Commission for Environmental Cooperation (CEC) of North America
Traditional Ecological Knowledge Expert Group (TEKEG)

Summary of the Trinational Forum on Indigenous Approaches to Freshwater Management in North America

27–28 November 2023

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Executive Summary

On 28–29 November 2023, the Trinational Forum on Indigenous Approaches to Freshwater Management was held and organized by the Commission for Environmental Cooperation (CEC) of North America and the Traditional Ecological Knowledge Expert Group (TEKEG) in Oaxaca, Mexico. The forum explored the vital role of Traditional Ecological Knowledge (TEK), stewardship practices, and the intersection with Indigenous rights in freshwater management across North America, which is now a wider part of CEC´s project titled: Indigenous Approaches to Freshwater in North America.

Indigenous People from the three countries (Mexico, United States, and Canada) gathered for two days to discuss the importance of incorporating TEK in water management experiences. The event was structured in five sessions to identify the major challenges, solutions, and recommendations to improve freshwater management in the region and incorporate an Indigenous People's perspective.

During the discussion, the participants raised the importance of recognizing and implementing Indigenous rights by the governments. The respect for the autonomy and sovereignty of Indigenous Peoples to manage their territories and natural resources was identified as a fundamental issue. Furthermore, the participants emphasized the right of Indigenous Peoples to be previously consulted in a free and informed way in every matter that can affect their territory, as well as to find mechanisms that benefit them in the instance of the implementation of any projects within their lands.

Indigenous nations and communities have strong relationships with water. This is reflected in the way they take care of water and the develop TEK over time to manage their natural resources. Some Indigenous communities have their own systems for managing, monitoring, and securing the sustainable use of this resource. These systems are based in TEK and are tied to their identity and their long presence on their lands.

"Water is life itself" was a phrase regularly invoked by the participants. Many speakers and audience members echoed the concept that water transcends being a mere resource—it is part of their identity. This can be seen in the origin stories of some groups, their rituals or ceremonies, and their daily practices. This identity and their relationships with water have caused some Indigenous actors and movements to organize for its defense and preservation.

The biggest challenges and impacts to sustainable freshwater management (and therefore Indigenous ways of life) mentioned by forum participants included: industrial development, colonization, colonial policies, and climate change. Nevertheless, resilience, resistance, community organization systems, the fight for control over their own lands, TEK itself, and the recruitment of new generations of Indigenous Peoples were mentioned as key to mitigating these threatening issues.

Several speakers noted that their groups self-identified as "guardians of the water." One of the main conclusions of the forum was the importance of involving youth. Passing on leadership, knowledge, and support for new generations is critical to defending water rights. There are many stories of determined efforts by Indigenous People to find ways of reconnecting people with the importance of caring for water and to empowering them to do so.

TEK is a living knowledge system that is continually growing and evolving, just as Western science does. To secure the sustainable management and effective governance of natural resources, Indigenous traditional knowledge and science should be complemented with information and technologies developed by Western science. Cooperation between

Indigenous People and governmental and academic research institutions could be a way to achieve this.

As part of the project and the mandate of the CEC to promote collaboration and find solutions between the three countries, the forum included a series of messages and recommendations directed to the governments and environmental ministries that concerned incorporation of Indigenous Peoples' perspectives on managing freshwater. The main recommendations were focused in three areas: supporting Indigenous autonomy and sovereignty; supporting education and TEK; and making regulatory changes that would support the previous two points and limit harmful actions by third-party actors.

At the conclusion of the forum, there was also a session focused on strengthening the CEC's push for the incorporation of Indigenous Peoples' visions and needs in the regional agenda towards freshwater management. The main recommendations included documenting and sharing success stories; promoting Indigenous representation in governments; capacity-building; strengthening the TEKEG and its faculties; and promoting multisectoral collaboration.

Caring for water and any other natural resource must be a responsibility shared among the three countries and the different sectors of society, government, and industry. Preserving and promoting the continued access, availability, and quality of freshwater is absolutely imperative.

I. Introduction

Traditional Ecological Knowledge (TEK) can play a key role in ensuring the sustainable and responsible use of our planet's most vital resource—fresh water. By recognizing the need to respect Indigenous rights and self-determination, the importance of TEK and by collaborating with Indigenous governments and communities, we can promote inclusive, equitable, and resilient freshwater management practices, protecting water for present and future generations.

The Trinational Forum on Indigenous Approaches to Freshwater Management, organized by the Commission for Environmental Cooperation (CEC) of North America sought to explore these vital roles of Traditional Ecological Knowledge, Indigenous stewardship practices and the intersection with Indigenous rights in freshwater management across North America.

The forum is part of a wider project of the CEC, titled: Indigenous Approaches to Freshwater in North America. As part of this, the CEC is also documenting Indigenous freshwater management initiatives in North America and making lessons learned available to the public through an online portal on CEC's website. This initiative includes a series of successful case studies identified by the Traditional Ecological Knowledge Expert Group (TEKEG) and an exchange of experiences through a knowledge dialogue to complement the successful case studies.

The CEC's landmark forum gathered Indigenous and non-Indigenous People from the three countries of North America—Mexico, United States and Canada—to present important water management experiences.

The forum lasted two days and was divided in five sessions: (1) CEC Case Studies (2) Indigenous-led Water Restoration and Conservation Projects across North America: Strengthening Collaboration between Indigenous Peoples, Local Communities and Other Key Actors on Freshwater Management; (3) Dialogue and Recommendations; (4) Applying and Co-Applying Indigenous Science to Freshwater Management: Bridging Knowledge Systems; and(5) the CEC's mandate, projects, and initiatives.

This document summarizes the main ideas expressed during the presentations of the panelists and the conversations with the assistants held during the forum.[1]

Welcoming Ceremony in Charge of Amelia Monteros Reyes Gijón, Nahuatl from the State of Mexico, Mexico

We are in a really important and representative place. Oaxaca is the state of Mexico that has the most Indigenous People and largest population of Indigenous language speakers. The state is divided in eight regions and a town that was never conquered while still preserving its traditions and customs.

I am grateful to my ancestors and the ancestors of this land for letting us work here. I am grateful to Mother Earth, and ask my ancestors, and your ancestors, for our words to be heard and spread like the wind. I ask and thank the guardians of the four points to let us be the bond and the fraternity. Tlazocamati![2]

I thank each one of you for helping to achieve the impossible and leaving your families to be here. I hope the work of these days is fruitful for Mother Earth and all the elements inside her: the water, the sun, the wind, and nature.

[1] A wider narrative report with a larger description of the cases, presentations, and question and answer sessions can also be reviewed.
[2] Tlazocamati means to have a very high esteem, in Nahuatl language.

Today, in this place, with so much cultural diversity, we thank our ancestors and ask them to let our words flow.

Tlazocamati and thanks to all of you!

Welcome!

II. Indigenous Rights in Freshwater Management

One of the main themes discussed during the forum was the importance of the three governments recognizing and implementing Indigenous rights. The major necessity identified by the panelists and assistants is related to the respect for the autonomy and sovereignty of Indigenous People to manage their territories and natural resources.

Due to their presence since ancestral times, Indigenous People have developed significant knowledge about the sustainability and well-being of the territories in which they live and they have sustainably stewarded their resources for generations. However, it has been all too common to observe many Indigenous nations and communities struggle for decades to maintain autonomy and control over their territories.

For this reason, the main recommendation to the governments and environmental ministries is to respect this autonomy and sovereignty and reflect it in laws, projects, programs and legal mechanisms that secure Indigenous rights. An example of this would be the right of Indigenous People to have free, prior and informed consent on any matter that can affect their territory and find a mechanism that shares benefits with them, where projects are implemented within their lands.

In freshwater management, some Indigenous communities have developed their own systems to manage, monitor and secure the sustainable use of this resource. Most of these systems are based in TEK and are linked with their identity and a long presence over their lands. Some representative cases are presented below.

The Taku Tlingit People and Constructing the Vision of Their Territory

This case, presented by Charmaine Thom, Spokesperson of this First Nation in Canada, was focused on how the Taku River Tlingit People have been protecting their water and land, as well as negotiating with the Canadian government to establish land protection that reflects their way of life and vision over their territory.

In 2003, the Taku Tlingit People leadership wrote their Constitution in consultation with their elders, and in it they established the main principles for protecting and governing their lands for present and future generations. This was the basis for the meetings and negotiations with the Canadian Government to support their way of life.

In 2009, the Tlingit People published the Tlatsini Vision Map, a project to develop a territory-wide land protection plan that outlines the areas of high ecological and cultural value from their own perspective in a collective way. With the Tlatsini Vision Map as the basis for negotiation, in 2011, the Atlin Taku Land Use Plan was approved by the Government of British Columbia. However, not all the areas that had been identified on the map as priorities for conservation were protected, particularly the southern portion of the Taku Watershed.

In 2023, the Taku Tlatsini Indigenous Protected and Conserved Area (IPCA) Declaration was released, and it identified 60 percent of the Taku Watershed as Tlatsini protected areas. The IPCA includes existing protected areas, important wildlife habitats, and culturally important landscapes that provide for climate change resilience now and into the future. The IPCA also establishes that industrial development and mineral exploration and development by the Taku River Tlingit First Nation are subject to free, prior and informed consent, ensuring that projects

are developed in an environmentally and culturally sensitive manner that generates meaningful employment and benefits for the Tlingit people over the long term.

Coordinator of Towns Defending the Water (COPUDA, by its Spanish acronym) and the Organization between Communities to Manage Their Resources

Ernesto Santiago Martínez, President of COPUDA, described how communities of the Central Valleys of Oaxaca, Mexico, got organized to claim their right for the use and management of water in times of scarcity.

It all started in 2005 when the communities, and especially the farmers, began to suffer from water scarcity due to a drought that diminished water levels significantly. Because of the scarcity, farmers had to pump from deeper levels, raising their electric bills considerably. Instead of having support from the State, the farmers were asked for a surplus for the use of water and electricity, which triggered the first assembly between towns in 2006.

The COPUDA was created as an organization of communities that struggled for the same issues: to protect their territory, to secure the use of their resources, and to build a common front against unjust actions of the State. Now they are involved on three different fronts: the organization inside the communities and between them, the management of freshwater, and such legal issues as the right to preferential use of resources in their territory, autonomy, and self-determination.

One of the biggest achievements of the movement has been determining an Indigenous authority for water management that includes several authorities at the interior of the communities so there is a more organized collective work. As part of the system, they monitor the aquifer and generate their own information.

“The final purpose is that the next generations see the land as something that supports life, not just a resource; something that can generate well-being for everyone. At the COPUDA we say that it is our water, because it is our territory, and therefore, our right. When we extract the water for the vegetables and fruits, we produce life; we give life to our people—from our communities, respecting our own structures.”

The Shoshone-Bannock Nation and the Negotiations for Their Water Rights

Jeanette Wolfley, member of the Shoshone-Bannock Nation and inhabitant of the Fort Hall Reservation, presented the story of the negotiations between her tribal nation and the State of Idaho in the United States, for the recognition of their water rights.

The Shoshone and Bannock Tribes were settled before the colony close to the Biagaweit, which means big or mighty water stream, also called the Snake River. This river flows from Yellowstone National Park in Wyoming through the Fort Hall Reservation in Idaho. The Fort Hall Reservation, in the territory of the Shoshone-Bannock Nation, was established by Executive Order in 1867 and affirmed in the 1868 Treaty of Fort Bridger. Its original area was some 1.2 million acres, established with the purpose of “absolute and undisturbed use and occupation” of the tribes, and to be” their permanent homeland.” The present-day Fort Hall reservation covers 546,000 contiguous acres.

According to the Tribal Waters Rights, which are the senior water appropriation systems in the western United States, water is implicitly reserved for the Tribes when the Tribal homelands are set aside to fulfill the purpose of the reservation: agriculture, culture, and so forth.

This has generated a lot of conflict within the water system because the non-Indian settlers who have come to the West to build homelands or villages, arrive thinking they have water rights, but are informed by the Tribe: “we have had the water since 1868, you arrived here in 1932, so we get the water first.” What happened then is that the Tribes created an adjudication

of tribal water rights in the West, established through litigation or settlement agreement. In this way the Tribes are renegotiating their rights.

The Shoshone Bannock Nation started a negotiation with the State of Idaho in 1985 to determine their water rights. The Tribal Council had resources saved for this. They began the negotiations in 1987, asking for the water management rights of the Snake River, and in 1990, reached the Fort Hall Indian Water Rights Agreement. In this agreement, they secured 581,031 acre-feet per year of water from the Snake River Basin for present and future uses. Their main uses are irrigation and domestic, commercial, industrial, municipal uses, stock water, instream flows, and leasing the water, if there is any left over. Leasing water is very important, as it increases resources to their Water Department.

III. Challenges, Impacts, and Resilience

During the forum, panelists and assistants identified some of the biggest challenges and impacts to the sustainable management of freshwater, as well as the erosion of Indigenous ways of life, such as: climate change, industrial development, colonization, and colonial policies. Nevertheless, resilience, community organizational systems, TEK, and involvement of the new generations of some Indigenous communities are considered the main factors to mitigate these threatening issues. As an example of the resilience of these Indigenous nations, we have described below a couple of cases presented at the forum.

The Gwich'in Tribes and the Protection of the Arctic

This case was narrated by Sarah James, a respected Elder from the Neets'aii Gwich'in village of Vashraii K'oo (Arctic Village) and Spokesperson for the Tribes of Arctic Village Council, Venetie Tribal Council and Native Village of Venetie Tribal Government on the Arctic Refuge, and Edward Alexander, from Gwichyaa Zhee Gwich'in (Fort Yukon), who is Co-Chair of the Gwich'In Council International. As part of the CEC's TEKEG project, a video of this case was filmed and shown at the forum. Their video, "There Was Only Water in the Beginning," is about the struggles of the Gwich'in People to protect their waters, lands and animals essential for their way of life with TEK interviews in Arctic Village in Alaska in the United States and about concerns mainly provoked by the climate change, and their actions to protect their caribou, land, water and the Boreal Yedoma.

For the Gwich'in People, water is at the beginning of everything. A version of theirCreation Story, shared with many other First Nations, centers around a woman in a raft who asked a muskrat to swim to the bottom of the river with a cord tied to its leg to bring some mud from the depths in order to make land. The muskrat swam but was not able to get to the bottom. When the woman pulled the muskrat back, it was already dead, so she breathed into the muskrat's mouth and revived it. The muskrat dove down again, but the same thing happened. It was not until the third time that the muskrat was able to bring a little bit of mud from its paw and gave it to the woman, who took it and sang until the land was created. That is how the valleys and mountains were born. "The Gwich'in are responsible for the creation of the land, and that means we have to take care of it."[3]

The Gwich'in territory extends from Arctic Village North of the Arctic Circle to Canada and is divided into 15 villages. The border [between Alaska and Canada] split the villages 150 years ago, but they share language and traditions. They are Caribou People and TEK says they have been where the Porcupine Caribou have been since time immemorial. Their territory encompasses many rivers, but in Arctic Village there was no running water until 1984 and most homes still do not have it.

[3] Similar versions of this creation story were mentioned at the forum for different Indigenous Nations, such as the Haudenosaunee Nation, the Asaabikone-zaaga'iganiing Nation and the Shoshone-Bannock Nation.

The Gwich'in freshwater resources come from two big watersheds: the Yukon River with headwaters in the Brooks Range from which major rivers flow (Porcupine, Chandler, Black River and Sheenjek) and the Mackenzie River which flows into the Beaufort Sea/Arctic Ocean. They have thousands of lakes, rivers and streams in these watersheds. Ancient glaciers in the mountains provide water that is still running even in winter, and in fall the water overflows and freezes. There are approximately 12 glaciers, or river icings, in streams around Arctic Village where they get their fresh water. The presence of snow and ice provides the opportunity to travel and access to fresh water. In addition, animals such as Porcupine caribou cross watersheds over the mountains to the Arctic Coastal Plain where water is very limited on the caribou birthplace and nursery, and where river icings provide insect relief for the migrating animals. Furthermore, migratory birds, which nest in the Arctic, travel across to vital wetlands and waters across the world. All these sources are critical for cultural purposes and ways of life.

Their directional and orientational system is based on the water. Nevertheless, global warming is hindering their access to clean water. The temperature of the water is rising rapidly, causing the glaciers to melt earlier each year and this impacts the fish population.

The Gwich'in have tribal governments and have also formed the Gwich'in Council International with the mission of amplifying the Gwich'in Nation voice in subjects of sustainable development and environment at an international level to support healthy and resilient communities. It represents 10,000 members of the Gwich'in Nation in Alaska, the Yukon and the NWT as a permanent participant in the Arctic Council.

The Arctic Council encompasses eight Arctic States: The United States, Canada, the Russian Federation, Iceland, Sweden, Norway, the Kingdom of Denmark, and Finland. It also has six permanent participants: the Gwich'in International Council, the Inuit Circumpolar Council, Saami Council, Russian Association of Indigenous Peoples of the North, Arctic Athabaskan Council, and Aleut International Association.

The immense importance of the Arctic is due to the fact that it is the largest boreal forest in the world and it contains as much greenhouse gas (carbon, methane, nitrous oxide, etc.) as the entire global atmosphere. Under its soil lies the biggest supply of permafrost in the Northern hemisphere, containing double the amount of greenhouse gasses as the atmosphere of the entire planet. This is called the Boreal Yedoma, rich in organic material, and its degradation is a significant threat to the survival of the entire planet.

The Yedoma is concentrated in a small area of the Yukon Territory, Alaska, and Russia. It is an ancestral carbon gas with a rich greenhouse effect stored in frozen freshwater deposits. It is fragile and could collapse, something that could cause a significant contribution of emissions if the Arctic keeps burning and melting due to wildfires in the North (wildfires have touched 64% of the Yukon plains between 1960 to 2020).

However, the Gwich'in People have taken action to protect the Yedoma. They have promoted and protected biodiversity and have crews to deal with the fires. They also manage their land and resources in a responsible way. Sovereignty over the land is a critical component of being able to respond effectively.

The wildfire problem is a responsibility that should be addressed by everyone, and not only Indigenous People. International cooperation and collaboration are crucial to address global warming. In order for that to happen, there needs to be access and contribution to fund Indigenous People to create knowledge and expertise, respecting their sovereignty. This is a shared responsibility, and we all need to take care of freshwater and address the wildfires from the North. There is a need for more research and inclusion of Traditional Indigenous Knowledge. We all need to find a way to keep the Yedoma frozen.

The Yedoma is ripe for partners seeking forest preservation and carbon credit swaps.

The Struggle of the Cheyennes Defending Their Way of Life

This talk, by Gail Small, a Cheyenne leader born in Montana and a TEKEG member, was narrated in first person, because as she said: "it's through history that we learn best. And that's what traditional ecological knowledge is, the history of our people."

> *I come from the Cheyenne Ethnicity, that means the Original People, we call ourselves the Real people. As Indigenous People we don't fit in Western science, the colonial government structure, or the education system.*
>
> *A bit of context from my chat about TEK. The Northern Cheyenne Reservation is so small; our territory was vast. We were the Warrior Tribes, the Fighting Cheyennes.*
>
> *Homeland is the base of our knowledge. We don't need McDonald's, we can survive in this land, but we need our land. We are hunters, women are gatherers. I grew up with my mom, and she taught me everything about plants– every flower, every plant.*
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> *There is a saying in my tribe: "some of us only live like the breath of buffalo in the winter. Some of us only live briefly like certain flowers." That's what they said about sudden infant death syndrome, that the child was like a beautiful flower. That's TEK, the beautiful philosophy we have.*
>
> *The center of everything is love. Why don't we hear that word in Western science? It's love of your people, love of your homeland that makes our kinship strong. The first thing you learn is your kinship: who are you, your identity, where you come from. That's what we do when we are born. When you are born, they give you your Cheyenne name. You know who your family is, and you know where you are from. Your parents have given you TEK since the beginning.*
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> *We have a matrilineal society. My father is from another village, but when he got married to my mom, he moved to my village. My mom acquired all the land from his mother, that is matrilineal, that is TEK; it's very different from how American people see their life. Women are like toys for boys. But no, remember, you are a warrior woman, remember that. That is TEK, you know your role.*
>
> *As for the environment, my tribe voted for a homeland. We found we have the richest coal. The Bureau of Indian Affairs came in the 70s and convinced the Tribes to mine their lands and took 50% of our lands. They didn't speak English, they all spoke Cheyenne, and were told they were going to be given schools and hospitals if you sign here. The price was ten cents per ton, a dime for a ton of coal, and some of these leases are still running. My life was about canceling these close leases—it took us 15 years. We sued the Bureau of Indian Affairs, and we put a halt to mining. It took us a lot of time and money.*
>
> *We fought for our homeland, for our air. Next thing you know, coal mining is booming all around us. How are we going to get clean air, clean water? You have to play their game. I became a lawyer, and I learned about class one air quality. We are going to get air quality and protect our airsheds.*
>
> *They told us, "You are not really a government, we can't give you tribal implementation money to monitor your air." They were discouraging; they were not allies, so we had to go into a legal settlement with the coal companies: "We are going to let you develop these first two power plants. In exchange we want money to build our monitoring*

stations." That's what we had to do to monitor our air, because the federal government refused to support our sovereignty.

Next, clean water. When you strip mines, you take away the clean water, the aquifer. To protect our water, we passed our water quality standards, and that is our right as a recognized Tribal government. They refused to approve our water quality standards for five years, because during that time, coal mining had a boom. Then they started drilling and taking away all the natural gas around us and draining our water. So we fought back. "We are going to use our water quality standards whether you approve them or not." At every step along our way, the government has not been our ally.

Today we talk about the sacrifices, we could have been rich. It took 30 years for my community to get a high school. They want to keep us low, so they can manipulate our thinking and take what they want. Our Indian health clinic is pitiful, and we never got a hospital. These are treaty rights. My tribe is a signatory of the Fort Laramie Treaty. We were supposed to get schools, doctors, hospitals, and support for our people in return for living in this little piece of land, because we gave away a vast part of our territory.

I want to close with a call of action. We lost a lot of our elders during the pandemic. They are like libraries, they are the holders of our TEK. It is important that you go out in your communities and start documenting this knowledge by yourselves. Go with your grandparents, your parents, your aunts, and uncles, because that knowledge is getting lost pretty quickly. And use that knowledge to dream. What do you desire? What do you want for your grandchildren? That's what we think, the desire for a better life. And one of the hardest things to do is to dream for a better life, because when you are under the thumb, you have no money, no scope—how are you going to put food on the table? And many of our people are in that situation now. So how do you dream of a better future?

IV. Cultural Aspects of Freshwater Management

"Water is life itself" was a recurrent phrase invoked by the participants. The relationship of some Indigenous nations and communities with water transcends the idea of it being a mere resource; it's a part of their identity. This can be seen through the foundational creation stories of some of Indigenous towns, like in the story of the muskrat and the creation of the earth; or through their rituals, like the ceremonies celebrated in some Indigenous communities in Mexico every third of May.

It's around this identity and relationship with water that some Indigenous' actions and movements to defend it get articulated, like the COPUDA in Oaxaca, Mexico, or the actions to take care of this resource by the Gwich'in people.

To keep this tradition of Indigenous People self-identifying as "guardians of the water," one of the main conclusions of the forum was about the importance of involving the youth and passing on to the new generations the knowledge and interest to take care of this element. This idea is tied to the constant efforts that Indigenous People are leading to find ways to reconnect people with water in order to raise awareness on the importance of caring for water for the survival of the planet. The next two cases illustrate significant efforts to strengthen the relationship between human beings and water.

The Indigenous Peoples Tasks Force and Their Effort to Reconnect People with Water

Sharon M. Day, Founder and Director of the *The Indigenous Peoples' Task Force* and member of the Asaabikone-zaaga'iganiing Nation spoke about the importance of reconnecting with the environment and transmitting the importance of taking care of nature for the future generations.

Part of Sharon's work along with her NGO from Wisconsin in the United States is to grow organic seeds and products with the goal of getting young mothers to feed their children these healthy and natural foods. Their farming practices are free of herbicides or pesticides, and they use goats for fertilization. They intentionally farm this way to have an environment that is safe for all creatures including pollinators, fish, deer, birds, and humans. This, of course, also includes water.

In their culture, along with others from the Midwest, they believe that it is the responsibility of women to take care of the water. They gather the water, pray for the water, and walk for the water. They organize the Nibi Walk, a ceremony where they walk and pray for the water.

"What we are trying to do is to be able to pass the knowledge of taking care of the Earth to our sons and daughters. The good grain, what we were given, these teachings of our grandmothers and grandfathers. We want to achieve peace. If we take care of the water, respect the water, be thankful for water, we recognize we are water. Our bodies are 65% water. If we can treat the water with love, respect and gratitude, we can also treat ourselves like that."

Machi-Ko NGO and his Educational Model

Cirila Ángel, an Indigenous leader and agroecological engineer, who is the Intercultural Director at Machi-Ko, an NGO located at Guachochi in the mountains of Chihuahua, Mexico, was focused on the environmental education model of children, teenagers, and adults of the organization.

Machi-Ko works with Indigenous People of Chihuahua to teach and practice for care of the Earth. They have a multifunctional center that is divided in four areas: earth, water, wind, and fire. In the soil section, they take care of the animals, prepare compost, and produce food from organic material. In the water area, they produce food using aquaponic methods in geodesic structures that function like greenhouses. For wind, they have sustainable constructions powered with renewable energies for people to get trained in these construction styles. And for fire they promote human interaction with the environment. All their work is done with an ecological lens.

Another main component of the center is the literary creation of stories for children and the translation of these tales in different languages: Spanish, Tarahumara, and English. These small books can be accessed by the kids anywhere so they don't need the internet to read them.

Regarding water, they have been promoting the use of materials, such as wire, rubber, cement, to capture the rainwater for different purposes that can be used during the drought season. The government has given them Rotoplas[4] water tanks before for capturing the water, but their system lasts longer, it's economical, and doesn't take that long in getting built.

V. Indigenous Knowledge Systems and Science

TEK comes from practices, cultures, and traditions passed down from generation to generation of the Indigenous People since ancient times. It's a living knowledge system that is constantly getting enriched and should be valued in the same way as Western science. The most contemporary version of TEK is what is now named Indigenous science.

In order to secure the sustainable management and a real governance of natural resources, there is a need to complement Indigenous traditional knowledge and science with information

[4] Rotoplas is a popular brand of plastic water tanks in Mexico.

and technologies developed by Western science. The cases presented above are examples of efforts rescuing ancient knowledge and technologies, complementing different knowledge systems, and implementing models of collaboration between indigenous communities and governmental agencies.

The Ancient and Living Technology of Jaltunes in the Mayan Peninsula

Cessia Esther Chuc Uc, former TEKEG member and social anthropologist with Mayan roots, specializing in working with Melipona bees, and Eunice Uc González, archaeologist from the National Institute of Anthropology and History of Mexico (INAH, its Spanish acronym) discussed a project to research ancient technologies for storing and, where necessary, purifying rainwater. They also discussed the transmission of this knowledge to children and youth as well as the role of biodiversity in their territory. The project is being developed in the Yucatán Península. As part of the CEC's TEKEG project, a video of this case had been filmed and was projected at the forum.

The soil from the jungle in the Mayan Peninsula tends to be stony and karstic, with particular characteristics linked to the appearance of natural wells in the ground named *jaltunes.* The Spanish word *jaltún* derives from the mayan *chultun* and refers to natural wells that supply water to the houses, farmers, and animals of the jungle.

The jaltunes have been used and taken care of since ancestral times from the Mayans. They get full during the rainy season and can be used for the crops and domestic purposes. As part of their care, people keep them clean using the *Xanab Mukuy* and the *Sid* plants to remove mud and unwanted things from the well. Traditionally, children are asked to keep the *jaltunes* clean because their small hands get to the bottom of them easily.

As part of the project, the researchers have also been studying and restoring the water reservoirs built by the Mayans in the ancient city of Uxmal, which at its height had more than 20,000 habitants. The artificial water systems were crucial for the survival of the habitants from this city during the Classic Period. The system consisted of the construction of *casimbas*, or holes in the ground, that worked as cisterns that filled up during the rainy season. They were then covered and the water was supplied and rationed to the population during the dry season. These systems are not active now, but they are considered a possible remedy for current problems of diminished water levels during the rainy seasons.

At present, it is crucial that new generations learn about the importance of these systems, which can be an ecological alternative for the people of the region. For this reason, part of the project is presenting workshops in Campeche to children and youth so they recover this traditional ecological knowledge.

Water Forever in the Mixtec Region of Oaxaca and Puebla in Mexico

Gisela Herrerías, a member of *Alternatives and Participation Processes,* founded in 1980 discussed the organization's two principal programs: Water Forever and the Quali Cooperative group (the latter focuses on the recovery of the amaranth (a plant with pre-Hispanic origins). The objective of these programs is to promote regional sustainable development to benefit the poorest farmers and Indigenous families, by raising their levels of hydric, dietary, economic, and ecological security to combat poverty, inequality and disease.

The project started with a participatory research methodology, asking local people what was needed to improve poverty and marginalization in the region. The main answer was water: "without water, we can't do anything."

The organization has 43 years of working experience in the Mixtec Region with localities from Oaxaca and Puebla in the watersheds of the Papaloapan and Balsas rivers. The territory is divided into basins and sub-basins to ease the work in this vast territory. At Water Forever

there is a combination of recovering ancestral techniques and supporting them with the new technologies. It is important to note that the engineers working in the organization are people of the region, and they are the ones that direct this program.

For the organization, it is important to have an integrated natural resource management program encompassing water, soil, and vegetation. These elements are not treated separately. For example, a reforestation project in the Oaxaca Mixtec brought water back to the "dry well." Educational methodologies about how to regenerate the watersheds are used: Water Pots, where the farmers assign a part of their cropland to make deposits for water; catchment and storing rainwater systems; sides and ditches to avoid erosion and retain water; noria wells (with water wheels for bringing up water); amaranth crops supported by Water Pots and drip irrigation to take advantage of the scarce water supply from the region.

The effort is a display of TEK concepts and understandings of water management blending with contemporary materials and machinery. Projects will often have as their basic design an indigenous concept, but that is put into practice using cement and backhoes.

The organization started a Water Museum in 1999 to transmit what the program is about and how to do ecological regeneration to have more healthy water, soil, and vegetation. It is part of a Global Network of Water Museums from the United Nations Educational, Scientific, and Cultural Organization (UNESCO).

For Gisela, the key is not to have people say: "that's nice," but something more along the lines of "what can I do that could change my relationship with the water in daily life, in my hometown?" Environmental education should lead to action—otherwise it is not environmental education.

The Kahnawá:ke Environment Protection Office of the Mohawk Council

Brandon Rice, an experienced hunter and fisherman from the Mohawk Nation at Kahnawá:ke in Quebec, Canada, works as a Project Support Technician for the Kahnawá:ke Environment Protection Office. Brandon relayed the story of how the Kahnawá:ke community started their own environmental office with the mission of placing the community point of view and Traditional knowledge at its center. This initiative is called the North Creek Community Envisioning Project and is focused on involving the community in the care of their lands and water, specifically the Creek.

The community of Kahnawake is located on the banks of the St. Lawrence River's South Shore of Montreal, Quebec, Canada. The Mohawks are part of the Haudenosaunee Nation, which means "the People fof the Longhouse" and are a confederation of Six First Nations. A matriarchal society, the women are at the center, and the society is structured in a clan system, with every nation divided into a different number of clans. Rather than voting, their decisions are made by consensus. They are ruled by the Great Law of Peace, which is incorporated into their constitution.

People from the Six Haudenosaunee Confederacy Nations are principally an agricultural people, with their main crops being what they refer to as the three sisters: corn, beans, and squash. They also hunt and fish, but their main means of sustenance is from agriculture. For them, both water and these crops are precious. In their language, to say ´"I love you" is expressed as "you are as precious to me as the rain."

In the 1950s, the Mohawk People saw a large expropriation of their land, specifically their waterfront property, undercutting the heart of their community and destroying hundreds of acres of riverfront for constructing the Saint Lawrence Seaway. The government project dumped the clay and bedrock to create arable land, but this brought about severe changes, in addition to the land lost, the language was negatively affected, as was culture, the people's

connection to their river, and a feeling of cultural stagnation. Today, the effects of low water levels and sedimentation in their bay and recreation areas remain issues that create local challenges.

Because of these setbacks, the community took environmental actions and issues into their own hands, creating the foundation for the movement to establish their environmental office. The community has led multiple protests over the years, such as blocking the Archipel Hydro Project, a hydro dam that was going to destroy the rapids in the St. Lawrence and affect the sturgeon that the Haudenosaunee use for nutritional purposes. Through imposed governance and resultant funding as an Indian Act Band, the Kahnawak:e community made the best of their situation by using the financing to continue to grow and lead their own projects, including their environmental office.

The North Creek Community Visioning Project, led by the environmental office, started with an assessment and monitoring of the North Creek. They also began to ask community members to relate the stories and uses of the Creek to recapture the historic memory of their lands. Now they have implemented community workshops that include walks along the Creek and interviews with the elders. Their elders help them understand the changes that have happened to the Creek over time, as well as their vision of the future, and how the Creek could be restored.

As they move to a restoration phase planned for next year, they are using the vision of the community to guide their work and let the community choose how to continue with the restoration of the Creek. They will gather the information to present different options to the whole community, asking them to determine the path forward.

The Indigenous Science Division of Environment and Climate Change in Canada

Paul MacDonald, the Director of the Science Division (ISD) from Environment and Climate Change in Canada (ECCC) relayed the story about how the Division, formed in January 2022, has been bridging, braiding, and weaving Indigenous science with Western science.

Indigenous science is a distinct, time-tested, and methodological knowledge system that can enhance and complement Western science. The main difference from Indigenous science and Traditional knowledge is that Indigenous science represents the modern continuation of Traditional knowledge. Indigenous science is built on Traditional knowledge and applied to climate change impacts and adaptations, prevention of wildfires, land stewardship, wildlife protection, and species at risk, for example.

The Indigenous Science Division of ECCC is Indigenous-led, and its specific objective is to develop and apply an Indigenous lens to ECCC science, policy, and program activities. By applying an Indigenous lens, the Division has committed to support Indigenous leadership and innovation in science. An example of this is the Indigenous Voices Series, a monthly online meeting where Indigenous scholars present their work.

By bridging these two fields, the Division fosters awareness, understanding and recognition of Indigenous science as distinct and equal to Western scientific approaches. To bridge these two areas, language is crucial, making workshops about language and its importance key to successfully incorporating this new integrated approach.

Braiding, according to the Indigenous Science Division Team, is bringing together Indigenous science and Western science systems to achieve a holistic understanding of the environment while maintaining the integrity of each knowledge system.

Weaving involves appreciating and applying the tools of Indigenous science, to inform approaches on environmental issues and species management in ways that align with the

approaches specified by Indigenous Nations, governments, specific communities and international instruments such as the *United Nations Declaration on the Rights of Indigenous Peoples*.

In terms of freshwater management, the Government of Canada recognizes the importance of Indigenous communities and of supporting Indigenous peoples and governance to ensure their inclusion and consideration in any decision-making regarding regulatory affairs, research, policy and project development.

VI. Key insights

At the beginning of the second day, Kathy Hodgson-Smith, TEKEG Facilitator, guided an exercise in which she made 35 statements related to TEK and freshwater management, according to the work from the previous day, and asked the attendants to write down their level of agreement with each statement. The average level of agreement was measured on a scale from 0 to 3, where 0 meant not agreeing at all, and 3 being in complete agreement (see following table).

Statements	Average level of agreement
Traditional knowledge is an expression of Indigenous peoples' self-determination and sovereignty	2.52
Indigenous sovereignty is key to environmental protection and management	2.78
TEK is best accessed through collaborative dialogue and relations of trust and cooperation	2.47
TEK use requires inclusion of gendered/distinct voices from within our communities.	2.7
TEK is informed by Indigenous People's customary laws, institutions and authorities	2.56
TEK is not informed by colonially established boundaries, including international, state or provincial/ regional/ reserve boundaries.	2.39
TEK is informed by the relationship of Indigenous nations to their traditional territories	2.26
TEK is understood in a cultural context of reciprocity	2.65
TEK is a way of life and a system of knowledge that has been passed from generation to generation	2.69
Intergenerational knowledge transfer ensures knowledge will be available for future generations	2.60
TEK is dependent upon the education and inclusion of children and youth.	2.78
TEK has an indivisible spiritual foundation	2.52
TEK is the path by which we balance humanity, nature and the divine	2.82
TEK expresses values, knowledge and skills which were relied upon by indigenous people since time immemorial	2.78
TEK is a valuable tool to identify and prioritize matters of concern. (ie: freshwater management; fish habitat)	2.82
TEK is a valuable to identify and prioritize key areas to be protected	2.86
TEK is dependent upon the revitalization and preservation of Indigenous	2.39

languages	
Customary laws inform TEK	2.65
TEK use will contribute to the wellbeing of future generations	2.82
TEK is best expressed through local and regional expertise	2.52
TEK requires continued access to and use of traditional lands	2.39
Engagement and use of TEK must be used informed by human rights and intercultural approaches	2.82
TEK is an expression of Indigenous knowledge systems	2.73
TEK use is best placed in consensus decision-making models	2.65
TEK must be valued equally with other knowledge systems	2.65
TEK must be given mutual respect and consideration as with other knowledge systems	2.82
TEK is an expression of Indigenous´ Peoples relationship to land	2.91
TEK is premised on a cosmovision that humanity can live in harmony with nature	2.91
TEK use must be in alignment and consultation with the institutions of indigenous peoples	2.69
Indigenous and human rights frameworks must inform any use of TEK	2.73
Indigenous peoples must consent freely and prior to the use of their TEK	2.56
TEK is understood as an expression to build healthy resilient communities and environment.	2.78
TEK is understood in the context of the inherited rights of Indigenous Peoples arising from the prior occupation of indigenous peoples on their traditional territories	2.52
All life exists within the sacred circle of earth which is made up of water, air, fire, and earth.	2.82
Nature is sacred and the traditional territories of Indigenous Peoples are holy spaces which require the need to balance the three essential forces: nature, humans and the divine.	2.86

VII. Dialogue and Messages for the Governments

As a trinational organization, the CEC works with the three countries and promotes collaboration between them. The forum presented an historic opportunity to listen to the needs and proposals directly from Indigenous Peoples from the three countries.

To gather inputs for the TEKEG project and elaborate on public policy recommendations to incorporate Indigenous traditional knowledge on freshwater management, the assistants at the forum worked at their tables for roughly an hour, answering three questions:

1. From the things you have heard today, what were the most inspiring? What gives you hope?
2. What are the common themes that you have heard today?
3. Imagine that your environmental ministers are in front of you, and as you reflect on the presentations from today, what messages would you transmit to them?

A summary of the answers is presented in three tables below.

Inspiring Themes	
Gathering knowledge, experience, and work from Indigenous communities are critical for a sustainable future.	The deep spiritual connection of Indigenous People with water.
	The daily work and commitment of Indigenous People to take care of water, based on their communitarian structures.
	Application of particular experiences and knowledge from the different Indigenous communities applied to their own context.
	Passion and power from Indigenous People to build healthy and resilient communities for the future.
	Awareness provoked by the work that the communities are doing.
Inclusion and participation of youth and women are critical to effectively stewarding water and the territory	Young people and women engaged in environmental issues and in defense of the territory.
	Education and intergenerational knowledge transmission.
	Processes of sharing knowledge and experience between Indigenous communities.

Common Themes	
Indigenous governance of water resources is essential	Communities are working in a holistic way to protect water.
	Governance of the water in Indigenous communities. Each town possesses critical knowledge and should have sovereignty to make appropriate management decisions.
	Autonomy should not be feared by the governments.
	Support between communities.
Indigenous identity is intimately tied to freshwater	The original myths from the communities are still valid. Water is not considered a resource; it is considered life itself.
	There is a need to resume TEK to create narratives and stories.
	There is a need to strengthen the social fabric of the communities.
	The level of significance given to the bond between water and food production by the communities.

TEK needs to be shared and passed on through environmental education and transfer of knowledge	The importance of education at all levels and the intergenerational transfer of knowledge.

Messages for the Environmental Ministers	
Support Indigenous autonomy and sovereignty	Governments should let the communities manage their own resources.
	Strengthen local and regional initiatives from Indigenous People.
	Funding for the activities and actions of the communities that are currently managing their resources in a successful and ecological way.
	Give direct funding to Indigenous nations so they can lead their own initiatives.
	Provide resources to support leadership by Indigenous People, because not all the ministries have the capacities to work with Indigenous People.
	Support the production (and storage) of Indigenous scientific data.
Support education and traditional ecological knowledge	Education is the basis of everything. Promote intercultural education of the knowledge of the communities that inhabit the territories.
	Protect and support traditional Indigenous knowledge.
	Promote intercultural dialogue between people of different territories to share this knowledge.
	Support capacity-building processes for freshwater and natural resources management.
Regulatory changes	Incorporate the points of view, concerns, and TEK of Indigenous People in the design of policies, programs, and projects.
	Incorporate consultation processes to understand the needs and concerns of the Indigenous communities. These processes should be done with different government offices present: mining, energy, water, etc.
	The ratification, fulfillment, and implementation of environmental international treaties and agreements by the countries.
	Deny permits and concessions to non-sustainable, extractivist projects, and review the ones that have already been given but that are not adhering to environmental or social standards.

	Every permit or concession given to a company in an Indigenous territory should go through a consultation process in the potentially affected communities.
	Promote obligatory studies from basins and sub-basins.
	Consider approvals to the National Waters Law (Mexico), including from gender, intercultural, and human rights perspectives.

VIII. Recommendations for the CEC to Support Indigenous Efforts to Manage Freshwater and Incorporate Their Vision

The forum ended with a session for assessing potential opportunities to utilize the CEC's mandate to advance the interests of Indigenous Peoples, as well as to apply TEK directly to CEC operations and policy recommendations, by identifying key areas of collaboration with Indigenous and local communities.

In this session, the assistants discussed ways to give recommendations to the CEC that would support Indigenous People's efforts to freshwater management and incorporate their vision in the way it works. For this exercise, the assistants were divided in working tables to answer the following questions:

1. What can the CEC do to support Indigenous efforts to manage freshwater in your respective countries?
2. How can the CEC take Indigenous perspectives into account when doing its work?

A summary of the outcomes is presented in the tables below.

Recommendations supporting Indigenous Efforts to Manage Freshwater	
Support and disseminate success stories	Support success stories and models, share and promote them with authorities and communities.
	Promote the exchange of knowledge and experiences between Indigenous People from the three countries.
	Promote the social, community, and economic recognition of the value of the work and participation of Indigenous People.
	Recognize and promote the value of TEK.
	Register the different practices and traditions related to stewardship of the natural resources that the communities practice to share them with the next generations.
Support capacity building processes	Establish a territory-wide leadership program from a holistic approach, i.e., "Guardian spirits of life, water, and land."
	Strengthen the legal capacities of the communities to defend and maintain their territory and its way of governance.
	Create a trilateral capacity-building program that is oriented toward a dialogue between TEK, Indigenous science, and Western science for

	members of Indigenous communities, to manage their territories with an integrated approach.
	Conduct education and training that is oriented to public policies about sustainable production, such as agro-ecological tourism.
Strengthen the TEKEG and their faculties	Involve the TEKEG in the design of all relevant work of the CEC.
	Reimburse TEKEG members for their valuable work.
	Invite more people from Indigenous communities to participate in TEKEG events.
Promote Indigenous representation in the governments	Recommend that the three governments secure Indigenous representation at all levels.
	Include more Indigenous People on the CEC team.
	Recommend the inclusion of local and Indigenous authorities in all relevant government decisions.
Promote multisectoral collaboration	Generate multisectoral networks to improve water management with communities, companies, and governments.
Engage in communication activities	Communicate and spread the work of TEKEG and the importance of TEK.

Recommendations to Take Indigenous Peoples' Perspectives into Account
Promote dialogue encounters between communities and the CEC.
Organize forums and events in the communities. Highlight the importance of the CEC more in fieldwork and in recovering the perspective of the communities.
Do more fieldwork to show the reality of the communities and include their perspectives.
Generate safe spaces for the communities to talk about TEK and then create and present recommendations to the various governments.

IX. Conclusion

To have more sustainable freshwater management in North America, governments need to incorporate Indigenous Peoples' vision in their policy making and project implementation. Over the two days of the Trinational Forum on Indigenous Approaches to Freshwater in North America, a series of dialogues and presentations underlined the importance and value of the TEK that Indigenous nations and communities of the North America region had developed to manage their resources, specifically freshwater, in a sustainable and harmonic way.

Respect, recognition and fulfillment of Indigenous rights were identified as the main ways to ensure a sustainable management of freshwater in Indigenous territories. Due to the deep understanding and knowledge of their lands, Indigenous Peoples should be the ones

managing their resources. Conservation projects should be developed with autonomy and sovereignty over their territories. Free, prior, and informed consent should occur for project, laws or policies or any other decision that could affect Indigenous Peoples and their territories.

Indigenous communities take care of and protect significant areas with important natural resources. Throughout the forum, various challenges and impacts were identified, from climate change and colonial policies to water sustainability and Indigenous' ways of life. Nevertheless, the resilience, TEK, involvement of the youth, relationship to the elements, and community organization processes were identified as factors mitigating these impacts and fighting against them.

TEK and Indigenous science are living knowledge systems that should be valued and taken into account as we do with Western science. All these knowledge systems should complement each other, with the purpose of generating a more complete and effective understanding of nature to develop better and more sustainable technologies to manage freshwater and other natural resources.

Governments and environmental ministers of the three countries should seek ways to incorporate the Indigenous vision of managing natural resources. As illustrated during the forum, the three opportunity areas are: supporting Indigenous autonomy and sovereignty, supporting education and economical traditional knowledge, and making regulatory changes.

To strengthen the CEC's role of promoting collaboration between the three countries and incorporation of the Indigenous People's vision and needs in the regional agenda for freshwater management, the main recommendations are: documenting and sharing success stories; ~~impulse~~drive Indigenous representativity in the governments; starting capacity building processes; strengthen the TEKEG and his faculties; and incite multisectoral collaboration.

Caring for water and any other natural resource must be a shared responsibility between the three countries and the different sectors of society, government, private, and civil. The only way to ensure access and availability of this element is through cooperation and consideration of the TEK of Indigenous People.

X. Acknowledgments

We want to acknowledge and show our appreciation for the participants, sponsors and organizers of the forum and for their engagement and dedicated work during these days. We also give special acknowledgement to the TEKEG members who have been part of the design and coordination of the entire project since its conception. Without the collaboration and efforts of the attendees during the forum, we could not have included so many essential voices on these important discussions. Thank you for your participation and collaboration.

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