuable resource to Ojibwe people who traditionally harvests foods and medicines connected to the lakes and rivers and use phases of the moon to correspond with cycles and harvest events. Seasonal harvest events include ricing, hunting, gathering, and fishing. Asema (tobacco) is offered with a prayer to remind one to be mindful and thankful for the sacred gift of water. The relationship with water is understood to be reciprocal and there is TEK and wisdom that comes with understanding nature's balance. When the connection is disrupted from events like climate change, there is a ripple effect to the local ecosystem that disrupts TEK, harvest cycles, and tribal identity (GLIFWC 2022).To ensure that TEK and cultural connection to water is preserved and passed on a collaboration with the Indigenous Women's Water Sisterhood (IWWS), a group of Indigenous and non-indigenous women who came together to share cross-cultural knowledge systems and connection to water, created water curriculum for fifth-grade students. The curriculum is called 'Nibi Gizaagi'igoo Water We Love You' and was written to honor of local Water Walkers, women who walk along rivers that need healing, saying prayers in support of Nibi and all who depend on waterways (IWWS 2022, Fig. 8). Nibi Gizaagi'igoo shares a water walker's personal experiences walking along St. Louis River, which is the second biggest tributary on Turtle Island.

Figure 8. Cover of fifth-grade curriculum "Nibi Gizaagi'igoo Water We Love You." Image courtesy of the Indigenous Women's Water Sisterhood.

Universal Indigenous Connection to Water

Indigenous peoples around the globe continue to maintain a complex, physical, and spiritual connection to water, with water possessing beinghood and having rights of being a healthy entity. This importance is reflected in TEK, passed through the generations in oral traditions in creation stories. The lessons taught through water stories hold true even today, thousands of years after they were first spoken, as our human dependence on water has not changed. What has changed is how economies has grossly corrupted our perception and the narrative of water as a vital life force to a commodity not afforded to all. Today, Indigenous women, responding to their cultural responsibility, have taken the lead by bringing awareness of water's importance, our dependence on water, and on the beinghood water should be afforded.

Discussion

Traditional stories reveal knowledge gathered over thousands of years through exploration, inquiry, and observation of natural phenomena by Indigenous peoples. Knowledge that holds true today is transmitted through space and time through art, stories, and songs. Even so, academia and mainstream society consider such repositories of knowledge as nothing more than myths or legends that hold no value, resulting in their dismissal by the scientific community. TEK is often described with a deficit narrative outside tribal communities due to the nature of data collection and dissemination and by the credentials of those collecting and analyzing the data. This deficit narrative allows for the dismissal of TEK by western researchers, who conscientiously and intentionally extract knowledge from traditional stories and take credit for "new" discoveries claiming TEK as their own new knowledge, without acknowledging the original knowledge bearer. If science is going to be truly innovative seeking to acquire, develop, and disseminate new discoveries, technologies, and innovations, it must begin to acknowledge that there is more than one valid knowledge system (Smythe and Peele 2021). Even so, the academic landscape is slowly changing, with a steady increase of Native environmental scientists, who assert their TEK systems and histories into their research practices. Acknowledgment of the deficit language describing TEK and a conscious effort to change to asset language has thrust TEK into a new light. This changing scientific landscape continues to empower a new generation of Native scholars, as well as beginning to heal historical wounds associated with education due to the history of boarding school. For the first time, we are seeing acknowledgment of the validity of TEK and public displays of TEK in a positive way. In September 2021, mural artist Amanda Phingbodhipakkiya (findingsproject.com) completed a mural of Haida TEK in Seattle, Washington (Fig. 9). The installation is called "Everything is connected to everything else," after the Haida phrase "Aajii 'wiadluuwan nu gid ahl kiwaagang," meaning "Everything is connected or related," reflecting the connectedness and reciprocity in all things.

Referring back to the story of Raven stealing water from Eagle and considering the concepts it relays, the description of Raven bending water quickly brings one to the realization that Native cultures understood that water moves among reservoirs, as well as the important role water plays in the lives of living beings. The transmission of knowledge through stories provides both knowledge and historical context so that the consumer of the knowledge can use their own life experiences to understand concepts provided.

While the story presented here was from the Haida Nation, there are elements that are reflective of the Ojibwe worldview; we see the relationship to, and connection to water, not unlike Ojibwe water stories. Interestingly, the TEK in these stories was developed in vastly different environments, from the Haida on the Northern Pacific Ocean and the Ojibwe on the freshwater of Lake Superior. Both tribal communities share similar stories to describe natural phenomena of water movement, composition, and importance to human life demonstrating the transferability of worldviews and science concepts in cross-cultural collaborations.

Figure 9. Mural of TEK featuring three Haida matriarchs of the land, air, and water. The mural is the work of Amanda Phingbodhipakkiya (findingsproject.com). Image courtesy of Wendy F. Todd.

Acknowledgements

Hàw'an to our precious Haida elders, Alma Cook, Anna Peele, Claude Morris, Alec Douglas Sr., Elsie Douglas, Chuck Natkong, Robert Sanderson Sr., Raymond Sanderson, Lavina Bor, Viola Burgess, Helen B. Sanderson, Ester Nix, Clara Natkong, Matthew Charles, Glenn "Buddy" Douglas, and Samuel Douglas Jr., who have always given their love, support, and encouragement to our community. Hàw'an to Theodore "Teddy" Peele for his guidance and for sharing his TEK with our team. Hàw'an to Ryan Kessler and Sarah Peele for translating the story from Haida to English and for their mentorship.

Funding Acknowledgment

This work was supported by the National Science Foundation ICER-2036452, ICER-2025156, and ICER-2022931.

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Recommended Citation

Todd, Wendy F. K'ah Skàahlswàa, Arianna V. Northbird, and Chessaly E. Towne. 2023. "The Science In Indigenous Water Stories, Indigenous Women's Connection To Water." *Open Rivers: Rethinking Water, Place & Community*, no. 23. https://openrivers.lib.umn.edu/article/science-in-indigenous-stories/.

DOI: https://doi.org/10.24926/24711903X.10023

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ISSN 2471-1903

DOI: 10.18130/OR.23.10023

ORIGINALLY PUBLISHED ONLINE

ISSN 2471-1903