

Indigenous Elder perspectives on climate change challenges and solutions: learning reflection from Blackfoot First Nation perspectives, Canada

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Abstract

In this article, we explore the importance of incorporating Indigenous Elders' perspectives in developing solutions to climate change. Following relational land-based theoretical frameworks, we learn from Indigenous Elders how they foster a strong sense of community and collective responsibility. Indigenous Elders prioritize inclusivity, social cohesion, and the interconnectedness of humans with nature. In our study, we focus on two main perspectives: how traditional land-based knowledge and practices held by Indigenous Elders contribute to the development of solutions for climate change mitigation and adaptation. *What lessons can be learned from Indigenous Elder perspectives that may guide global efforts in addressing climate change and creating a sustainable future for all?* Our study suggests that recognizing and incorporating Indigenous Elder perspectives into climate change solutions is essential for addressing the complex and multidimensional challenges of the current climate crisis.

Keywords

Elders' perspectives on climate change, environmental justice, Indigenous Elders, land-based learning, relational theoretical framework

Introduction

Indigenous Elders' perspectives on climate change solutions are diverse and vary across different Indigenous cultures and communities. Elders' perspectives reflect the wisdom and experiences of specific Elders within their respective communities. They should be respected and considered alongside other knowledge systems in the quest for sustainable and equitable solutions to climate change. Indigenous Elders are considered respectful Knowledge-keepers in many Indigenous communities as they carry much successful sustainable knowledge. Therefore, many Indigenous communities see their Elders as scientists for their community and their land-based knowledge as scientific knowledge (Datta et al., 2022).

Indigenous communities in Canada face unique challenges to climate change (Ford et al., 2020). Indigenous communities in Canada continue to grapple with the legacies of colonization, including the dispossession of land, loss of cultural practices, and marginalization (Comberty et al., 2019; Jones et al., 2014). These historical injustices compound the challenges they face in addressing climate change and can exacerbate vulnerability to its impacts. While Indigenous people have a proven history of

sustainable knowledge and practice in dealing with climate crisis through their Elders and Knowledge in Canada, there are still significant challenges and barriers that prevent Indigenous Elders and Knowledge-keepers² from land-based knowledge in Canada's climate change policy and practices, particularly in many Indigenous communities. Studies (Comberty et al., 2019; Jones et al., 2014; Mach et al., 2020; Thompson et al., 2020) have identified that many systematic barriers prevent Elders and Knowledge Keepers' land-based knowledge from fully integrating into Canada's climate change policy, including the historical marginalization of Indigenous voices and perspectives within policy-making processes, the legacy of colonization that excluded traditional governance structures, impeding the recognition of Indigenous knowledge as equally

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valuable in shaping environmental policies. Other barriers, such as limited resources, inadequate representation, and power imbalances, hinder effective collaboration between Indigenous communities and governmental bodies. All these systematic barriers created ongoing racist perspectives in many Indigenous communities (Denis, 2007).

Cultural and linguistic differences also contribute to misunderstandings, making it challenging for policymakers to fully grasp the nuanced insights offered by Elders and Knowledge Keepers (Reid et al., 2022). Studies also suggested that addressing climate change challenges requires a commitment to reconciliation, meaningful engagement, and recognizing Indigenous rights (Comberti et al., 2019; Jones et al., 2014; Mach et al., 2020). Indigenous Elders possess unique traditional knowledge deeply rooted in the land, offering invaluable insights into climate patterns and ecosystem dynamics; they should be strongly engaged in climate policy discussion and implementation (Berkes & Jolly, 2002; Cameron et al., 2021). Their leadership is essential for crafting culturally sensitive and community-specific climate adaptations that draw on centuries-old wisdom, ensuring the sustainability of Indigenous communities. Engaging Elders respects their unique role as stewards of the environment and enhances the effectiveness and resilience of climate policies by incorporating holistic perspectives deeply connected to the land. Indigenous Elders can help and lead this process to build trust, create inclusive spaces for dialogue, provide adequate resources for participation, and ensure that Indigenous perspectives are embedded throughout the policy-making process (Reid et al., 2022). Recognizing Indigenous Elders' land-based knowledge systems as equally valuable to western scientific frameworks and prioritizing Indigenous self-determination and sovereignty in climate change policy discussions is crucial. Active participation should involve fostering genuine partnerships, acknowledging Indigenous sovereignty, and providing meaningful representation in decision-making processes. Implementation efforts must prioritize Elder-led initiatives, integrating their wisdom into climate policies to ensure a comprehensive and sustainable approach that respects Indigenous values and environmental stewardship (Berkes & Jolly, 2002; Cameron et al., 2021).

Following Indigenous and relational theoretical frameworks, we tried to learn and reflect from Indigenous Elders while maintaining full respect and honor the following research questions: *How is climate crisis created by humans in many Indigenous communities? In what ways can Indigenous Elders' land-based knowledge contribute to the development of climate change mitigation strategies, such as reducing greenhouse gas emissions or promoting renewable energy solutions? How can Indigenous Elders' land-based knowledge inform and guide land-use planning and decision-making processes to ensure sustainable and climate-resilient development practices? What cultural practices, ceremonies, and teachings from Indigenous Elders'*

land-based knowledge can foster a deeper connection between communities and the environment, promoting stewardship and sustainability in the face of climate change? In what ways can Indigenous Elders' land-based knowledge contribute to climate change education and awareness programs, particularly in engaging youth and future generations in sustainable practices and environmental stewardship? What collaborative approaches and partnerships can be fostered between Indigenous Elders and scientific experts to integrate Indigenous knowledge systems and western scientific approaches for more comprehensive and effective climate change solutions? We hope engaging Indigenous Elders in discussions around these questions can provide valuable insights and guidance for developing context-specific climate change solutions rooted in local knowledge, sustainability, and cultural values.

Researcher positionality

Researchers must be aware of their own position of privilege within the research process and work to ensure that their research is conducted ethically and respectfully, centering the voices and agency of Indigenous communities. Indigenous scholar Kovach (2021) emphasizes the significance of researcher positionality in Indigenous research and argues that acknowledging one's positionality is essential for conducting respectful, collaborative, and empowering research for Indigenous communities. Another Indigenous scholar Smith (2021) discusses the importance of researcher reflexivity and awareness of positionality in Indigenous research. She highlights the need for researchers to critically examine their cultural biases and assumptions to avoid perpetuating colonial narratives and engage in respectful and decolonizing research practices. This involves engaging in meaningful consultation and collaboration with Indigenous knowledge holders, respecting protocols and cultural protocols, and actively seeking to challenge and dismantle colonial structures and practices that may perpetuate harm.

Ranjan Datta is a settler of color scholar in Canada, born in a minority family in Bangladesh and raised in a land-based culture and tradition. He is currently living in Treaty 7 Territories. He is sincerely grateful to all Indigenous Nations in Canada who provided an opportunity to live on their land as a guest and learn and respect land-based knowledge. Learning land-based learning from Indigenous Elder is a gift for him as it creates belongingness with land and Indigenous people.

Teena Starlight is a Tsuut'ina Cree (one of the Indigenous Nations in Alberta, Canada) woman from the Tsuut'ina Nation at Treaty 7 Territory, Canada. As a land-based educator, she has earned the right to teach at the University. She earned the right to take a leadership role in First Nations, Inuit (Indigenous peoples who primarily reside in the Arctic regions of Canada, specifically in the Northwest Territories, Nunavut, Northern Quebec, and Labrador), and

Métis (people of mixed Indigenous and European ancestry, particularly those with historic connections to the Red River area of what is now Manitoba, Canada) curricula from the University. She became responsible for the revitalization of Indigenous languages. She is currently pursuing her rights to validate Indigenous ways of knowing and being in education. She has shared her knowledge and experiences of teaching, land-based learning, Indigenous perspectives in education and climate change in various settings.

Daniel Craig Mistaken is an Indigenous Elder born and raised on the traditional lands of Kainai (one of the Indigenous Nations in Alberta, Canada) First Nation at Treaty 7 Territory. He was raised with Siksikáí'powahsin (commonly referred to as the Blackfoot language, spoken by Blackfoot nations, Canada and the USA) language and culture who served as his community's chief. His roots and positionality come from the land and language he was immersed in. His life experiences as a father, grandfather, residential school survivor, rancher, agriculturalist, minor chief, and society leader continue to guide the communal, educational, political, and ceremonial work he does for the betterment and survival of his community.

In our research, as researchers, our positionality is not just about self-reflection but also about active accountability. It involves ongoing self-education, self-awareness, and reflexivity throughout the research process. By understanding and grappling with their own positionality, researchers can contribute to more ethical, respectful, and empowering research supporting Indigenous communities' self-determination and well-being. In this study, an Indigenous Elder author, Daniel Craig Mistaken had the chance to share his knowledge with both the next generation, Author 2, and a settler of color scholar, Ranjan Datta. The second author directly engaged in learning and reflecting on Indigenous Elders' land-based knowledge and practices. As a non-Indigenous settler of color and a land-based scholar, the first author learned about the responsibilities involved in aligning their research and actions with community needs and practices.

Theoretical frameworks and methods

In our research, we used a relational theoretical framework, which is a perspective that emphasizes the interconnectedness and interdependence of individuals, communities, land, and spiritual dimensions (Datta, 2015; Fast & Kovach, 2019; Richmond, 2018). It recognizes that all entities within the community are inherently connected and that relationships form the foundation of well-being, harmony, and balance. Indigenous cultures often have a holistic worldview that views all life's interconnected aspects. We chose the relational theoretical framework because it recognizes the relational nature of existence, where humans are part of a larger web of relationships with the land, animals, plants, ancestors, and spiritual entities (Figure 1).



Figure 1. Traditional sweetgrass braiding photo shows Elder perspectives on relationality (photo by Ranjan Datta).

The relational theoretical framework emphasizes the importance of maintaining harmonious relationships with all elements of creation (Battiste, 2014; Cajete, 2000). It includes reciprocal relationships between humans, as well as with the natural world and spiritual realms. It emphasizes the importance of supporting and uplifting the collective through shared values, practices, and responsibilities (Battiste, 2014; Kovach, 2021). Following the relational theoretical framework, we used land-based research methodology. The land-based research methodology facilitates the respectful exploration of individual narratives, operating as a relational process adhering to specific protocols aligned with tribal knowledge, as evidenced by prior studies (Datta, 2015, 2020; Kovach, 2021; Thompson et al., 2020). Following our deepest respect and honor to our Elders, we used deep listening as our research method. Indigenous Elders shared their land-based stories in various settings such as at cultural camps, during land-walk, hunting, and fishing. Our learning was mostly from the Blackfoot First Nation Elder, Alberta, Canada. Through our deep listening method, we gained valuable insights into the stories of Indigenous Elders with utmost respect and honor. During this learning experience, we refrained from introducing unrelated topics, allowing us to focus on understanding the intricacies of land-based learning and practice. This respectful approach not only facilitated the discovery of new perspectives but also illuminated our responsibilities in conducting research. As collaborative, we are motivated to translate our findings into actionable steps that benefit the community, ensuring our work aligns with the needs and aspirations shared during this transformative process.

Research ethics and analysis

We have followed the First Nations principles of ownership, control, access, and possession (OCAP) principles for this

research project (<https://fnigc.ca/ocap-training/>). OCAP is First Nations principles of ownership, control, and access. The term OCAP is important for us as it helps to understand why First Nations should have control over data collection processes and that they own and control how this information can be used. The Elder owns our collected stories ownership of stories collected. The Elders decided the information gathered individually and collectively on how we used their stories and under what conditions. At any time during the study, the Elder participants have the right to seek control over the information they share. Following OCAP's responsibility, our Elder is the co-author of this article. Focusing on community protocols, there is a continuous desire for transparency and active community involvement in our research endeavors. Collaborating with Indigenous Elders in this article serves as a pivotal initiative, addressing ethical considerations that bridge the gap between community and institutional ethical perspectives. In our research, emphasis was placed on prioritizing community protocols over institutional ones, recognizing the significance of aligning our work with the values and guidance of the community. Our research primarily drew from cultural camps, involving immersive sessions of deep learning with 10 Elders from the community. Thematic analysis, guided by the main themes identified by the Elders that addressed community needs, formed the basis of our analytical approach. Throughout this process, we continuously shared our insights with the Elders, seeking approval and guidance from our co-author Elder as part of an ongoing learning process. In conjunction with deep listening, both the first and second authors applied reflective learning in crafting this article.

Findings: learning reflections

We learned from Elders from the Blackfoot First Nation, Alberta, Canada. Elders discussed many challenges and possibilities related to climate change in climate change with land-based knowledge and practice. In the following section we shared some of our learning with direct quotes.

Human-created climate crisis

Elder explained that many climate crises are human-created and profoundly impact Indigenous communities in Canada and beyond. Many communities often bear a disproportionate burden of climate change's environmental and socio-economic consequences. One of the Elders explained how humans created climate change:

I do not know what climate change means to you [indicating the researcher], but I learned from my everyday observations that many of climate change has been created by human interference. For instance, extreme climate events such as very dry summers, no rain, heat waves, forest fire, and floods become more frequent. I can keep going on and on with the climate change extreme event lists. Because of climate change, our animals are not finding water and food where they used to, they are moving away from our community to deeper and further into the mountains. (Elder 1, 65 years old)

Another Elder similarly explained: "Because of climate change, it is negatively impacting our traditional hunting and gathering practice; we do not have as many animals, and animals are getting sick too" (Elder 2, 67 years old).

The Elder also explained how climate change impact increased significantly in their community:

Floods being prominent since 2000, with more than 500 wildfires in Canada, more than 100 in Alberta and 80 percent of forest fires are uncontrolled, did you see the impacts, it is happening every year nowadays. Weather patterns changed a lot from dryness, and we don't take care of forests the way we used to; extreme weather, storms, and patterns have changed. (Elder 2, 67 years old)

The Elder continued:

Less rainfall, the forest is going through a deep crisis, the land is drying out, trees are stunted, berries don't grow as much as they used to, birds are not migrating as they normally would, and they are all becoming sick because it is the impact of climate change. Facing drought, more common now in the last 30 years. Has a lot to do with changing weather, moisture in the ground, floods fires; we don't take care of things anymore. (Elder 2, 67 years old)

Another Elder explained impacting by saying:

When our animals get sick, they are not getting the natural medicines they need because of habitat loss. Water contamination is a major cause of sickness. People must maintain their connection with the land. People are losing their taste for natural vitamins and wild meat that sustain our health and wellness. (Elder 3, 70 years old)

We learned from Elders stories that climate crisis solutions on Indigenous communities requires a holistic and inclusive approach that acknowledges Indigenous rights, values, and knowledge systems. It is crucial to involve Indigenous Elders in decision-making processes, honor their traditional land-based knowledge, support their efforts to adapt and mitigate the effects of climate change, and promote resilience and sustainability based on their unique cultural perspectives.

Challenges in climate change adaptation

Western climate change adaptation policies and practices face several challenges that can hinder their effectiveness. Several Indigenous Elders, for example, pointed out that the Indigenous land-based knowledge and practices were often overlooked in various climate adaptations within their community. The Elders expressed that they had not been included or invited to participate in any climate initiatives. Therefore, the western climate change adaptation often relies heavily on scientific expertise and modeling, overlooking the importance of local and Indigenous knowledge systems. Local communities possess valuable insights and experiences that can inform adaptation strategies, but their perspectives often need to be recognized and addressed in policy development processes. For instance, an Elder explained some of the challenges:

There are lots of challenges because we have been forcefully away from our traditional way of life, where we used to take care of each other. Through colonization, through residential schools, they [indicating western colonizers] took away our language, culture, hunting etc. The dollar is more important than our traditional way of life right now. (Elder 6, 69 years old)

Another Elder said:

All these have a lot to do with changing weather, moisture in the ground, floods, fires, we don't take care of things anymore. Fighting against the coal mines and limited drilling, farmers are asked to be more environmentally conscious and use less chemicals. (Elder 5, 65 years old)

Historical and ongoing racism in the agricultural system

Historical and ongoing racism in the agricultural system and its connection to climate change have significantly impacted Indigenous communities. For instance, an Elder explained:

One of the biggest factors for our family was the drought; we had everything invested in the farm. When the 2-year drought hit, we sold everything and went into debt. In the 80s was the drought, and after that, it became too expensive for our family to run farms machinery, fuel, and fertilizer were just way too expensive. For the amount of land our family had, there was no way our family could make a living off the land because of all expenses. People also started moving to cities, getting educated, and forgetting how to live off the land. (Elder 1, 65 years old)

Another Elder similarly explained.

Non-native farmers that have access to millions of dollars are working our lands right now. The policy of land leasing prevents our own people from working our lands. A white farmer can come in and sign a contract, for example, to farm 6000 acres and take the contract to the bank off reserve and borrow against that contract on the estimated profit; where a FN [First Nation] was to take the same contract to the bank, they would get turned down. That is a federal policy. First Nation land is community-owned. We don't own the land; the Queen still owns the land, so the banks will not give an FN the same opportunity because of that. (Elder 4, 66 years old)

Elder 7, 66 years old, further explained:

What could help is if First Nation people could own the land, but on the other hand, that is a dangerous thing to get into because if you lose that piece of land, then it no longer belongs to the tribe; it will belong to the bank causing them to chip away at your reserve slowly. This caused a lot of animosity, just land occupancy, people think they own the land, but they don't own it. They are just occupants that have caused issues and land disputes for the last 40 years.

Another Elder explained that:

A few years ago, thirteen percent of the population had their name on the land. The other 87 percent are non-land occupants.

The ones that get money are land occupants, but the ones making money are the farmers coming in to lease the land; it is not the band. Only 5 percent goes to the land department to run their programs out of all the lease money; the rest goes to land occupants. Now they took out another 15 percent to give to non-land occupants. (Elder 8, 68 years old)

Elder 7, 66 years old, discussed racism in the governmental system:

The racism that is strongly prevalent in Southern Alberta prevents us from working with each other. It is hard to work with people who do not respect you or look down at you all the time. It's been like that since Cardston came. Communities surrounding us have negative histories and relations that affect working relationships today and long-standing issues with our neighbours in our community.

Therefore, understanding historical and ongoing racism requires acknowledging and dismantling systemic racism within the agricultural system. We learned from Elders stories that how historical and ongoing racism is interconnected with environmental injustice and systemic discrimination. Our learning from this research highlighted how Indigenous communities, often marginalized, face disproportionate impacts from climate change. Acknowledging these connections is vital for developing inclusive policies that address both environmental concerns and historical injustices. It involves recognizing Indigenous rights and sovereignty, promoting equitable access to resources and opportunities, incorporating Indigenous knowledge and perspectives in decision-making processes, and supporting Indigenous-led initiatives for sustainable agriculture and climate change adaptation.

Climate change and oil industries

Industries have significantly contributed to climate change, and its impacts have disproportionately affected Indigenous communities. Elders provided some key aspects of the relationship between the oil industry, dam, climate change, and Indigenous communities. As an Elder explained:

Oil industries in Alberta have enhanced climate change, and oil wells in the south negatively affect our community, traditions, and animal migration. They are negatively impacting our traditional hunting and gathering practice; we do not have as many animals, and animals are getting sick with too much contamination from the Oil industries in Alberta. It also contaminates our water system through rain and snow in a drastic way; our fish are getting harder and harder to find. (Elder 7, 66 years old)

Focusing on the human-created dam and its impact, Elder 4 (66 years old) explained: "Dams' industries on our rivers are also affecting our fishing, which affects birds, eagles and hawks." The Elder also explained how government is involved in the processes: "Don't know much about policies; provincial gov is not trying, costing governments lots of money switching from fossil fuel. Alberta gov is hard to read; Alberta government uses a lot of oil and gas" (Elder 4, 66 years old).

According to Elders, addressing the impacts of the oil industry and climate change on Indigenous communities requires recognizing and respecting Indigenous rights, including the right to free, prior, and informed consent.

Community-led adaptation practices to climate change

In this research, we learned that Indigenous Elders directed their attention toward community-led adaptation practices in Indigenous communities, emphasizing the empowerment of local communities to formulate and execute climate change adaptation strategies grounded in their cultural values, traditional wisdom, and local context. All these approaches place a significant emphasis on community engagement, self-determination, and the cultivation of resilience.

Traditional land-based practice

Traditional land-based practices offer valuable insights and solutions for addressing climate change. Indigenous communities have developed sustainable land management techniques that promote biodiversity, enhance ecosystem resilience, and mitigate the impacts of climate change.

For instance, one Elder explained that:

We have been using the traditional method of picking firewood, taking only what we need from animals. The biggest challenge is that they don't see First Nations or our traditional practices as lower than theirs; we always try to adapt to them instead of what we already know. (Elder 7, 66 years old)

Integrating traditional land-based practices into climate change solutions acknowledges the value of Indigenous knowledge systems and promotes sustainable and resilient approaches to land management. An Elder explained traditional land-based knowledge as:

Sources of knowledge are all told to us through our histories and stories; they are all intertwined with how the environment was at the time. It helped us adapt as we went along. We were taught to respect nature as number one. If it weren't for nature, none of us would be here. (Elder 4, 65 years old)

Similarly, another Elder:

From my Elders, my hunting and fishing teachers, people who have been on the land and passed information. I was a rancher and farmer, I learned from going to college and my father, and he got his knowledge from his father. (Elder 8, 68 years old)

Treaty rights

Treaty rights are another critical way to address the climate change crisis in many indigenous communities. For example, an Elder said:

Be aware of FN treaty rights instead of trying to take them away under the pretext of saving the environment when it was FN that kept the environment healthy. Until White man came,

nobody owned the land. As FN, we all belonged as one. The environment was number one because we all needed to survive. Now it has come to a point where lots of people are fighting for the environment, and lots of money is spent, but not a lot of actual changes either by policy or through interactions with nature. (Elder 7, 66 years old)

At the same point, another Elder said: "People that live on the land should be creating the policies; they know how to keep the land healthy. How many politicians do you see counting bugs and making sure the forests are healthy" (Elder 8, 68 years old).

Land-based teaching from buffalo and beavers

Indigenous Elders focused on traditional knowledge as buffalo teaching. One of them said:

The buffalo, irrigation to withstand drought conditions. Mother Nature took care of that; we had to adapt to what she brought us. Watching and mimicking the beavers, when they make dams, you may have to break them so that water can get through; sometimes, you need to dam the water so people wouldn't have to travel so far for it. (Elder 7, 66 years old)

Another Elder, focusing on beavers as traditional knowledge, said: "Most of our water practices came from the beavers. We observe them by watching the water beings. Our beaver bundle ceremonies pay homage to the water and animals" (Elder 8, 66 years old).

Fewer industries

Elders discussed there are so many industries enhancing the climate crisis. The number of industries needs to be limited:

Turning towards fewer chemicals and biological agents when spraying crops, minimal till to save as much moisture in the ground as possible, and fewer fertilizers because they are not working the ground as much. The animals adapt independently; when it gets dry, herds get smaller, see fewer big game animals if it is a dry year, and see fewer new baby animals. Bring them water can help. Diseased animals or sickly animals take that sick or injured animal out, also, in nature, wolves take out the weakest. Cougars, wolves, and bears are there to maintain herds elk. (Elder 7, 66 years old)

The Elder also suggested that removing dams from local water will be a helpful and significant ways

Yes, we need to keep our land and water clean. If the land is sick, it is not going to produce anything. Rethink about the dam. We have a dam that is owned by the community that was part of a deal when St Mary's dam which was built way back. There are no band initiatives to keep the land clean, incentives, or support. There is a lot of chemical dumping on the reserve by individuals that all contribute to climate change. (Elder 7, 66 years old)

Another Elder explained:

Traditional and historically, animals and people adapted to their environment, but if you become disconnected from your environment, you yourself become sick by eating processed food and getting Western sicknesses that are caused by not being able to adapt. The spiritual part gets people involved in the spiritual part of taking care of the land through ceremonies. Become aware and involved—share and experiences of the land and ceremonies. People need to become aware of themselves that the mind-body-spirit must be balanced. Right now, most people are unbalanced because we no longer go on the land. Before contact, everything was pure and clean because we lived along side the animals; we learned from the land, animals, grass, plants and everything. Now we go to school to learn, are disconnected, and are not on the land. We are in classrooms, sitting on a box, sitting on cement. (Elder 7, 66 years old)

Alternative energy: wind and solar power

Alternative energy solutions are crucial in addressing climate change in Indigenous communities. Climate change often disproportionately affects these communities and has a deep connection to their lands and natural resources. Implementing alternative energy systems can help reduce greenhouse gas emissions, promote energy independence, and support sustainable development. An Elder explained:

We are still practicing our ceremonies and moving away from oil and gas to solar and wind power. Trying to get into solar and wind power, on the reserve, the data ends at our boundaries. They don't include the data of the wind and water within our boundaries. It's measured on either side of our boundaries but jumps over the reserve. (Elder 1, 65 years old)

Governments' responsibilities

Elders suggested that all governments, local, provincial, and federal, have several responsibilities in addressing climate change in Indigenous communities. An Elder suggested that:

Both federal and provincial governments need to be responsible and take the initiative. The local government needs to take the initiative to set up an environmental station on the north end which has been in operation for about 15 years now. We should have data that the wind blows on the reserve and in our borders. Federal and provincial government policies hold up the process. Elder (Elder 1, 65 years old)

Similarly, another Elder explained:

It is the Federal government's need to get into environmental initiatives. Our local and provincial governments won't push as hard as they should for the environment. It's up to us to push for it and the governments to show that it is worth their time and that the provincial government does the same. Elder (Elder 7, 66 years old).

Elder 2, 67 years old, explained:

The Federal government has not been providing funding for starting the process. They always need to show more of what it should be to make things work. They only pay for consultation,

studies, and meetings but don't put actual money into the project unless you have a third party involved, usually the Alberta government. The federal government always has a third-party agreement for doing anything in our First Nation communities. The project usually dies if the Federal, provincial, or local governments decline. All the governments have to agree. We are under federal jurisdiction but live in a provincial area. Even though the provincial government has no jurisdiction over the reserve, we still need to follow provincial policy because we are within the provincial areas. . . . Only in the last couple of years, have we gotten a voice in the Provincial environmental board. We told them that they must do more to protect our environment.

Another Elder contributed:

[I] don't know much about policies; the provincial government is not making an effort, costing the government a lot of money to transition from fossil fuels. The Alberta government is difficult to understand; it heavily relies on oil and gas. They should take more action to support the Tribal environmental group by testing water quality, reintroducing buffalo to aid in grassland restoration, limiting drilling and mining on the reserve, and exploring solar power options. (Elder 1, 65 years old)

By fulfilling these responsibilities, governments can support Indigenous communities in their efforts to mitigate and adapt to climate change while respecting their rights, preserving their cultures, and promoting sustainable development. Collaboration, respect, and partnership-building are essential for meaningful and equitable climate action in Indigenous communities.

Traditional Indigenous ceremonies

Traditional Indigenous ceremonies are essential in addressing climate change by fostering spiritual connections to the land, promoting environmental stewardship, and strengthening community resilience. These ceremonies are deeply rooted in Indigenous cultures and belief systems and provide a space for reflection, healing, and guidance. For example, Elder 1, 65 years old, explained:

Some individuals initiate community cleanups. People have become accustomed to handouts they don't care for themselves anymore. Traditional knowledge keepers and spiritual and ceremony leaders talk to people about garbage and keeping their area clean; this usually happens at the Sun Dance [traditional Indigenous ceremonies]. The majority does actually listen to them. Even coming from our leadership, when they do actually get involved, like a clean-up or something, it does help. Our Traditional Indigenous ceremonies can help build awareness; it just doesn't happen often enough, and there are not enough people to make a huge difference.

Another Elder explained: "Through our traditional Indigenous ceremonies, we can educate our children. We can teach how garbage and trash cause many environmental issues" (Elder 7, 66 years old).

Elder 1, 65 years old, explained the importance of ceremonies by explaining:

Ceremonies, storytelling, ability to adapt. If you really look at our stories they tell us what not to do or you get climate change. They are meant for us to learn from the land and animals how to care and respect them. When you don't follow or listen this results in climate change.

Funding and infrastructure support

Funding is a significant crisis when dealing with climate change in Indigenous communities. For instance, an Elder stated:

Funding is challenging. Funding challenges that prevent citizens from participating in cleaning up your community are support, transportation, and machinery. The provincial government helps with clean up just along provincial highways once a year, but there is no funding otherwise. (Elder 7, 66 years old).

Another Elder focused on infrastructure support:

We have one dumping site on reserve and access to Cardstone, but they restrict what we can throw away there. We only have one dumping site for 550 sq[ua]re miles of land. Regular garbage pick up is not regular whenever the truck is running. Garbage bins have been tried but couldn't pick them up in time, causing communities to create dumping sites boarding their community. (Elder 2, 67 years old)

Indigenous and western collaboration

Collaboration between Indigenous and western approaches is crucial for addressing climate change in Indigenous communities. In our research, we prioritized Indigenous-led solutions for addressing climate change, placing greater emphasis on these perspectives rather than striving for a balance with western viewpoints. It recognizes the importance of combining Indigenous knowledge, cultural values, and practices with scientific understanding and technological advancements. For instance, an Elder explained:

Yes, by using the best of both, by integrating what works for First Nation and Western. Collaboration, information sharing, working together. . . .Our contribution would be to show how to respect the land, and to be one with the land. On the Western side, the science behind some of this stuff would be helpful and explain how some of the science falls in line with some of our traditional knowledge. It should be side by side, not one over the other. (Elder 7, 66 years old)

At a similar point, another Elder added:

Yes, to collaborate and develop the best solution for all of us. Let the people decide the policy. Local gov chief and council make the policies; there is little opportunity for local people to get involved in policy-making. There is room for improvement; they speak and involve elders but not the general public. (Elder 2, 67 years old)

By embracing collaboration between Indigenous and western approaches, we can draw on the strengths of both knowledge systems to develop innovative, culturally appropriate, and effective climate change strategies.

Access to traditional knowledge

Access to traditional land-based knowledge plays a significant role in climate change solutions. Elder 1, 65 years old, explained:

Accessible knowledge practices on reserve, you need to ask; off reserve, I don't know how much access they have. During the Sun Dance, about 20 percent of the people attend and have access to traditional knowledge at that time. Complacency, people have forgotten how to live off the land. They want people to come and hand them things when we can actually go out and get food and what we need from the land. But again, that comes to colonial practices that took our culture, work ethics, morals that we had in place. Our activities were governed.

Effective communication

Effective communication to promote community-based knowledge. Elder 1, 65 years old, explained:

The collaboration will take people working together to be open-minded about this stuff. Local gov putting money towards environmental community initiatives. People need an incentive; they don't just go out and do it for themselves anymore; they need a reward again this is from colonial practices. Before it was a necessity to be on the land. Modern conveniences have made a really big dent in why people don't go on the land anymore. . . .The more people that know community-based knowledge the better. Youth should be taught traditional knowledge, climate change, environmental practices etc on a regular base so that it becomes embedded right in the curriculum to become regular practices. (Elder 1, 65 years old)

Act urgently

Urgent action is critical for dealing with the climate crisis. As an Elder explained:

If we don't learn really quickly, we won't have an environment to live in. Being open and honest about how environmental issues affect everyone. Education is one of the most important for anybody. Our traditional practices involved storytelling which helped us learn many things. As far as climate change, most of our stories addressed climate change; the biggest thing is to respect what is around you. (Elder 1, 65 years old)

Our critical learning

Indigenous Elder perspectives on climate change solutions bring unique wisdom and insights. Indigenous communities have long-standing connections to the land, environment, and traditional knowledge systems, enabling their survival for generations. When addressing climate change, Indigenous Elders offer valuable perspectives that emphasize the interconnectedness of humans and nature.

Respect for Elder knowledge and practice

Respecting Indigenous Elders' knowledge of climate change policy has invaluable wisdom gained through years of observation and experience (Latulippe & Klenk,

2020). Integrating traditional practices ensures a holistic approach, drawing on time-tested solutions for sustainable environmental management (Cuaton & Su, 2020). By honoring the wisdom of Indigenous Elders, we foster a collaborative and inclusive strategy that combines ancestral insights with modern innovations to address the challenges of climate change. In our study, we also learned that Indigenous Elders often emphasize the importance of treating Pachamama (Mother Earth) as a living entity, with inherent rights and a reciprocal relationship with humanity. This perspective highlights the need for respect, gratitude, and care for the Earth's natural systems and resources. Indigenous Elders possess rich traditional ecological knowledge derived from centuries of observation, experience, and intergenerational transmission. This knowledge encompasses a deep understanding of local ecosystems, weather patterns, biodiversity, and sustainable resource management practices. Elders emphasize the importance of incorporating traditional land-based knowledge alongside Western scientific approaches to address climate change. Indigenous Elders view the world through a lens of interconnectedness, recognizing the intricate relationships between humans, animals, plants, and the environment. They stress the need to approach climate change solutions holistically, considering social, cultural, and spiritual dimensions alongside environmental considerations.

Community-centered approaches

Indigenous community-centered approaches for climate change adaptations prioritize local wisdom, engaging communities as custodians of their ecosystems. Drawing on traditional knowledge, these strategies empower Indigenous peoples to adapt and thrive in the face of environmental challenges (Atallah et al., 2021; Datta & Kairy, 2024; Kumasaka et al., 2022). By incorporating Indigenous perspectives, policies become more nuanced, sustainable, and culturally attuned, fostering resilience in the broader fight against climate change. In our study we also learned that Indigenous Elders emphasize the importance of community-based solutions to climate change. They advocate for the involvement of local Indigenous communities in decision-making processes and the recognition of Indigenous rights and sovereignty over traditional lands and resources. Elders highlight the significance of intergenerational knowledge sharing and involving youth in climate change actions. Indigenous Elders often emphasize revitalizing and preserving traditional practices and wisdom as part of climate change solutions. This may include sustainable land and resource management practices, revitalizing Indigenous languages and cultural traditions, and transmitting traditional knowledge to younger generations.

Land-based education and conservation

Indigenous land-based education intertwines cultural teachings with environmental stewardship, fostering a deep connection to the land and its ecosystems (Datta et al.,

2022; Sawatzky et al., 2021; Vogel et al., 2022). Through this holistic approach, Indigenous communities cultivate sustainable practices that serve as adaptive responses to climate change. Integrating traditional knowledge into conservation efforts not only preserves biodiversity but also nurtures a harmonious relationship between Indigenous peoples and the environment, contributing to effective climate change adaptations. Elders stress the importance of land-based education, which connects people directly to the Earth and fosters a deep sense of responsibility and stewardship. This includes teaching younger generations about sustainable practices, traditional teachings, and the importance of conserving ecosystems and biodiversity. Indigenous Elders advocate for climate justice, highlighting the disproportionate impacts of climate change on Indigenous communities and the need to address historical and ongoing injustices. They call for recognizing Indigenous rights, land and resource sovereignty, and including Indigenous perspectives in climate change policy and decision-making processes.

We have learned that Indigenous Elders view climate change through a holistic lens, recognizing that environmental degradation is not solely an ecological crisis but also a cultural and spiritual one (Cajete, 2020; Johnson et al., 2021; Kennedy et al., 2020). Their perspectives emphasize restoring harmony and balance between humans and the natural world. Elders often stress the need for sustainable practices that respect and protect the Earth, drawing on traditional land-based knowledge and practices that have sustained Indigenous communities for centuries. Moreover, Indigenous Elders advocate for community-centered approaches to climate change solutions. They emphasize the significance of self-determination, local decision-making, and the empowerment of Indigenous communities in addressing environmental challenges. Elders highlight the importance of engaging with traditional knowledge holders and integrating Indigenous perspectives into climate policies and practices. Indigenous Elders also highlight the importance of intergenerational knowledge transfer, recognizing that youth play a crucial role in climate action. They encourage passing down traditional knowledge, values, and practices to future generations to address climate change and preserve cultural resilience.

Our learning experiences have taught us that Indigenous Elders offer a wealth of wisdom and perspectives on climate change solutions. Their holistic worldview, grounded in deep connections to the land and culture, provides valuable guidance for sustainable and community-centered approaches to address the urgent challenges posed by climate change. Incorporating their perspectives into climate policies and practices is essential for fostering resilience, respecting Indigenous rights, and promoting a more sustainable future for all.

Authors' note

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Teena Starlight (Tsuut'ina First Nation) is a PhD candidate at the University of Calgary, Canada. She comes to us with an extensive list of experiences such as being a teacher for Kainai Board of Education for 14 years. During Teena's teaching career, she obtained her master's degree in the FNMI Curriculum and Leadership Development Master's Program from the University of Lethbridge. She has worked for the Tsuut'ina Board of Education as a teacher, vice principal, and curriculum coordinator. As a curriculum developer, Teena has been in an administrative and managerial role, overseeing the Culture Program, managing employees, budgeting, offering training, and professional development for Tsuut'ina Department of Education.

Daniel Craig Mistaken is a revered Indigenous Elder who was born and bred on Kainai First Nation's ancestral grounds within Treaty 7 Territory, southern Alberta, Canada. Nurtured in the embrace of Siksikáí'powahsin, the Blackfoot language, and cultural traditions, he ascended to leadership as his community's chief. His profound connection to land and language shapes his identity and purpose. As a father, grandfather, residential school survivor, rancher, agriculturalist, minor chief, and society leader, Daniel draws from his rich life experiences to guide communal, educational, political, and ceremonial initiatives, steadfastly working toward his community's betterment and survival.

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Glossary

Inuit	Indigenous peoples who primarily reside in the Arctic regions of Canada, specifically in the Northwest Territories, Nunavut, Northern Quebec, and Labrador
Kainai	one of the Indigenous Nations in Alberta, Canada
Métis	people of mixed Indigenous and European ancestry, particularly those with historic connections to the Red River area of what is now Manitoba, Canada
Siksikáí'powahsin	commonly referred to as the Blackfoot language, spoken by Blackfoot nations, Canada and the USA
Tsuut'ina Cree	one of the Indigenous Nations in Alberta, Canada

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