

Indigenous Knowledge

“Indigenous Knowledge is a body of observations, oral and written knowledge, innovations, practices, and beliefs developed by Tribes and Indigenous Peoples through direct contact and experience with the environment.⁷ It is applied to phenomena across biological, physical, social, cultural, and spiritual systems.⁸ Indigenous Knowledge can be developed over millennia, continues to develop, and includes understanding based on evidence acquired through direct contact with the environment and long-term experiences, as well as extensive observations, lessons, and skills passed from generation to generation.⁹ Indigenous Knowledge is developed by Indigenous Peoples including, but not limited to, Tribal Nations, American Indians, Alaska Natives, and Native Hawaiians. Each Tribe or Indigenous community has its own place-based body of knowledge that may overlap with that of other Tribes” ([Guidance for Federal Departments and Agencies on Indigenous Knowledge](#)).

The goal of including Indigenous Knowledge into the Section 106 Tribal Guidance is to:

1. Recognize the value Indigenous Knowledge adds to water resources management.
2. Establish the Section 106 Program’s responsibilities and commitment to the inclusion of Indigenous Knowledge in water quality programs.
3. Identify opportunities to utilize Section 106 grant funding to support inclusion of Indigenous Knowledge into water quality programs.
4. Acknowledge tribal flexibility in adopting Indigenous Knowledge into water quality programs.
5. Provide case studies on how Indigenous Knowledge has been incorporated into water quality programs.

Recognition of the Value of Indigenous Knowledge

Practically, Indigenous Knowledge offers techniques and stewardship principles to guide tribal interactions with the natural world, such as hunting, fishing, plant collection, ceremonial practice, cultivation, harvesting, and forestry. Embedded within Indigenous Knowledge is the awareness that humans are part of the natural world, not “apart from” it, and that there are beneficial connections between humans and nature that are founded upon a framework of reciprocity. Water resources hold a key place within Indigenous Knowledge and nurture healthy, traditional foods; plants used for medicinal, healing, and ceremonial purposes; reeds, grasses, and other plant materials for weaving baskets and making textiles; for ceremonial bathing and consumption purposes; and fish and wildlife. The health of

Figure 5. Sharon Day, Water Walker, on Spirit Island, MN, a place of spiritual and cultural significance to the Ojibwe people. Credit: Photo courtesy of Lucas Reynolds.



⁷ U.S. Fish and Wildlife Service’s [Traditional Ecological Knowledge for Application by Service Scientists](#) document and the Inuit Circumpolar Council Activities’ [Indigenous Knowledge](#) website.

⁸ U.S. Fish and Wildlife Service’s [Traditional Ecological Knowledge for Application by Service Scientists](#) document.

⁹ U.S. Fish and Wildlife Service’s [Traditional Ecological Knowledge for Application by Service Scientists](#) document.

these resources, all of which everyone is in relationship with, affects every aspect of tribal life. The Indigenous framework of reciprocity means that it is an individual and collective responsibility to care for the species—“our relatives”—who have given themselves to benefit humans.

Indigenous Knowledge and the western scientific tradition share some important fundamental beliefs: a desire to make natural sense of the world around us; the importance of practical and inquisitive-driven investigations to learn useful practices; and the need to update information as conditions and knowledge change. There are also differences. In general, western science strives to be objective, intellectual, quantitative, exclusive, and avoid value judgments; people apart from nature. Indigenous Knowledge on the other hand, is communal knowledge based, qualitative, holistic, intuitive, and spiritual (social values); people are a part of nature (reciprocity) ([Listening and learning from traditional knowledge and western science: A dialogue on contemporary challenges of forest health and wildfire](#)). There are times when the two systems are at odds, but they can complement each other, by providing important information and perspectives that help create a realistic understanding of the natural world and its relationship with human activity.

“When I stare too long at the world with science eyes, I see an afterimage of traditional knowledge ... We see the world more fully when we use both” -Robin Wall Kimmerer, “Braiding Sweetgrass.”

Integrating Indigenous Knowledge in Water Quality Programs

Many Tribes use Indigenous Knowledge to inform water quality program implementation as another form of evidence that is on par with quantitative data. Indigenous Knowledge holders are essentially “long-term datasets” representing both personal and intergenerational experience with water. Often, Tribes incorporate Indigenous Knowledge in the foundation of program operations such as defining water quality goals and cultural uses for tribal waters. Additional examples include:

- Sampling locations often align where cultural ceremonies occur to better understand water quality to ensure safe exposure.
- Gaining a local understanding of watershed processes, seasonality, and environmental variability.
- Tribal water uses can be significantly driven by Indigenous Knowledge. For example: Concepts like “first foods” are representative of the environmental goals Tribes employ to monitor and protect their cultural traditional foods with their water quality monitoring.
- Water quality program outreach materials may contain Indigenous Knowledge to better reflect tribal goals and needs for their waters.
- Water quality standards (WQS) may be created or revised to represent sustenance fishing rates which are informed by Indigenous Knowledge.

Figure 6. Canoeing to Wild Rice monitoring location to take sediment cores (Lac du Flambeau Band of Lake Superior Chippewa Reservation). Credit: Photo courtesy of Madeline Nyblade.



Opportunities to Use Section 106 Funding for Indigenous Knowledge

“Agencies should consider Indigenous Knowledge in promulgating regulations, issuing guidance, or adopting policies with Tribal or Indigenous implications, consistent with legal authorities” ([Guidance for Federal Departments and Agencies on Indigenous Knowledge](#)).

Tribes use their Section 106 grant funds to develop, maintain, and expand water quality programs designed to prevent, control, and eliminate water pollution and educate tribal members and the public. Therefore, the collection of Indigenous Knowledge for use by tribal water quality programs to inform and support CWA program activities and actions can be funded by Section 106 grants. Activities and actions include, but are not limited to:

- Documenting Indigenous Knowledge holder information and the collection (for example, funding travel and hosting meetings) of Indigenous Knowledge holder stories to support current and future tribal environmental staff in water quality goal setting and determining the status of those goals.
- Using Indigenous Knowledge along with scientific methodologies in assessing water quality.
- Supporting tribal environmental staff in developing approaches for how Indigenous Knowledge and monitoring data can be paired to create and complement comprehensive water quality goals, assessments, and decisions. This can include in-person training, courses, and reading materials.
- Developing communication materials for the tribal community to inform Indigenous Knowledge sharing and identify how Indigenous Knowledge supports tribal water quality programs. This can include the creation and participation in academic literature.

“Science can be a way of forming intimacy and respect with other species that is rivaled only by the observations of traditional knowledge holders. It can be a path to kinship” -Robin Wall Kimmerer, “Braiding Sweetgrass.”

“We cannot change our [indigenous] knowledge, but we have to work to make it acceptable in western science approaches” -Mervin Wright, Pyramid Lake Paiute Tribe.

Figure 7. Pyramid Lake, NV. Credit: Photo courtesy of Pyramid Lake Paiute Tribe.



Tribal Sovereignty When Adopting Indigenous Knowledge Into Water Quality Programs

Indigenous Knowledge is reflective of individual knowledge holder experiences and intuition. The application of that knowledge is unique to every circumstance. While the Section 106 Program supports the inclusion of Indigenous Knowledge into tribal water quality programs, the use or sharing of Indigenous Knowledge is optional. Sovereignty, protection of tribal cultural practices, and distrust are just some of the reasons why Tribes may not want to include Indigenous Knowledge into their water quality programs or share the knowledge outside of their Tribe. Tribal leadership and staff are often faced with the important and sometimes challenging task of educating their potential partners about the meaning and the role of Indigenous Knowledge in their respective culture. Often, they must do so while honoring the confidentiality of sensitive cultural information and respecting the boundaries of the privacy of tribal members.

The Section 106 Program is committed to respecting tribal Indigenous Knowledge sovereignty practices. Indigenous Knowledge informs many aspects of tribal water quality programs and the information shared by Indigenous Knowledge holders is owned by them. Tribes that use Section 106 funds to collect Indigenous Knowledge will not be required to report that shared knowledge as part of their grant requirements. Tribes are expected to meet the three reporting requirements (Monitoring Strategy, water quality data submitted through WQX, and Water Quality Assessment, as described in Chapter 6) but are not expected to share the underlying Indigenous Knowledge used to inform water quality objectives and management practices. Programmatic activities that reflect decisions based on Indigenous Knowledge, such as location of sampling sites and monitoring data, are still subject to grant reporting requirements; however, the Indigenous Knowledge-based rationale for site selection does not have to be reported to EPA. Where applicable, Tribes should engage with their Project Officers early to discuss how Indigenous Knowledge can be protected if it is used to influence policy and regulatory decision making.

Case Studies for Indigenous Knowledge Inclusion in Water Quality Programs

Dan Mosley, Northern Paiute, Nevada

Native peoples are connected to their Creator, and as stewards live in harmony with their environment, air, land, water, and ecosystems. Elders are the knowledge keepers, story tellers, and cultural bearers, which have been passed down through many generations in the original languages of the people. In this way, Native peoples can live in community in order to survive and subsist off the land.

Indigenous Knowledge is passed on when spending time with elders as they share their stories, songs, insights, and lessons learned when demonstrating or teaching the survival skills needed. For example, to fish, hunt, trap, construct shelters, canoes, fish weirs, and regalia; and when gathering traditional foods, medicines, and basket making materials.

I incorporate Indigenous Knowledge principles when teaching “learners” how to conduct water quality monitoring and physical habitat or biological assessments. Here are some examples of Indigenous Knowledge principles I share: “Our elders teach us that everything is alive, the land, the plants, water ... and they can speak to us. So, let the wetlands, river teach us, the plants, animals, and aquatic life speak to us. Be quiet and listen as you walk in the field. And they will let you know if they are in a good place, or not. Then we can take the course of action needed to bring everything back in harmony again. As caretakers, we can speak ‘life’ over the waters, and over the land.”

Denise Jensen, Winnebago Tribe

When I first started working with the Winnebago Tribe, I approached a Water Spirit Clan Elder asking how I should approach the water. He stated, “Never curse the water for it never sleeps.” Those words have remained in my heart throughout all these years.

The water is a person deserving of respect and honor. When approaching the water, I greet the water by name, such as “good morning, Omaha Creek”; request permission to step into its channel where upon we, the water and myself have a conversation. Mostly I think I do most of the talking and the water listens while still revealing things to me. As the water folds around my body, notice the temperature, speed, presence of floating debris. Notice how the banks are doing, presence of animal tracks, and anything else the water wants to tell me. After sampling is finished, thank the water for allowing me to intrude upon its solitude and thank the water and the Creator for another safe sampling session while leaving the area.

Nancy Schuldt, Fond du Lac Band of Lake Superior Chippewa

When I came to work for the Band, I had just finished grad school and moved to northern Minnesota for the job, knowing very little about either Anishinaabe culture or the Northern Lakes and Forest ecosystem. Within my first few weeks here, I attended a meeting of tribal staff working together on Lake Superior-wide issues alongside state, federal, and provincial agencies. I learned from the Red Cliff Band’s cultural specialist that, “in Ojibwe culture (as in other Indigenous cultures), women are considered the ‘keepers of the water.’ Women carry the sacred water to ceremonies and act on its behalf; women have a unique bond with water in that both are life-bearers. It is women’s responsibility to safeguard the water for all our relations.”

In setting up the Band’s WQS and monitoring program, that perspective has been an important guide. Although I came to this place with training only in science, it has been through tribal members and their willingness to share their knowledge of these waters with me that we have been able to define beneficial uses and establish standards to protect those traditional practices; to know where and when and how to respectfully access lakes, streams, and especially manoomin (wild rice) beds so that they are not damaged by our paddles or probes; to pay close attention to “all the relatives” in the ecosystem, not just the target species. They all have stories to tell us about the conditions they are experiencing, in the short term (like a recent road construction project) and the long term (like a changing climate and alterations to seasonal patterns).

Maddy Nyblade, Graduate Student in Earth and Environmental Sciences at the University of Minnesota

Upper Great Lakes Tribes, intertribal treaty organizations, and University of Minnesota-Twin Cities have come together to protect wild rice as the *Kawe Gidaa-naanaagadawendaamin Manoomin* (First We Must Consider Wild Rice) research collaborative. Wild Rice (Ojibwe: manoomin, Dakota: psiŋ, scientific name: *Zizania palustris*) grows naturally throughout the shallow lakes and streams of the upper Great Lakes region and is dependent on clean waters for survival. This plant provides spiritual, cultural, and physical sustenance as a sacred food for Anishinaabe, Dakota, Menominee, and many other Indigenous Peoples in this region. This research collaborative centers tribal priorities and approaches in researching Wild Rice and its waters. Both the partnership process and the scientific practice of this research collaborative have been informed and led by the Indigenous Knowledge and Indigenous methodologies,

as detailed in our paper, [*Transforming research and relationships through collaborative tribal-university partnerships on Manoomin \(wild rice\)*](#).

Our emerging methodology centers humility, reciprocity, personal connection, interrelatedness, spirit, and healing. Our values take shape through our practices, such as constructing Memoranda of Understanding and Data Sharing Agreements between tribal governments and university researchers; hosting knowledge-exchange workshops between tribal members and university researchers; learning through observation and interactions on collective fieldwork outings; collaboratively building conceptual models based in Ojibwe and western worldviews; engaging together in ceremony to respect the water before sampling; and sharing gratitude before starting each meeting. Our co-production methodology allows our science to connect to deeper understandings of the physical and relational dimensions of the environment. We have shifted and expanded research based on Indigenous Knowledge and the priorities of our tribal partners to encompass sites of cultural significance and to consider more environmental dimensions such as the role of sediment deposition, climate change, and human relationships.