Centering Indigenous Knowledge: Reimagining Research Methods, Pedagogies, and Sustainability With Niitsitapi Awaaáhsskataiksi (Blackfoot Elders)

Sandra Bartlett Atwood
Utah State University

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CENTERING INDIGENOUS KNOWLEDGE: REIMAGINING RESEARCH

METHODS, PEDAGOGIES, AND SUSTAINABILITY WITH

NIITSITAPI AWAAÁHSSKATAIKSI

(BLACKFOOT ELDERS)

by

Sandra Bartlett Atwood

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Environment and Society

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Vice Provost of Graduate Studies

UTAH STATE UNIVERSITY
Logan, Utah

2023
“OLD MAN NAPI” by Blackfoot artist Bryce Many Fingers Singer

Used with permission from Rothney Astrophysical Observatory University of Calgary.
ABSTRACT

Centering Indigenous knowledge: Reimagining research methods, pedagogies, and sustainability with Niitsitapi Awaaáhsskataksi (Blackfoot Elders)

by

Sandra Bartlett Atwood, Doctor of Philosophy
Utah State University, 2023

Major Professor: Dr. Mark W. Brunson
Department: Environment and Society

My research sought to better engage with Indigenous ways of knowing and being (IWKB). Specifically, I collaborated with Blackfoot Elders (and Hawaiian Kupuna) to better understand 1) their perspectives towards land, 2) what factors instigate and perpetuate these perspectives, 3) how these perspectives play out in terms of identity; wellbeing; daily life; education; environmental concern, behavior, and stewardship, and 4) ways that these perspectives towards land can inform and transform Western perspectives on land and perhaps lead to better and more equitable social-ecological outcomes. I approached this from three angles. First, I described a method for braiding Indigenous and Western scientific approaches to broaden the ways we might think about the human-environment relationship. Then I explored how IWKB (Blackfoot and Native Hawaiian) regarding nature are disrupted by recreation use, to the detriment of both Indigenous experience of their native lands and of the land itself. Finally, I described how K-12 science, technology, engineering, and math (STEM) educators may be able to
effectively accommodate both Western and IWKB in their teaching and how this broader perspective could lead non-Indigenous persons to treat the land differently as well as create greater continuity for Indigenous learners.

(202 pages)
PUBLIC ABSTRACT

Centering Indigenous knowledge: Reimagining research methods, pedagogies, and sustainability with Niitsitapi Awaaáhsskataiksi (Blackfoot Elders)

Sandra Bartlett Atwood

My research sought to better engage with Indigenous ways of knowing and being (IWKB). Specifically, I collaborated with Blackfoot Elders (and Hawaiian Kupuna) to better understand 1) their perspectives towards land, 2) what factors instigate and perpetuate these perspectives, 3) how these perspectives play out in terms of identity; wellbeing; daily life; education; environmental concern, behavior, and stewardship, and 4) ways that these perspectives towards land can inform and transform Western perspectives on land and perhaps lead to better and more equitable social-ecological outcomes. I approached this from three angles. First, I described a method for braiding Indigenous and Western scientific approaches to broaden the ways we might think about the human-environment relationship. Then I explored how IWKB (Blackfoot and Native Hawaiian) regarding nature are disrupted by recreation use, to the detriment of both Indigenous experience of their native lands and of the land itself. Finally, I described how K-12 science, technology, engineering, and math (STEM) educators may be able to effectively accommodate both Western and IWKB in their teaching and how this broader perspective could lead non-Indigenous persons to treat the land differently as well as create greater continuity for Indigenous learners.
DEDICATION

This work is dedicated to my father, Charles Claymore Bartlett, for teaching me that “to give a man dignity is above all else” and for instilling in me at a young age humility in the face of nature and respect for all people. I also dedicate this work to my four sons, Angus, Bryn, Col, and Daniel whose love and patience make all things possible.

Sandra Bartlett Atwood
ACKNOWLEDGMENTS

I give thanks to my family, friends, and colleagues for their encouragement, moral support, and patience as I worked my way from the initial proposal writing to this final document. I could not have done it without all of you. Special thanks to Mark Brunson and James Maffie whose mentorship and commitment to the project exceeded all reasonable expectations or requirements as committee members. Most of all, thanks to the Blackfoot Elders and community members for their generosity in sharing some of their ways of knowing and being with me and their trust in allowing me to share some of what we developed together, with the academy.

Sandra Bartlett Atwood
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# GLOSSARY OF TERMS

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<th>Description</th>
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<td>AR</td>
<td>action research</td>
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<tr>
<td>CAE</td>
<td>collective autoethnography</td>
</tr>
<tr>
<td>CBPR</td>
<td>community-based participatory research</td>
</tr>
<tr>
<td>DOCARE</td>
<td>Division of Conservation and Resources Enforcement</td>
</tr>
<tr>
<td>FNMI</td>
<td>First Nations, Metis, and Inuit</td>
</tr>
<tr>
<td>IEK</td>
<td>Indigenous ecological knowledge</td>
</tr>
<tr>
<td>IK</td>
<td>Indigenous knowledge</td>
</tr>
<tr>
<td>IWKB</td>
<td>Indigenous ways of knowing and being</td>
</tr>
<tr>
<td>KEPA</td>
<td>Kainai Ecosystem Protection Association</td>
</tr>
<tr>
<td>NPs</td>
<td>national parks</td>
</tr>
<tr>
<td>PAs</td>
<td>protected areas</td>
</tr>
<tr>
<td>PAR</td>
<td>participatory action research</td>
</tr>
<tr>
<td>RAP</td>
<td>rapid assessment process</td>
</tr>
<tr>
<td>SoTL</td>
<td>science of teaching and learning</td>
</tr>
<tr>
<td>STEM</td>
<td>science, technology, engineering, and math</td>
</tr>
<tr>
<td>TCE</td>
<td>traditional cultural expression</td>
</tr>
<tr>
<td>TEK</td>
<td>traditional ecological knowledge</td>
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<tr>
<td>TK</td>
<td>traditional knowledge</td>
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## Blackfoot terms

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<tr>
<td>Aatsimoiyihkaan</td>
<td>resetting harmony and balance in relationships</td>
</tr>
<tr>
<td>Aatsimihkásin</td>
<td>via our actions and behaviours (e.g., putting tobacco down)</td>
</tr>
<tr>
<td>Aawaatsimihkaasataiksi</td>
<td>people who put tobacco; undertake to restore balance</td>
</tr>
<tr>
<td>Aimmoniisi</td>
<td>Otter</td>
</tr>
<tr>
<td>Ai’stomatoominniki</td>
<td>embodying knowledge</td>
</tr>
<tr>
<td>Aistommatop</td>
<td>coming to know your heart; embodying knowledge</td>
</tr>
<tr>
<td>Ahnoom</td>
<td>this very place; this very spot</td>
</tr>
<tr>
<td>A’tsoo’tsi’kakimaan</td>
<td>combining our efforts</td>
</tr>
<tr>
<td>A’tso’tsi’kakimatop</td>
<td>when everybody works on something together</td>
</tr>
<tr>
<td>Awaaáhsskataiksi</td>
<td>Elders</td>
</tr>
<tr>
<td>Ihptsipaitapiyo’pa</td>
<td>Source of Life; Essence of Life; Creator</td>
</tr>
<tr>
<td>Isskanai kswokwa’ahkata</td>
<td>all things including earth</td>
</tr>
<tr>
<td>Ihpipototsp</td>
<td>the purpose for being there</td>
</tr>
<tr>
<td>Isspi’po’totsp</td>
<td>responsibility</td>
</tr>
<tr>
<td>Istikoyistako</td>
<td>Slide Out Mountain; Sofa Mountain</td>
</tr>
<tr>
<td>Itsiipoootsikimskai</td>
<td>where the water comes together as friends, confluence</td>
</tr>
<tr>
<td>Kakyosin</td>
<td>to be observant and aware of your surroundings; alignment</td>
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<tr>
<td>Kakyosin isstaokakitsotsp</td>
<td>observation gives us intelligence knowledge and wisdom</td>
</tr>
<tr>
<td>Ksaahkomm</td>
<td>Earth</td>
</tr>
<tr>
<td>Ksahkomitapiiksi</td>
<td>earth beings/people</td>
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Ksiistikomm Thunder
Ksisststaki Beaver
Miistakistsi mountains
Naatoyitapiksi a spirit animal
Natosi Sun
Natoiyapiiyaa they are now spirits (Akawatoitapiyaa)
Niksókowaawákwáiks all my relatives
Niinohkanistssksinipi this is the way I know it to be; speaking personally
Niitoiyiss painted tipis
Niitsipowahsin Blackfoot language
Niitsitapi Real People
Niitsitapisinni Blackfoot ways of knowing and being
Nitákkawa lifelong friend; ally
Nitsiissti I am listening
Nitsi’powahsinni the words that carry the breath of the ancestors
Omahskispatsikoyii Great Sand Hills
Otahkoitahtayi Yellowstone River
Paahtómahksikimi Lake Created from Ice and Streams/Waterton Lakes National Park
Ponokasisahta Elk River; North Saskatchewan River
Poo’miikapii balance
Sapahtsimahkokita Can you help me understand?; Am I saying it right?; Am I doing it right?
Sikapistaanistsi transfer gifts/payments
Siksikaitisitapi Blackfoot people
Sokaapii good
Soyiitapiksi water beings/people
Spomitapiksi sky beings/people
Taamatosim smudge

Hawaiian terms

Aloha searching your heart, coming to know and acting from your heart
Aloha ʻĀina sustaining the ea or life breath between people and environment
Ahupua’a traditional land divisions
ʻAumakua where the spirits of ancestors live
Haleakalā House of the Rising Sun
Honua Earth
Ho’okupu sacred offerings; literal translation: to sprout forth or cause to grow
Ikeloa knowledge; wisdom; perpetual learning
Ikepono to see the truth; to see clearly without any doubt
Iwi Kūpuna the bones of ancestors
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<td>Native Hawaiian</td>
</tr>
<tr>
<td>Kūleana</td>
<td>responsibility</td>
</tr>
<tr>
<td>Mālama ka ‘aina</td>
<td>to love and honor the land</td>
</tr>
<tr>
<td>Mana</td>
<td>Spiritual life force; spiritual power</td>
</tr>
<tr>
<td>Mana’o</td>
<td>coming to know; thought; belief; intention</td>
</tr>
<tr>
<td>Na’auao</td>
<td>knowledge; wisdom; enlightenment</td>
</tr>
<tr>
<td>Paniolo</td>
<td>cowboy</td>
</tr>
<tr>
<td>Pono</td>
<td>righteous; true</td>
</tr>
<tr>
<td>Pule</td>
<td>pray; prayer</td>
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Introduction

This Introductory chapter to my dissertation begins with some background information and my positionality in relation to Indigenous community partners. I then discuss my research objectives and guiding questions for this work. Following this, I offer reviews of the literature on coproduction methods and Indigenous knowledge (IK). Next, I offer a brief summary of each of my three data chapters as well as descriptions of the study areas for my research. Finally, I demonstrate how each of the studies come together to offer a better understanding of how “centering” Indigenous ways of knowing and being can inform a more harmonious relationship between humans and nature.

Background and positionality

As a worldview folklorist, I have built enduring relationships with diverse Indigenous and local peoples over the years. I genuinely enjoy people and seeing the world through their eyes. As a folk ecologist or social-ecologist, I have sought to understand what land means to various Indigenous peoples in order to better acknowledge Indigenous traditional territories and encourage increased co-management of public and private lands by Indigenous stakeholders.¹ I see this as performed land acknowledgement and a next step in the decolonial Indigenization of government agencies and academic institutions. Niitsitapi which means “Real People” in the Blackfoot language is the name by which Blackfoot people call themselves. In this work I use the terms Niitsitapi and Blackfoot somewhat interchangeably even though they are not exactly interchangeable. As an Irish Canadian settler educator, scholar, and ally born, raised, and currently residing in

¹ On March 28, 2023, Indigenous soil scientist Lydia Jennings tweeted “Stop calling tribal nations stakeholders! We are rights holders.” I use this word because it is understood by environment and society scholars and managers but as a discipline, we should probably move away from using it and find a term that acknowledges Indigenous rights and shared responsibility rather than having a vested interest.
Niitsitapi traditional territory, I have grown up with Niitsitapi culture and people all my life. I’ve made many friendships within the Blackfoot community through my service on the Cardston Minor Hockey board, as a K-12 educator working with Blackfoot youth and their families, and through casual interactions as neighbors sharing the Cardston, Lethbridge, and Waterton areas of southwestern Alberta.

Initially, when I began this research about 10 years ago, I collaborated with pastoral Kānaka Maoli (Native Hawaiian) community partners in the coproduction of range science and management knowledge. However, it became clear that there was no way to talk about Hawaiian resource “management” with paniolo (Hawaiian cowboys) without acknowledging mana the spiritual life force that enlivens and empowers all things in the natural world and cosmos, and kūleana the Hawaiian word for responsibility. Kūleana is considered a privilege given to those who are pono (righteous) and ready to handle a responsibility such as mālama ka ʻāina, to love and honor the land – that is, to care for and protect the land like a beloved relative, a living ancestor. “This deceptively simple yet endangered practice is at the core of Indigenous Hawaiian culture and guides the current Hawaiian sovereignty politics in Hawaiʻi” (Sustainability and the Struggle for Self-Determination 2022). The significance of these beliefs and practices is reflected in the Hawaiʻi State Motto, which is a saying attributed to King Kamehameha III on July 31, 1843 (Hawaiʻi Visitors & Convention Bureau 2022) “Ua ma uke ea o ka ʻāina i ka pono.” or “The life of the land is perpetuated in righteousness.”

After taking a leave of absence from my PhD and returning home to Alberta to pursue a teaching career at a rural elementary school that enrolls approximately 30% of its students from the nearby Blood Tribe Reserve, I recognized the need to actively
decolonize-Indigenize my curriculum, pedagogy, and procedures. In the process I was
invited to take a Master of Education course with a predominantly Blackfoot cohort that
was taught using Blackfoot pedagogies and methods. Through my participation in the
Niitsitapi master of education program, I developed a deeper understanding of Niitsitapi
protocols, axiologies, ontologies, epistemologies, ecologies, methodologies, and
pedagogies while working closely with various Niitsitapi Awaaáhsskaiktisi (Blackfoot
Elders), ceremonialists, storytellers, scholars, and community members. I understand that
for Niitsitapi and most Indigenous people, knowledge is territory and culture-specific and
therefore knowing the land, the people, and the language of a given group is requisite to
understanding, embodying, sharing, and engaging in their ways (Miiniipokaa/Weasel
Moccasin 2021). Regardless of how much I’ve learned, I recognize that as a non-
Indigenous scholar-ally and according to Niitsitapi and other Indigenous protocols, I will
always need the support and collaboration of Elders to carry out Indigenous knowledge
(IK) research. This awareness of Niitsitapi and other Indigenous protocols has allowed
me to build relationships of trust and mutual respect among the community partners I
have collaborated with throughout this study. While I learned from a dozen Blackfoot
Elders and various other Blackfoot knowledge keepers (some of whom are also academic
scholars) who instructed us, the similarities among the Hawaiian understandings and
experiences with Mana and ‘Āina and Blackfoot understandings and experiences with
Ihtsipaitapiiyo’pa (Essence Of All Things/Source Of Life) and Nisökowaawaiks (all my
relatives) became a source of interest for me. Some of the Elders and community
members encouraged me to go back and finish my PhD, this time focussing on Blackfoot
ecological knowledge and relationships with land. Likewise, the Kānaka Maoli from the
Big Island (the Island of Hawai‘i) and Maui whom I had previously built relationships with encouraged me to do the same.

Although some Blackfoot knowledge has been transferred to me through ceremony by Elders with the intent that I should share and use it in a good way and for good purposes, I acknowledge that my understanding and application of Indigenous knowledge will always be influenced to some extent by my Western upbringing and education. For this reason, I humbly defer to the Elders and respect their expertise and experience as well as their responsibility and right to speak for their people and about their people in authoritative ways. Likewise, in my roles as co-investigator and co-author, I follow the lead of Elders and community members who determine the questions, problems, and projects they want to address and work on together as a collective/society, as well as the interpretation and distribution of the outcomes of the research or knowledge.

**Research Objectives**

If Indigenous managed and co-managed lands maintain “equal-or-higher” biodiversity than protected areas (Sarfo-Adu 2022; Schuster et al. 2019), we must ask ourselves: What can we learn from Indigenous ‘ecologies’? My research explores possible mechanisms underlying biodiversity and ecological integrity of Indigenous landscapes by engaging with Elders and other community partners through listening; making observations; participating in or experiencing cultural learning; and directly asking them their perspectives towards land (my first guiding research question). I then consider the remaining three research questions listed below. Developing effective and ethical
collaborative processes for engaging Indigenous communities in research was also a research objective. To address these, my research is guided by the following questions.

1) What are Niitsitapi perspectives toward land?

2) What factors instigate and perpetuate these perspectives?

3) How do these perspectives play out in terms of identity; wellbeing; daily life; education (e.g., knowledge production and pedagogy); economics; environmental concern, behavior, and stewardship?

4) How might the coproduction process, learning from Indigenous ways of knowing and being, disrupt and inform Western methods, management, and pedagogies and lead to better and more equitable social-ecological outcomes?

**Coproduction**

Coproduction is essentially a type of action research (AR, first coined by Kurt Lewin in 1948). Examples include participatory action research (PAR), which *considers* community perspectives, and community-based participatory research (CBPR), which *involves* community members in the research. Originally these research models were developed to move standard research on social problems into the realm of interactive inquiry and social action to the end of understanding, predicting, and effecting social change (McNiff & Whitehead 2005). The specific methods of AR (ibid. 2005), PAR (Reason & Bradbury 2001), and CBPR (Wallerstein & Duran 2008) have become increasingly structured over time by the social scientists, agencies, and communities who have developed and employed them. For example, if one says they are doing CBPR research, they might be met with, “You didn’t actually do CBPR. You didn’t follow the specific parameters of the CBPR model.” Coproduction has largely avoided this kind of rigidity as it is mostly regarded as a general term for scientists to be collaborating with
“lay” individuals to coproduce knowledge or coproduce protocols or curriculum and so on. I have employed a particular kind of coproduction (a more “deliberate” form) in my research that is based on the work of Meadow et al. (2015). This method is a loosely structured framework that seeks to observe how stakeholders frame an issue and to understand the terms and knowledge systems they use to interpret an issue. Coproduced research almost always has a social component but most often also includes an environmental component, making it especially appropriate for working with Indigenous people whose worldviews typically do not separate humans and environments in the ways that Western cultures do. The specific mode of coproduction I used was collaborative as illustrated below (Table 1.).

Table 1. Table of modes of stakeholder engagement from Meadow et al. (2015)

<table>
<thead>
<tr>
<th>Mode</th>
<th>Objective</th>
<th>Origin of research</th>
<th>Type of relationship</th>
<th>Stakeholder involvement</th>
<th>Stakeholder representation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Contractual</td>
<td>Test applicability of new technology or knowledge</td>
<td>Researchers</td>
<td>Unidirectional flow of information from researchers to stakeholders</td>
<td>Primarily as passive recipient of new knowledge or technology</td>
<td>Views and opinions of stakeholders are not emphasized</td>
</tr>
<tr>
<td>Consultative</td>
<td>Use research to solve real-world problems</td>
<td>Stakeholders or researchers</td>
<td>Researchers consult with stakeholders, diagnose the problem, and try to find a solution</td>
<td>At specific stages of research such as problem definition, research design, diffusion of findings</td>
<td>Stakeholder views primarily filtered through third party (e.g., social scientists)</td>
</tr>
<tr>
<td>Collaborative</td>
<td>Learn from stakeholders to guide applied research</td>
<td>Stakeholders</td>
<td>Stakeholders and researchers are partners</td>
<td>Continuous with emphasis on specific activities, depending on joint diagnosis of the problem</td>
<td>Stakeholders themselves, local representatives, trained research team members</td>
</tr>
<tr>
<td>Collegial</td>
<td>Understand and strengthen local research and development capacity</td>
<td>Stakeholders</td>
<td>Researchers actively encourage local research and development capacity</td>
<td>Variable, but ongoing</td>
<td>Stakeholders themselves</td>
</tr>
</tbody>
</table>

The specific approaches to collaboration I employed were AR and rapid assessment process (RAP) (Beebe 2001) where the objective was to learn from Niitsitapi (and
before that, Kānaka Maoli) and help effect change for the Blackfoot community (as well as Western society and academia) by understanding how they “frame issues; what terms and knowledge systems they use to understand issues” in order to challenge and inform Western knowledge and normalize Indigenous knowledge within the academy – reimagine methodology, pedagogy, and sustainability. This process is a semi-structured qualitative approach that identifies “the most important elements of the local situation from the perspective of the local participants” (Beebe 2001) so that problems can be solved in ways that fit within local knowledge frameworks (Meadow et al. 2015) which do not necessarily consider scientific information to be more important than other knowledge (Cvitanovic et al. 2014). My role as a researcher was principally that of ethnographer (listening and documenting) and support (Nitákkaawa meaning ally/lifelong friend) as we coproduced a sort of collective autoethnography (CAE) in the process of identifying research problems/questions they wanted to work on together.

Table 2. Table of approaches to collaboration categorized by the mode(s) of engagement they fulfill from Meadow et al. (2015).

<table>
<thead>
<tr>
<th>Approach to deliberate coproduction</th>
<th>Mode(s)</th>
<th>Type of question</th>
<th>Role of research team</th>
<th>Resources required</th>
</tr>
</thead>
<tbody>
<tr>
<td>Action research</td>
<td>Collegial</td>
<td>-Stakeholder defined&lt;br&gt;-Effecting change for stakeholder&lt;br&gt;-Social/environmental justice focus</td>
<td>-Facilitators, teachers, technical guidance&lt;br&gt;-Support the research of the stakeholder community</td>
<td>-Sufficient time to spend in stakeholder community&lt;br&gt;-Financial (or other) support for stakeholder participants</td>
</tr>
<tr>
<td>Transdisciplinary</td>
<td>Collegial</td>
<td>-Technical question that also has complex political or social impacts</td>
<td>-Equal partners with stakeholders&lt;br&gt;-Facilitators of the process</td>
<td>-Sufficient time to spend on participatory activities</td>
</tr>
<tr>
<td>Rapid assessment process</td>
<td>Consultative Collaborative</td>
<td>-Understanding how stakeholders frame an issue; what terms and knowledge systems they use to understand the issue</td>
<td>-Ethnographers -- learning about stakeholders’ context&lt;br&gt;-Proposing solutions to address issue of concern</td>
<td>-Social science research training&lt;br&gt;-Travel funds to go to stakeholder community/organization</td>
</tr>
<tr>
<td>Participatory integrated assessment</td>
<td>Consultative Collaborative</td>
<td>-Scenario planning&lt;br&gt;-Development of integrated models</td>
<td>-Facilitators of participatory processes&lt;br&gt;-Provide technical input</td>
<td>-Sufficient time to spend on participatory activities</td>
</tr>
</tbody>
</table>
One thing that became important while learning social-ecological, ontological, and pedagogical knowledge from Blackfoot (and Hawaiian) people, which diverged a bit from Meadow et al.’s (2015) model, was to recognize that in the case of my particular study, it was not a coproduction of knowledge per se as the knowledge being shared was solely Blackfoot (or Hawaiian) knowledge but, rather just followed their coproduction framework for engaging in coproduced research. I embodied the Blackfoot word Sapahtsimahkokitaa (Can you help me understand? Am I saying it right? Am I doing it right?) as an ongoing guide for my collaborative partnership with them. The coproduction framework provides important guides for individuals wanting to engage in this kind of genuine equitable knowledge sharing and reflects some of the values inherent to contemporary Indigenous research methods such as Mi’kmaq two-eyed seeing (Reid et al. 2021).

**Indigenous ways of knowing and being**

For primarily practical reasons, Indigenous knowledge was welcomed and even sought after by early European trading companies/trappers and settlers (Belanger & Hanrahan 2020). By the turn of the twentieth century, however, both the American and Canadian governments implemented legal acts meant to, in the words of Duncan Campbell Scott, “kill the Indian in the child (Joseph 2018)” and thereby root out Indigenous knowledge
systems in North America entirely. Lieutenant Colonel Richard Henry Pratt, founder of Carlisle Indian Industrial school in 1879—the first government-run boarding school for Native Americans in the USA—similarly stated the goal was to, “Kill the Indian, and save the man.”

As was famously stated by Canada’s first Prime Minister John A. McDonald in 1879,

> When the school is on the reserve, the child lives with its parents, who are savages, and though he may learn to read and write, his habits and training mode of thought are Indian. He is simply a savage who can read and write. It has been strongly impressed upon myself, as head of the Department, that Indian children should be withdrawn as much as possible from the parental influence, and the only way to do that would be to put them in central training industrial schools where they will acquire the habits and modes of thought of white men. (Joseph 2018)

These attitudes persisted until the civil rights movement and Native renaissance (e.g., Red Power) of the 1960’s when Indigenous scholars and activists like Leroy Little Bear and Vine Deloria Jr. began publicly asserting things like, “Any group that wishes to be regarded as the authority in a human society must not simply banish or discredit the views of their rivals, they must become the sole source of truth for that society and defend their status and the power to interpret against all comers by providing the best explanation of the data” (Deloria 1997). Until these Indigenous advocates and the formation of Indigenous studies programs which took TK/IK seriously, it was the, “European writers, philosophers, jurists, and academics [who] established the prevalent—and what in many cases remain largely uncontested—ideas about Indigenous peoples [now] being challenged by [Indigenous peoples and] those individuals working in the Indigenous Studies tradition” (Belanger & Hanrahan 2020).
By the turn of the millennium many Western disciplines had acknowledged value in and were proactively engaging with TK/IK and traditional knowledge is favorably defined by the International Council for Science (ICSU) (2000) as “a cumulative body of knowledge, know-how, practices and representations maintained and developed by peoples with extended histories of interaction with the natural environment. These sophisticated sets of understandings, interpretations and meanings are part and parcel of a cultural complex that encompasses language, naming and classification systems, resource use practices, ritual, spirituality and worldview.”

The term Indigenous knowledge (IK) is often used synonymously with traditional knowledge (TK). Sometimes TK as (technologies, skills, ‘sciences’ and ‘philosophies’) and traditional cultural expression (TCE) as (cultural protocols and practices) are considered subcategories of IK. However, both IK and TK refer to the knowledge systems endemic to a particular cultural group or region. Though well-intended, these remain Eurocentric terms used to distinguish between Western knowledge systems and those of myriad distinct Indigenous, traditional, and/or local peoples. Typically, “knowledge” is associated with epistemology and “being” with ontology. For this reason and because Indigenous knowledge isn’t static, some Indigenous Elders and scholars prefer the term Indigenous ways of knowing and being (IWKB) to Indigenous knowledge (IK) (Aahsaopi/First Rider July 19, 2019; Ninna Piiksii/Bruised Head October 11, 2019, 2022; Keakealani pers. comm. May 29, 2015, 2017; Little Bear 2011: Nakachi 2020; Tuhiwai Smith 2012; Wilson 2008). One problem with TK being a subset of IK is that traditional may also refer to cultural groups that are not necessarily Indigenous.
In this paper I will be using IK in the comprehensive sense described by the ICSU. However, although this definition is holistic in ways that reflect Indigenous ways of knowing and being, many Blackfoot (and Hawaiian) Elders and knowledge keepers I have collaborated with prefer to move away from the term *Indigenous* entirely. They feel it is a European word that: generalizes Native peoples; doesn’t exist or have a translation in their language; isn’t as old as their own words for *traditional ways of knowing and being* “Niitsitapiisinni”, “Kakyosin” *to be observant and aware of your surroundings; the process of coming to know*, and “Ai’stomatoominniki” *coming to know your heart* (Ninna Piiksii/Bruised Head 2019; Bastien 2004) in Blackfoot. In Hawaiian, “Aloha” *searching your heart, coming to know your heart, acting from the heart*, “Ikeloa” *knowledge, wisdom, perpetual learning*, “Na’auao” *knowledge, wisdom, enlightenment*. Other Hawaiian words associated with knowing and being like “Mana’o” *coming to know, thought, belief, intention*, and “Ikepono” *to see the truth, to see clearly without any doubt*, incorporate the concepts of being righteousness, balanced, aligned with the land and cosmos, good, equitable, and true (pono) and spiritual power (mana) as intrinsic components of knowing. Because this paper is intended for both Western and Indigenous academics and their respective communities, I will be using the academic terms IWKB and IK/TK, as defined above by the ICSU, in this paper when referring generally to the study of Indigenous or traditional ways of knowing and being from a Western lens and framework and when weaving or braiding traditional and Western knowledge systems as an academic exercise. However, I acknowledge that what Western scholars call IK and TK are generalized terms for specific traditions which have their own names and parameters and have been passed down orally through culture and territory-specific
sciences, technologies, skills, philosophies, languages, protocols, ceremonies, songs, dances, art, architecture, games, and stories (Battiste 2002; Ninna Piiksii/Bruised Head 2022; Wilson 2008). I recognize that these knowledges and ways of knowing and being have been transferred to humans by the Source of Life/Life Force; the ancestors; and all the environmental and cosmic relatives through observations and experiences/relationships over millennia (Bastien 2004; Ninna Piiksii/Bruised Head 2022; Keakealani 2017). For these reasons, in addition to those articulated in the following excerpt by Battiste (2002), I will also be using Blackfoot- (and Hawaiian) specific language and interpretations of knowledge/knowing and being throughout this paper.

First, a couple of points must be made about the effectiveness of conducting a literature review on Indigenous knowledge. The first point is that in the European (or Eurocentric) knowledge system, the purpose of a literature review is to analyze critically a segment of a published topic. Indigenous knowledge comprises the complex set of technologies developed and sustained by Indigenous civilizations. Often oral and symbolic, it is transmitted through the structure of Indigenous languages and passed on to the next generation through modeling, practice, and animation, rather than through the written word. In the context of Indigenous knowledge, therefore, a literature review is an oxymoron because Indigenous knowledge is typically embedded in the cumulative experiences and teachings of Indigenous peoples rather than in a library. The second point is that conducting a literature review on Indigenous knowledge implies that Eurocentric research can reveal an understanding of Indigenous knowledge. The problem with this approach is that Indigenous knowledge does not mirror classic Eurocentric orders of life. It is a knowledge system in its own right with its own internal consistency and ways of knowing, and there are limits to how far it can be comprehended from a Eurocentric point of view. Having said that, literature on the topic of Indigenous knowledge and pedagogy does exist, although it is limited in scope and depth... (Battiste 2002b)

Furthermore, I understand Indigenous ecological knowledge (IEK) or Traditional ecological knowledge (TEK) to include any principles and practices that derive from an Indigenous group’s beliefs about, and experiences/relationships with, the natural world. For this dissertation, these ways of knowing and being will be taken as true and self-
evident, reliable ways of knowing upon which new understanding can be extended, extrapolated, or generated (Itsiiipootsikimskai 2023 – Chapter 2 of this dissertation). I will be engaging collective or relational methods (ibid.) such as “Aatsimoiyihkaan, resetting harmony and balance in relationships with Níksókowaawák (all the relatives as a whole) or Isskanai kswkowa’ahkata (all things including earth) via our words (e.g., prayers, words of contrition) and by the way of Aatsimihkásin via our actions and behaviours (e.g., putting tobacco down). If we don’t do these things the land will no longer provide for us” (Blackfoot Elder Duane Mistaken Chief March 8, 2023); and in Hawaiian, Aloha ‘Āina “sustaining the ea – or life breath – between people and our natural environments ... Aloha [referring to] the relationships and consistent reciprocal care between all parts of our world to sustain pono and well-being, and ‘Āina [meaning] ... the land, sea, and skies – as well as the people and the knowledge systems that are deeply rooted in sustainable care and pono for Hawai‘i” (Kūali‘i Council 2018 as cited in UH Manoa 2023).

Blackfoot scholar, Dr. Leroy Little Bear’s Native Paradigm (2017) carefully identifies and generalizes a universal pattern for these kinds of Indigenous ways of knowing and being.

Native Paradigm refers to the way reality is viewed from a Native American perspective and also refers to the language used to express that view...Native Paradigm is [a] way of being that encompasses both conscious and unconscious infrastructures and is based upon generations of observations, collected wisdom, and relationships with the natural world. The intention imbedded within the practices of Native Paradigm is to create an enduring harmonious relationship with oneself, community, and the cosmos no matter which [I]ndigenous community you come from. In addition, the paradigm plants the seeds of decolonization by...acknowledging the inherent right to practice and articulate the wisdom of our ancestors. (Little Bear and First Rider as cited in University of Lethbridge 2017)
It is through the lens of these Indigenous frameworks that my community partners and I have conducted this research. One of the overarching themes for this dissertation is understanding the ontological and epistemological roots of environmental conflict and conservation. Blackfoot scholar, Leroy Little Bear (2016), describes colonizers as “plants without roots”. Each of the data chapters considers the deeply rooted beliefs and practices that inform Indigenous environmental attitudes and behaviors.

**Summaries of data chapters**

Chapter two considers the incompatibilities between Western and Indigenous research methods and proposes a uniquely Indigenous methodological framework to stand alongside quantitative and qualitative methods. This study takes place among Niitsitapi of the unceded lands of the Siksikaitisitapi (Blackfoot Confederacy), a territory which covers a vast area now known as southern Alberta, western Saskatchewan, and western Montana.

Figure 8. Current map of the federally recognized reservations of the four tribes of the Blackfoot Confederacy: A) Siksika Reserve B) Piikani Reserve C) Kainai Reserve D) Blackfeet Reservation.
Chapter three applies Blackfoot and Hawaiian understandings and experiences of comprehensive relational animacy to decolonize-Indigenize or give “roots” to recreation and parks management. This study also takes place in Blackfoot territory as well as among Kānaka Maoli of the unceded lands of the Kingdom of Hawai’i, now known as the state of Hawai’i, the islands of Hawai’i and Maui – Kona, Kohala, and Kula mokus in particular. Chapter four applies Blackfoot understanding and experience of comprehensive relational animacy to decolonize-Indigenize or give “roots” to STEM education. This study primarily takes place among Niitsitapi in Blackfoot territory as well. And finally, Chapter five describes how these three studies jointly inform an improved understanding of how “centering” IWKB can inform a more harmonious relationship between humans and nature.
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Níksókowaawák as axiom: The indispensability of comprehensive relational animacy in Blackfoot ways of knowing, being, and doing

Itsíipootsiikimskái:² Sandra Bartlett Atwood, Ninna Piiksii (Chief Bird) Mike Bruised Head, Mark W. Brunson, Aahsaopi (State of Being) Laverne First Rider, Tim Frandy, James Maffie, Aakaomo’tsstaki (Many Victories) Michelle Provost, Miiniipoka (Berry Child) Peter Weasel Moccasin

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² All authors contributed collectively and are listed alphabetically. The group formed an alliance and took the name Itsíipootsiikimskái (Where the Water Comes Together as Friends, Confluence). Itsíipootsiikimskái is the collective name by which this paper should be cited i.e., (Itsíipootsiikimskái 2023) as opposed to (Atwood et al. 2023).
“Soyiitapiksi” by Blackfoot artist Bryce Many Fingers Singer

Bryce created “Water Beings” to artistically represent níksókowaawák (all my relatives).
Níksókowaawák as axiom: The indispensability of comprehensive relational animacy in Blackfoot ways of knowing, being, and doing

This paper outlines a proposal, based in Blackfoot worldview, for a collective method to stand alongside Western qualitative and quantitative methods and highlights the value of collective methods in collaborative social-ecological research. Neither qualitative nor quantitative methods are adequate to disclose a world where all things are alive, where ‘objects’ are subjects—agentive beings in their own right. Most Indigenous cultures understand and experience the world as a network of living beings, a collective, with whom they are interrelated/connected and therefore, any efforts to collaborate with Indigenous peoples must acknowledge comprehensive relational animacy. Applying coproduction principles in concert with Blackfoot ways of knowing and being, the authors collaborate to articulate and advance a collective method wherein the many and diverse collective methods of Blackfoot and other Indigenous peoples might find quarter.

Keywords: Indigenous knowledge; methodology; ontological turn; coproduction

Introduction

[The only way you’re gonna connect with our culture is through Spirit, that’s our way…. That’s the things my people know. Everything we believe [know] comes through the heart, that’s why we treat everyone and everything with respect, we honor everything, because we believe everything has a spirit… this is our way, this is what the old people taught me. (Kainai Elder, Miiniipokaa [Berry Child]/Weasel Moccasin January 29, 2021)]

For most Indigenous or Native peoples worldwide, the belief that everything in the natural world is alive and interrelated is understood and experienced to be true and self-

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3 Káínai or Akáína (Many Chiefs/Many Chief People) or Blood Tribe is one of the tribes of the Siksikaisitapi (Blackfoot People/Nation). The other tribes are Siksiká (Blackfoot), Piikáni (Robes Not Fully Tanned; Peigan) or Aapátohsipikáni (Northern Peigan) and Amsskaapiipiikáni (Southern Peigan) or Blackfeet.
4 Because Blackfoot Elders expressed a strong preference that the term “Native” rather than “Indigenous” be used when referring to them, we have favored “Native” but also used these terms somewhat interchangeably.
evident (Blaser and De La Cadena 2018; Belanger and Hanrahan 2020; Little Bear 2011; UNDRIP 2012; Deloria 1999). This belief in relational animacy is insufficiently addressed by Western science (Belanger and Hanrahan 2020; Bruised Head 2022; Little Bear 2011; UNESCO and ICSU 2000; Villalpando as quoted in Hernandez 2022, i), even science designed to consider Native knowledge (Hernandez 2022; Wilson 2008). To more accurately understand and engage with Indigenous knowledge, we acknowledge this method for knowing the world to be axiomatic (true and self-evident). Rather than scrutinize the validity of such beliefs through a Western academic lens, we aim to collectively describe and establish the merits and utility of níksókowaawák method (and its generalized form, the collective method) for disclosing and interacting with social-ecological systems\(^5\) in more equitable, ethical, and holistic ways.

Two recent trends in human-environment studies are, incorporating traditional ecological knowledge/Indigenous ecological knowledge (TEK)/(IEK) (Albuquerque et al. 2021; Nelson and Shilling 2018) and engaging with stakeholders in coproduced research (Djenontin and Meadow 2018; Moran and Lopez 2016). We submit that genuine consideration of TEK/IEK requires scientists engaged in coproduction to understand—or at the very least, to recognize and respect—how Indigenous ontologies and epistemologies may be incompatible with standard approaches to social science and environmental science, which are not adequate to elucidate Indigenous worldviews. Positivistic (and therefore many quantitative) methods seek to separate the observer from the observed in pursuit of an unachievable notion of objectivity. And even though post-

\(^5\) The term "social-ecological system" has been used in multiple contexts and lacks a clear definition across disciplines (Colding & Barthel 2019); in this context, we use it to reflect Indigenous views that human and ecological systems are inextricably linked and mutually dependent (Fidel et al. 2014).
positivistic and critical qualitative literature and methods address and allow for
reflexivity and subjectivity, and begin to recognize the agency of the objects of research
(Burkhart 2019; Wilson 2008), many Indigenous scholars feel that the intersubjectivity
still falls far short of traditional notions of relationality present in Indigenous ways of
thinking, knowing, living, and being (Bastien 2004; Hernandez 2022; Kimmerer 2013;
Little Bear 2011; Wilson 2008).

Despite the ‘ontological turn’ in anthropology (Blaser and De la Cadena 2018;
Nadasdy 1999; Viveiros de Castro 2015), political ecology (Belanger and Hanrahan 2020;
Carolan 2004; Goldman et al., 2018), human geography (Hinchliffe 2007; Robertson 2016), and
the many Indigenous and non-Indigenous scholars who acknowledge plural or alternative
ontologies, research on relational animacy in Western scholarship has been confined
within the ethnocentric epistemological parameters of qualitative, quantitative, and mixed
methods, as defined in contemporary social science (Belanger and Hanrahan 2020).

Although the literature on environmental and epistemic justice highlights the importance
of TEK/IEK in transforming knowledge production and understanding the ontological
roots of environmental conflicts, in practice when scientists collaborate with Indigenous
peoples, TEK/IEK often gets integrated into existing knowledge frameworks as data
(Cruikshank 2012, 239). Blaser (2009) suggests this is partly due to recent funding trends
which privilege knowledge deemed useful and “influence how [I]ndigenous knowledge is…
defined and translated in discrete packages as ‘informational inputs’” (ibid.). When
this happens, distinct holistic knowledge systems are often dismembered (mined for their
most ‘useful’ recurring elements), coded, and generalized as pan-Indian/pan-Indigenous
knowledge. Dynamic elements are dismissed as many Western researchers miss the
“greater knowledge value, especially the possibility of surprises [that] come from unfamiliar oral accounts [stories] that do not seem to fit easily within conventional frameworks” (ibid), not to mention the harm integration exercises can cause Indigenous people and Nations.

Therefore, given the predominance of Native cultures who understand and experience the world as a collective of living beings with whom they are connected and related, we contend that efforts to collaborate with Native peoples must acknowledge comprehensive relational animacy. Indigenous peoples should not be obliged to use inadequate and ethnocentric Western frameworks in order to share ancestral knowledge that offers critical insights to vexing problems in every sphere of activity and knowledge from ecosystems to economics, recreation, physics, farming, ethics, well-being and so on.

Applying coproduction methods together with Ai’stomatoominniki⁶ (embodying knowledge), we collaborated to articulate and advance the collective methods of many Native peoples. While recent scholarship tries to create spaces for Indigenous methods within Western analytical frameworks, we submit that Indigenous methods can only be effectively conceptualized and actualized from within distinctly Indigenous frameworks.

These ostensible incompatibilities between Western and Indigenous ways of knowing, being, and doing can be illustrated by Niitsitapi, or Blackfoot discourse. In the words of Kainai Elder and scholar, Ninna Piiksii (Chief Bird) Bruised Head (2022):

> Blackfoot knowledge entails how we do things and what it's based on; it's almost the expression of everyday experience. This experience comes with language, song and ceremony. We believe all is animate; in the Blackfoot world, everything is interrelated.

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⁶ Ai’stomatoominniki is not easily translated into English and has many nuanced meanings including, “When you have made [knowledge] part of your body,’ ‘embodying your knowledge.’ [The] quality of coming to know your heart [which] designates ‘[I]ndigenous epistemology’ (Piikani Elder and scholar, Betty Bastien 2004, 198, 218)”
This interrelationship begins from our Creation stories, and how we come about the knowledge from our Creation stories and legends. Our source of knowledge derives from Niitsipowahsin, our language. The collective relationships of how the Blackfoot people survived and the protocols they followed are all transferred orally, from the thousands if not millions of generations: the oral transfer of Blackfoot knowledge.

In the next section, we present Niitsitapi worldview as a storied and embodied process. Following, we present a literature review on why Indigenizing science is important and can not be conducted with current Western scientific approaches. Then, we present our methodological practice for acknowledging and developing the collective method. We then describe the collective method and distinguish it from existing Western scientific approaches. This paper concludes with a discussion of the potential impacts that the collective method approach can have on Indigenizing social-environmental relations by understanding the ontological dimensions of environmental conservation and conflict.

**Niitsitapi worldview**

“Blackfoot ways are embodied in Tipi” (Ninna Piiksii/Bruised Head February 22, 2020). “The whole universe is right there” (Amsskaapiiikáni Elder, John Murray March 10, 2022). Niitooyiss (painted tipis) establish, enact, and make manifest human connections to níksókowaawák⁸, ‘all my relatives’ in Blackfoot, referring to both one’s human and non-human relatives. The top presents and represents spomitapiiksi (sky beings), which are atmospheric and cosmic relatives; “the middle is our power” (Murray 2022), naatoyitapiiksi (a spirit animal “who has given the people access to his powers to help them in their lives” [Niitsitapiisinni 2013, 26]); and the bottom, ksahkomitapiiksi

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⁷ A portable dwelling used by North American plains Indians.

⁸ As given to Atwood by Kainai Elder, Aahsaopi (State of Being)/Laverne First Rider November 6, 2019; Kainai Elder, Aiaistahkommi (Shoots at Close Range)/Duane Mistaken Chief September 30, 2021; and Ninna Piiksii/Mike Bruised Head November 2021.
(earth beings) and soyiitapiiksi (water beings) which often signifies the part of Niitsitapi territory where the design was given to an individual through a dream or transferred from elder relatives. In this way, Niitsitapi traditional places of dwelling are sacred bundles\(^9\) gifted with real properties that (like other sacred bundles) bring protection, knowledge, and balance by “chang[ing] the energy and creat[ing] new realities” (Piikani Elder, Aakaomo’tsstaki [Many Victories]/Provost February 27, 2021). Tipis are sacred spaces where daily experiences are understood through and influenced by dreams and ceremony. “We create an environment [e.g., fire, trills, pipes, prayer, songs, taamatosim (smudge)]\(^{10}\) where bundles can change energy… We literally co-create reality with the cosmos… We must have a reverence for that energy” (Aakaomo’tsstaki/Provost February 27, 2021).

Tipis also manifest the balance and relationship between things that are patterned and things that are rare in the world. “Things that repeat [like the patterns on tipis] are almost like laws, foundational points that are real for us and have deep meaning… things that only happen once, like a [tipi transfer] song\(^{11}\), are also significant” (Ninna Piiksii/Bruised Head February 22, 2020).

Figure 1. A Child’s Lodge – Piegan c1926, Blackfoot Tipis, c1926, Kainai Tipi c1927. (Photographs: Edward Curtis. Public Domain.)

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\(^9\) Sacred bundles are agentive non-human beings who communicate and interact with humans. Aakaomo’tsstaki/Michelle Provost (February 27, 2021) explains, “Our home belongs to Natosi [Sun] and houses bundles, they work miracles.” While painted tipis are in themselves sacred bundles, they also house other sacred bundles. Siksika Elder, Naato’tsisii (Holy Smoke)/Herman Yellow Old Woman (February 27, 2021), emphasizes the foundational role of sacred bundles, “The Beaver Bundle is the first ceremony given to Niitsitapi. Our ways are all rooted in the Beaver Bundle.” Piikani Elder, Naamaakaakomi (Going to Shoot)/Jerry Potts (March 6, 2021) elaborates, “Beaver Bundle has over a hundred songs, all the birds and animals are in there and the oldest stories like Scarface and Big Smoke ceremony.”

\(^10\) Some Elders don’t like the translation “smudge” because it gives the impression that one is smearing something on the face/body when really, the smoke rising from the smouldering sweetgrass simply rises skyward making a connection with Ihtsipaitapiiyo’pa (Source of Life/Essence of Life/Creator). As given to Atwood by Aahsaopi/Laverne First Rider July 19, 2019 and December 24, 2021.

\(^11\) Everything has a name, a story, a song, and in the case of some knowledge or bundle transfers such as tipis and tipi designs, the song is only given one time and must be committed to memory.
Kainai Elder, Frank Weasel Head, explains níksókowaawák method this way,

“We teach our culture through stories. Everything has a life and a story” (as quoted in Niitsitapiisinni 2013, 22). Piikani Elder, Peter Strikes with a Gun adds:

[Stories, these are the laws. They are not written down. The way the stories go, the one who told the story helps us to know ahead of time. That is the way with our bundles. Why we don’t make mistakes. They all have stories. The same for all the songs. We are all relatives to the things that fly around, the water people, the ground people, we are all related to these things. The songs came from them and they are transferable, [Etsik pumaksin, passed on through ceremony]. (as quoted in Raczka 2017, v)

Ninna Piiksii/Mike Bruised Head (February 22, 2020) repeats the significance of stories and their role in Native science:

[Our] stories are laws. Belief ¹² is beyond theory… [Western] science is based on theories and experiments and the theories keep changing. Our ways are based on stories that have not changed since time immemorial, stories that help us renew sacred alliances with níksókowaawák through experiences as we trust in spirit and grow in kinship and understanding.

These foundational beliefs are the nexus in which theory, knowledge, interpretation manifests and are therefore considered more reliable than knowing something through

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¹² Referring to belief in their stories as foundational knowledge, which knowledge is alive and composed of spirit (Bastien 2004).
‘rational’ thought and basic senses alone. Aistomatoominniki/aistommatop (Blackfoot epistemology/coming to know your heart/embodifying knowledge) upholds that the purest knowledge requires non-empirical sensibilities to detect. Niitsitapi believe ceremony and renewal of relationships with níksókowaawáak develop these refined sensibilities in important ways that Western education cannot or does not.

**Indigenizing science**

Since the ‘Enlightenment,’ for a variety of complex reasons, from ethnocentrism to rationalizing colonial expansion (Vinyeta 2021) and more, Niitsitapi and other Indigenous worldviews have been seen as primitive or rudimentary. While this notion has in recent decades relented to a genuine appreciation for what are now recognized to be rather complex, robust onto-epistemologies (Kimmerer 2013; Little Bear 2011; Maffie 2014; Peat 2005), Western scholars continue to address Native perspectives within the framework of Western constructs and from a Western point of reference. For example, even in the process of mitigating the negative consequences of colonization and residential schools on Blackfoot ways of knowing, being, and doing, one most often speaks in terms of ‘decolonizing’ education rather than ‘Indigenizing’ education. Although decolonization is used by many Indigenous scholars and activists to promote their civil and sovereign rights, within Western institutions/agencies, decolonization in recent years has often come to mean diversity, equality, and inclusion (DEI) and frequently focusses on ‘making room for’ Indigenous knowledges within existing Western frameworks which are still considered the standard or norm. Indigenization, however, normalizes Native ontologies, epistemologies, pedagogies, and methodologies
by acknowledging plural/alternative knowledge systems in non-hierarchical ways (Battiste 2004, 2013; Cajete 1994; Kovach 2010; Smith 2012; Wilson 2008). Battiste (2013) incorporates Indigenization into her definition of decolonization contending that decolonization is a two-pronged process that requires both 1) the “deconstruction” of colonial perspectives as privileged and neutral “exposing the political, moral, and theoretical inadequacies of colonialism and culturalism” (Battiste 2004, 1); and 2) the “reconstruction” of marginalized Indigenous perspectives as being established and reliable. For example, considering níksókowaawák and other Indigenous perspectives to be axiomatic, is Indigenizing as it normalizes Indigenous knowledge for its own purposes and it is decolonizing as it challenges the neutrality of Western science.

However, most often, when Blackfoot culture is engaged by other disciplines, one sees Western classifications like, Blackfoot philosophy, Blackfoot ecology, and Blackfoot physics—in other words, Blackfoot culture through the splintered and distorted lens of philosophy, ecology, and physics or Blackfoot culture as it relates/correlates to various Western disciplines. This kind of research is important and has a decolonizing effect on these disciplines and the academy. However, to truly reconcile and repair damages done to Blackfoot (and other Indigenous) communities and territories as a result of the colonial agenda (education in particular) and move towards a more complete understanding of social-ecological systems, the academy must also be Indigenized; Western scholars must take Indigenous stories more seriously and reconsider the world with a mind unfettered, undistorted, and unfractured by Western categories and worldview. This is challenging for Western scholars to do, even when they know it’s important, even when they sincerely try. The theories, methods, and language Western scholars use to engage and
explain the world are just so saturated with Western meanings and unwitting bias that to genuinely interface with Blackfoot (and other non-Western) perspectives and collaborate with any degree of equity and efficacy, Western scholars must somehow suspend their foundational Western ontological and epistemological assumptions about what it means to exist, think, feel/sense, and know.

For example, because Niitsitapi worldview and methods derive entirely from Ihtsipaitapiiy’pa (Source of Life/Essence of All Things), an energy that generates, enlivens, and unifies everything in the universe, including their language and stories, there is no way to talk about ecological knowledge devoid of spirit and in isolation from other kinds of knowledge the way that Western methods tend to. Whether one is considering health, law, education, nutrition, biology, linguistics, hydrology, economics, sociology, chemistry etc., Niitsitapi methods always begin with ceremony (Kainai Elder, Aahsaopi (State of Being)/Laverne First Rider; Wilson 2008) i.e., song, prayer, dance, taamatosim (smudge), making offerings such as putting tobacco, renewing relationships with niksokowaawak, in place—on the land, when possible. As such, Blackfoot ‘ecology’ is necessarily spiritual (Aatsimmoiyihkan), collective, holistic, transdisciplinary, and experiential (both spiritual and physical experience; personal experience with niksokowaawak who constitute one’s immediate environment).

**Methods**

In Niitsitapi culture, *cooperation, a’tsoo’tsi’kakimaan* (combining our efforts) is valued over competition, and it is in this spirit of cooperation/collaboration, *a’tsoo’tsi’kakiimatop*
(when everybody works on something together)\footnote{A’tsoo’tsi’kakimaan (combining our efforts) as given to Atwood by Sako Opakiyyi (Last to Break Camp)/Leroy Wolf Collar March 4, 2021 and January 5, 2022. A’tsoo’tsi’kakiimatop (when everybody works on something together) as given to Atwood by Ninna Piiksii Mike Bruised Head on January 5, 2022.} that the authors shared ideas. Similarly, we were guided by Meadow et al.’s (2015) coproduction collaborative mode of stakeholder engagement (a type of constructivist approach). The objective of the non-Native authors was to learn from stakeholders (Blackfoot Elders), who contributed as research partners and originators of the research question. In so doing, we sought to observe how these stakeholders frame the issue and to understand the terms and knowledge systems they use to interpret the issue (Meadow et al. 2015). The specific modes of collaboration we used were ethnography and action research (AR) or community-based participatory research (CBPR).

However, this project began quite organically for each of the authors. Niitsitapi Awaaáhsskataiksi (Grandparents/Elders) brought knowledge they had learned from the old people and from their years of experience living and working with the stories and language in ceremony and daily life (some also have university degrees). The non-Native authors (one of whom is Sámi American and the others of mixed settler ancestries) come from diverse disciplinary backgrounds and have dedicated much of their personal and professional lives to collaborative research and have ongoing alliances with various Indigenous and local people from Niitsitapi territory among the east-flowing watersheds of the Crown of the Continent ecosystem to Xhosa lands in South Africa to Anishinaabe territory in the Great Lakes region, Sámi territory in Scandinavia, Meso-America, Polynesia, and the rangelands of the Great Basin.
One of the authors (Atwood), a non-Native graduate student who was born and currently resides in Niitsitapi traditional territory near the Blood Reserve, was invited to participate in a twenty-person cohort (comprised predominately of Blackfoot and various other Native graduate students) to learn Niitsitapi ways of knowing, being, and doing from a dozen Niitsitapi Elders (some of whom are also academic scholars) and one Niitsitapi traditionalist and scholar. This deep learning involved nearly five hundred hours (from July 2019—present) of place-based, in-class, virtual, and one-on-one instruction/interaction (friendship) which led to a few of the Elders encouraging her to find sokaapii\(^{15}\) (good) ways to share what she had learned.

In the process of collaborating with Niitsitapi partners, Atwood learned and adhered to Niitsitapi protocols for developing relationships of mutual respect, trust, and sharing by approaching Elders with an open mind, humility, and sikapistaanistsi\(^{16}\) (transfer gifts/payments which are considered “part of the ceremony, not a transaction outside of it” [Aahsaopi/First Rider February 3, 2021]). She asked for knowledge and understanding of their ways (specifically Niitsitapi ‘ecological’ knowledge), then listened and observed intently while Elders smudged, prayed, and transferred knowledge orally, with no script. She listened respectfully for as long as the Elders wanted to gift/transfer knowledge, saving questions and comments until she was invited to share—typically after an Elder had finished speaking. Miiniipokaa/Peter Weasel Moccasin (April 3, 2021)

\(^{15}\) As given to Atwood by Blood Tribe member, the late Clarence Little Shields, August 2011.

\(^{16}\) Transfer gifts/payments traditionally include things like a tobacco offering, food, blankets, horses, but now also include money. Typically, these payments are placed in a wooden bowl covered with skins or cloth. According to Ninna Piiksi/Mike Bruised Head (February 27, 2021) and Miiniipokaa/Peter Weasel Moccasin (January 29, 2021), payments and offerings shouldn’t be capitalistic but rather based in feelings of generosity and commitment—an offering that reflects one’s desire to learn and acknowledges the Elder’s role, expertise, and authority to transfer knowledge in a good way. “You’re going to give up everything in your life [speaking of being an Elder], even materials, [it’s] not sacrifice, [sacrifice] is heroic, we are humbling ourselves before Creator, Ihtsipaitapiyo’pa” (ibid.).
shared with the cohort how he “spent countless hours to learn, a few hours, a few days, you don’t go to an Elder and say, ‘I’ve got five minutes, can you tell me…?’” There were many times the cohort expected to meet for the morning or day but the learning would continue on, well into the evening. Amskapiipiikani (Blackfeet) storyteller, Percy Bullchild (2005, 5) recalls his early experiences learning from the old people:

All stories were handed down from generation to generation by the mouth, in words, which the whiteman calls orally. I have listened to many wonderful stories that were told by the older men. At times, these storytellings went for several days… No one went to sleep until the wee hours of the morning, and every one awoke by sunrise to resume the storytelling.

Whenever possible, the cohort travelled to specific places in Niitsitapi territory to listen to the Elders’ stories in the appropriate settings/places and to develop relationships with, and learn not only from the Elders but from place/aanoom (this very place/this very spot) also—from all our relations. Yellowknives Dené scholar Sean Coulthard (2014, 13) defines Native conception of land as a place-based system of reciprocal relations and obligations between humans, places, and the nonhuman entities who share the place in question. In this way, we learned about níksókowaawák from níksókowaawák as well as learning about níksókowaawák from the Elders’ teachings.

Figure 2. Blackfoot Confederacy Territory – depicting the part of North America now designated as Alberta, Saskatchewan, and Montana, where this knowledge was shared, or transferred. (Print of original artwork by Api’soomaahka [Running Coyote] William Singer III which he painted for Red Crow Community College 1993. Used with permission by the artist.)
In short, Niitsitapi Elders were approached according to tribal protocols and the entire project was not only informed by but also fundamentally shaped by their prayers,
stories, songs, language, and practices, as well as their questions, concerns, and desired outcomes—i.e., a critical constructivist grounded theory (Charmaz 2016, 2017) approach of sorts; our study being grounded in Niitsitapi axioms such as comprehensive relational animacy. Some of these Elders have also overseen and participated in (as co-investigators and co-authors) the way their collective knowledge has been presented, interpreted, and utilized in this paper. It is with their consent and participation that we as a collective share this knowledge and the generalized version of Niitsitapi methods that we have articulated together for the benefit of both Indigenous and non-Indigenous scholars, researchers, managers, and policy makers. In the generous words of Kainai Elder, Sspomikkitstaki (Sky Offering)/Agnes First Charger (February 27, 2021), “Pass on what we taught you, what we know, how to survive, how to take care of ourselves… and all our relations.” Naamaakaakomi (Going to Shoot)/Jerry Potts (March 6, 2021) elaborates on what it means to have a relationship with, and to “pass on” knowledge when he shares,

Once you have [knowledge transferred to you], you have to live with it and take care of it, work with it, keep it with you. [The spirit of the knowledge] is always with you if you’ve lived with it and worked with it [embodied it] and shared it. This is your responsibility.

In addition to the oral transfer of Native knowledge by Niitsitapi Elders, we also used library research methods to draw on other social-environmental and methods scholarship.

**Identifying the research problem and forming alliances**

In Niitsitapi culture, *listening*, Nitsiisstii (I am listening), is esteemed as one of the most important traits\(^\text{17}\) one can cultivate on the path to becoming a real person. Throughout the

\(^{17}\) “Listening is such an important skill in our traditional ways. So important that we had terms for people who didn’t listen despite being spoken to, often, but didn’t retain what they heard. Some of these terms
many hours spent listening to Niitsitapi Elders and Native graduate students, one recurring theme presented itself as a problem we might work on together: the lack of a purely Indigenous research methods category to stand alongside qualitative and quantitative categories rather than be incorporated into them. Atwood recalls one Blackfoot graduate student’s lament, “When I’m in schools it feels like our ways and ideologies don’t carry as much weight or legitimacy… In order to succeed in their spaces, we have to give up some things. They have to see that their mindset is unhealthy for us” (Crazyboy 2021). And on another occasion Crazyboy (2020) spoke about how the academy needs to relinquish its control over the knowledge enterprise, suggesting a comprehensive transformation that applies to all agencies and structures. I find it interesting that a lot of us during our journey to our academic successes; certificates, degrees, diplomas, masters and Ph.D., we have to incur, cope and deal with a lot of trauma in these structures. Does it have to hurt this much for us to achieve our academic goals? How aspects of our identity are unacknowledged or there simply isn't space for them. I feel as most of these traumas are from the colonial frame in which these structures are built upon, which unfortunately is an environment that doesn’t just challenge us intellectually but also actively devalues and erases our cultural identity. How often do we have to fight to have not only our voices heard but for them to understand the rationale of our choices?

Naamaakaakomi/Jerry Potts (March 6, 2021) echoes these sentiments,

Our teachings have value… but we have to fight… to have the same respect and value as [Western knowledge] … At the university level, they need to do more outreach to the Blackfoot community and collaborate more on curriculum and methods … [To us it seems the attitude is] if a white person doesn’t say it, it’s not true.

include: Sa’namaistooki/[marrow filled] ears; sooto’kiyaiyi /No ear holes; ookspohtooki/sticky/gummy ear; etc. And if a person continued not to listen, they were threatened with: kitakahkannistookiyoko/you’ll have holes made in your ears/pierce your ears” (Aiaistahkommi/Mistaken Chief November 18, 2021).
Ninna Piiksii/Mike Bruised Head (January 30, 2021 and February 22, 2020), a PhD candidate at the University of Lethbridge and residential school survivor expressed his commitment to reverse these trends—even within the language:

We need this ethical space in academia, approved and accepted in Western education… Okiskiskinimaatsa used to mean ‘left the reserve [to get educated in the Western way]’ we are changing the meaning of the word to mean ‘getting a Blackfoot education at a university.’ [and on another occasion, regarding Western pedagogies and methodologies, April 27, 2021, Ninna Piiksii/Bruised Head continued,] Often you get taught with no story in the teachings, and you’ll hear stories with no teachings… I still have almost that boarding school feeling getting my PhD. I want a pure Blackfoot thought… We know what we know, from where we stand. We need entry points for Blackfoot ways. University degrees are setting me up to be a colonizer to my own people.

And Aahsaopi/Laverne First Rider (January 23, 2021), speaking for all Blackfoot people engaged in higher education and/or collaborating with outside researchers, insists, “It’s so important as Blackfoot people, that we can follow our protocols in our research.” So, this became the main focus of the authors’ work together: to articulate and advance the merits, utility, and necessity of a purely Indigenous methodological category to stand independently alongside existing Western frameworks rather than be integrated into Western categories and methods. Embodying the collective method, the authors borrowed Itsiipootsikimskai’s18 (Confluence’s) story as a template for Native and Western methods to “come together as friends” yet remain distinct.

Figure 3. Thompson River meets the Fraser River – Lytton, BC. (Photograph: Andy Astfalck. Taken August 1995. Used with permission.)

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18 As given to Atwood by Ninna Piiksii/Mike Bruised Head October 3, 2020 ahnoom (in the very spot) where the Belly River and the Old Man River become friends and given again January 23, 2020.
Figure 3. Where the Belly River and the Old Man River become friends (Google Earth aerial photograph. Open source.)
Red Crow Community College, the first tribal college established in Canada, is located on the Blood Tribe Reserve. For over thirty years, the college has acknowledged, and encouraged students to embrace, the distinct traditional methods of their ancestors while also acknowledging Western methods and thus it seems fitting that they would instigate the extension of this model to Western academic institutions. The Western academy has been the ‘gatekeeper’ of knowledge for centuries but Siksika ceremonial knowledge keeper, Kayiihtsipimiohkitop (Riding A Painted Horse)/Kent Ayoungman (April 4, 2021) reminds us of a parallel story of Blackfoot knowledge keepers who go way back, stating “That’s why our people were fierce, they were protecting those relationships with land, cosmos, climate, that’s why we were fierce, to protect that.” Miiniipkaa/Peter Weasel Moccasin (April 3, 2021) speaking in regards to Blackfoot knowledge and methods, advised the cohort, “Don’t be selfish with our stories (ways) but know when the time comes to share it and I feel that time has come… people need to hear them, it’s time, I think.”

As the authors worked together towards this common goal, our hearts and minds came together in love, respect, and understanding for one another and all our relations. Cardinal and Hildebrandt (2000) talk about the sacred relationship that comes with treaties and the importance of sacred alliances to the survival of all beings in this world. Niitsitapi were a treaty people long before colonial expansion and the signing of Treaty 7 with the Canadian government in 1877. They have been making and renewing sacred alliances/treaties with one another and with all the relatives since time immemorial. This is what is meant by interrelationship with all things/beings—níksókowaawák. To understand and participate in these sacred alliances is essential to genuine coproduction
with Niitsitapi (including ancestors) and the various nonhuman relatives (i.e., plants, animals, soils, rocks, mountains, valleys, water, weather, ideas, emotions, sounds, words) that inhabit their unceded lands. Indeed, the collaborative process and the intended outcomes of this study function as a treaty-like agreement/alliance between the Blackfoot and non-Native authors of this paper.

The authors recognize the landmark works of Indigenous scholars from around the world who have tirelessly carved out spaces within Western categories for Indigenous methods for decades, we honor your contributions by formalizing a decidedly and sovereignly Indigenous space (i.e., neither quantitative nor qualitative); a broad methodological category within the academy in which the diverse, plural, autonomous Indigenous methods which are already established and practiced within specific Indigenous communities can be more equitably acknowledged. We stand allied in our resolve to articulate and advance this Indigenous methodological category within Western academia, recognizing Indigenous worldviews about existence as true and self-evident; as foundational truths upon which knowledge can be constructed and developed rather than reduced to hypotheses to be falsified and deconstructed. While Western methods are designed to disclose the world in unique and important ways that often benefit humans and environments, the authors wanted Indigenous students and scholars to be able to ground their research in a formally recognized Indigenous method familiar to them and better suited to their ancestral knowledge systems without having to “fight [with Western institutions and agencies] to understand the rationale of [their] choices” (Crazyboy 2020).
The First Nations Information Governance Centre’s (FNIGC) Principles of OCAP (ownership, control, access, and possession) delineate and safeguard the relationship First Nations people have with their traditional knowledge. For example, Niitsitapi own information collectively in a similar way that Western individuals own their personal information and intellectual property. For this reason, the authors of this paper felt more comfortable publishing under a collective name. The name we took for ourselves is Itsiipootsikimskai (Two Friends Meeting).

Results

“Mixing ideologies creates dissentions (Aahsaopi/First Rider January 30, 2021).”
“Knowledge is important, it’s important to get it right or it creates conflict… When you use the knowledge in a good way, it will work.” (Miiniipokaa/Weasel Moccasin April 3, 2021).”

Unlike qualitative and quantitative methods, Blackfoot, and most Indigenous collective methods categorically entail: 1) animacy; all things/beings (human and nonhuman) are alive, agentive, and have a story—a legitimate vantage point, perspective, and positionality, 2) relationship; all things/beings (human and nonhuman) are interconnected through alliances and interrelate in collective, reciprocal, dynamic, and most often non-hierarchical ways, and 3) intuitive or spiritual awareness/analysis, alignment, and embodiment of relational knowledge gained through the initiation and renewal of sacred alliances with all human and non-human relatives and the mutual gifting of stories. Discerning knowledge in this real but nuanced way requires patience, “transfer is a process and it takes time” (Ninna Piiksii/ Bruised Head March 3, 2021). Examples of collective ‘metrics’ include: the degree to which one embodies/becomes/practices knowledge; the quantity, quality, and depth of relationships; the biodiversity of species in
a given area; and the general wellbeing of human and nonhuman relatives. Our project openly acknowledges not only the epistemic validity and fruitfulness but also the inimitability and autonomy of a longstanding Indigenous methodology we are calling “the collective method.” Moreover, by adopting and practically implementing this approach, our project reaches beyond the decolonizing efforts of Western scholars to absorb and incorporate Indigenous ontologies, epistemologies, pedagogies, and methodologies within qualitative and quantitative methods by creating an autonomous space within the academy for distinctly Indigenous methods.

For example, to understand and deploy Niitsitapi collective methods, one would have to acknowledge and experience that all things have a spirit, a name, and a story. According to Niitsitapi Elders, “Our ancient stories tell us how our traditions were given to us. These teachings show us how to live and explain our relationship with the other beings in Creation” (Niitsitapiisinni 2013, 18). Even though Elders and the old ones transfer these stories from one generation to the next, the stories themselves originally come from and belong to the relatives who gave each other and us humans their stories through the exchange of energy, observation (with all senses including spiritual senses), experiences with those relatives, and the questions we ask. “We just borrow their stories and share what the relatives gave [and give] us. In other words, the stories we tell about our observations and experiences with nature aren’t actually our stories, even though it seems like they are, they belong to the beings who gave [and give] them to us” (Ninna Piiksii Bruised Head January 19, 2022). This is what we mean by the mutual gifting of stories and it has profound implications when we consider all the information, knowledge, or stories that Western science has been given by niksókowaawák.
According to Niitsitapi ways, all of that knowledge can be interpreted as our nonhuman relatives gifting us their stories—such is the unique perspective imparted by collective methods. Niitsitapi scholar, Amethyst First Rider (2003) describes this experiencing the connection as Native science:

[W]e are instructed to recognize all our [relations], from the sky to this dimension of Earth, and underground or the water beings. So, in our science, our knowledge comes from experiencing, not experimenting, but experiencing how the connection is. (First Rider 2003)

This is not to say that Niitsitapi don’t understand the world experimentally but that their science is principally grounded in relationship. As such, the authors actually embodied níksókowaawák method in order to understand níksókowaawák; in order to interpret social-ecological systems through a Blackfoot lens, which ultimately led to the articulation of the more generalized collective method. For example, because words have being, it is believed and experienced by Niitsitapi that words will find you (Kainai Elder, Makoyiipookaa [Wolf Child]/Bruce Wolf Child March 1, 2020). Many of the words used in this paper, the word níksókowaawák in particular, ‘found’ us and transformed and enlarged our understanding of social-ecological systems. In fact, it was the authors’ relationship with this word and the beings it represents and embodies (including ourselves) that made plain the necessity of an autonomous Indigenous method to wholly understand and engage with animate ecosystems.

If the collective method is then a skeleton Indigenous methodological framework, then the culture-specific stories and ways of collecting and embodying relational knowledge existent in the diverse collective methods of various Indigenous peoples would be the flesh. This reality makes it not only difficult but inappropriate to outline a
simple formula for how the collective method ‘works’ i.e., how we build relationships and make treaty alliances with nonhuman people and how nonhuman people communicate their perspectives and knowledge with us. However, if we were to generalize the many diverse collective methods of Indigenous cultures who understand and embody these ways, some universal ways relational ‘data’ is ‘collected’ would certainly include Ninna Piiksii’s examples: the exchange of energy, observation, alignment, listening to Spirit, experiences, dreams, and the questions we ask. Naturally, each group’s specific protocols for doing these things will vary. Most significantly for Western science is that through the lens of collective methods, all Western knowledge can be construed as stories given to scientists as they approach certain nonhuman relatives with specific questions and develop intense relationships with those beings through acute observations and the accompanying thoughts and insights (or stories that nonhumans share) that come through the analysis of the data collected. In this way collective methods could be seen as more foundational than Western scientific methods if one considers that nonhuman beings honor their alliances by being consistent/patterned and reliable in their behavior with one another and humans in ways that make Western science possible. If nature is in fact comprised of a network of human and non-human peoples, then non-Indigenous people have already been using/doing the collective method in Western science and daily life without realizing it. Collective method implies that nature is always in relationship with us. Whether we acknowledge or recognize it, the ‘objects’ of study are communicating with us. Western science asks different questions and so the relatives give different answers (stories). These are some of the consequences
of collective methods that help non-Natives better understand ontological and sacred roots of environmental conflict.

Table 1. Indigenous collective methods in relation to quantitative and qualitative analytical frameworks.

<table>
<thead>
<tr>
<th>Method/methodology:</th>
<th>Quantitative</th>
<th>Qualitative</th>
<th>Collective</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ontological orientation:</strong></td>
<td>Animate vs. inanimate</td>
<td>Animate vs. inanimate</td>
<td>Comprehensive relational animacy</td>
</tr>
<tr>
<td><strong>Epistemic orientation:</strong></td>
<td>Deductive (aims to test existing theories)</td>
<td>Inductive (aims to develop theories)</td>
<td>Axiomatic (aims to extend and embody foundational truths/stories)</td>
</tr>
<tr>
<td>Scientific method</td>
<td>Comparative, evaluative, phenomenological, interview, and grounded theory methods</td>
<td>Axiomatic, experiential, and conversational methods</td>
<td></td>
</tr>
<tr>
<td>Falsification</td>
<td>Interpretation</td>
<td>Interrelation</td>
<td></td>
</tr>
<tr>
<td>Reductive</td>
<td>Constructive</td>
<td>Generative/creative and holistic</td>
<td></td>
</tr>
<tr>
<td>Top-down (linear)</td>
<td>Bottom-up (linear)</td>
<td>Inside-out and inside-in (cyclic)</td>
<td></td>
</tr>
<tr>
<td>Objective</td>
<td>Subjective (constructivism allows limited intersubjectivity)</td>
<td>Intersubjective</td>
<td></td>
</tr>
<tr>
<td>Closed-ended questions</td>
<td>Open-ended questions</td>
<td>Energy exchange, alignment, ceremony</td>
<td></td>
</tr>
<tr>
<td>Experimental</td>
<td>Conversational</td>
<td>Experiential and relational</td>
<td></td>
</tr>
<tr>
<td>Mathematical and statistical analyses</td>
<td>Perceptual and contextual analyses</td>
<td>Spiritual/intuitional analysis</td>
<td></td>
</tr>
<tr>
<td>Observation using 5 senses</td>
<td>Observation using 5 senses</td>
<td>Observation using 6 senses (Spirit)</td>
<td></td>
</tr>
<tr>
<td>Involves theoretical and empirical knowledge</td>
<td>Involves empirical and theoretical knowledge</td>
<td>Involves spiritual, embodied, and dream knowledge</td>
<td></td>
</tr>
<tr>
<td>Measurable, quantifiable data</td>
<td>Categorical, approximative data</td>
<td>Relational, storied data</td>
<td></td>
</tr>
</tbody>
</table>

**Discussion**

Miiniipokaa/Peter Weasel Moccasin (April 3, 2021) expresses his concern regarding the appropriation, interpretation, and overgeneralization of Blackfoot knowledge and methods saying:

> You have knowledge of our stories and our ways, but do you understand? This is the challenge I give to anyone who wants to write about our way, you have to know the people, you have to know the land and the language.
Miiniipokaa’s challenge to scholars provides some guidelines to forestall overgeneralizing collective methods, especially within the context of social-environmental research: 1) you should know the people in whose territory you are conducting research, 2) you should know the land (nonhuman people/relatives) through direct experience and interrelationship with the specific territory where you are conducting research, and 3) you should know the language or at least be actively learning from, and developing a relationship with, the language of the people (including nonhuman people) in whose territory you are conducting research even if only a few words of the language are still intact or in use. Many Indigenous and non-Indigenous scholars are already doing this kind of research by either trying to make room within quantitative and qualitative methods or calling for territory-specific methods, in which case they may find utility in choosing to generally describe their own specific methods as a collective method when interfacing with other Indigenous or non-Indigenous scholars.

When asked, “As an environmental scientist trained in both Western and Blackfoot ecology, what would you say are the most important distinguishing factors between the two methods?” Alvin First Rider (April 3, 2021) replied, “Blackfoot is experiential and interactive, you’re living with the land in relationship. Western is very strict, categorical, and prescribed. I try to walk in the two worlds the best I can. Holistic management is the best of both worlds.” Blackfoot Elder and anthropologist Naaminastohmi (Chief Body) Blair First Rider (August 18, 2020) similarly characterized this process of reciprocity and renewal of relationships with niksókowaawáks as an essential aspect of Niitsitapi science that informs and enlarges his academic understanding of social-ecological systems by acknowledging and engaging with the
storied landscape as a research partner. This is the value of “Two-Eyed Seeing” (Reid et al. 2021), exploring the world using a variety of distinct ways of knowing/methods in a synergistic attempt to better understand the whole of nature.

While the collective method enables diverse human stakeholders to better understand and collaboratively operationalize Indigenous perspectives and practices to improve social-ecological outcomes, it does more. The collective method further complicates the already challenging questions: “[W]hat is at stake, who is struggling and who gets to decide what is at stake in environmental conflicts?” by acknowledging all things: water, soil, rocks, plants, animals, topographical features, elements, energies, ancestors, and potentialities (even seemingly abstract or symbolic entities like words, music, totems, and numbers) as stakeholders—each with their own vantage point, requirements, obligations/alliances, objectives, methods, experiences, and stories. In other words, when considering stakeholders of any given environmental conflict, according to the epistemic parameters of the collective method, one must take into consideration matters such as: To what extent do bodies of water (or soils, sockeye salmon, glaciers etc.) as nonhuman stakeholders get to decide what is at stake and what is in the best interest of the collective? (Frandy 2021; Keakealani 2017; Wilson and Inkster 2018). Some governments and courts in South America, New Zealand, Asia, and North America have begun to recognize natural environments as entities rather than commodities by granting legal personhood to environmental beings like rivers (Khandelwal 2020). Again, the collective method complicates the process by asking, “What does a particular river want and need?” The answer to this question cannot be ascertained solely by acknowledging the personhood of a river, but requires disclosing
the vantage point of a river, which may or may not include the same perspectives, rights, and responsibilities that human persons might confer upon her. This can only be accomplished through interrelationship and alignment with a particular river and the collective of human and nonhuman stakeholders involved in relationships/alliances with that river over time.

By acknowledging the sociality and non-hierarchical interrelationship of all beings and considering Western policies and management through the lens of collective methods, recent proposals such as the one to decapitate a mountain in Southern Alberta for its coal, potentially polluting the headwaters of the Old Man River (home of Old Man Napi, the Trickster), become unthinkable. Findings from a recent University of British Columbia study (2019) confirm that “Indigenous land ‘management’ practices… result in higher native and rare species richness and less deforestation and land degradation than non-[I]ndigenous practices.” While their data revealed that vertebrate biodiversity on Indigenous managed and co-managed lands in Australia, Brazil, and Canada were equal to or greater than protected areas and randomly selected non-protected areas, their data did not allow them “to more fully explore the causal links with any specific practices and biodiversity” (Schuster et al. 2019). Collective methods are well suited to exploring the indicators of biodiversity which likely include specific practices rooted in comprehensive relational animacy. These specific practices and associated protocols will, of course, be culture- and territory-specific and therefore must be explored together with local Indigenous partners (Sarfo-Adu 2022).

Two concepts that inform both formal and informal Blackfoot land conservation are isspi’po’totsp (responsibility) and poo’miikapii (balance). For Niitsitapi, environmental conflicts and land degradation are seen as imbalances, breaches in treaty relations by Natives and non-Natives with níksókowaawák. Aisstainhkiakii/Sandra Manyfeathers (February 6, 2021) explains that whether an individual, community, or environment becomes imbalanced “it’s the responsibility of the collective to restore that balance.” The Buffalo Treaty (2014), signed and embodied September 23, 2014 in Blackfoot territory, represents the collective commitment of Blackfoot and other Northern Great Plains tribes to restore balance to their communities and environments by renewing their ancestral alliance with Ini (Buffalo) and restoring this keystone species to its prairie homelands. In the treaty, Buffalo’s vantage point and knowledge is recognized. He is acknowledged as the great provider and foundation of their economy, an agent of conservation, their beloved and respected brother/relative. While the Buffalo Treaty serves a distinctly practical purpose for the Native peoples who rely on Buffalo (and the balanced ecosystems he generates) for their physical and spiritual wellbeing and survival, the treaty also serves as an eloquent, compelling, authoritative exemplar of applied collective methods—a paragon of actionable Native science and conservation for other Indigenous groups and non-Indigenous people to emulate.

While qualitative methods such as constructivism, coproduction, and 4R (Respect, Relevance, Reciprocity, and Responsibility) research (Kirkness and Barnhardt 2001) are meant to accommodate Indigenous ways of knowing into research conducted at least partly within a Western institutional context, this should not imply that universities need not consider providing an autonomous space for studies conducted entirely using
Indigenous methods. This will require considerable effort by Western academic institutions to find ways to do so that truly eliminate expectations rooted in settler-colonial notions of scholarship. “People say, ‘Where did you get your education? Where did that knowledge come from?’ It come from the land, the mountains. The land, it is an epistemological source of knowledge for us. It’s a totally different knowledge system... We have a knowledge system. It’s not secret, but it’s privy. If you can cross, transcend that role of a sceptic, you can use it” (Murray 2019).

**Conclusion**

This paper argues that qualitative and quantitative methods are incomplete for knowledge acquisition and production because they cannot accommodate comprehensive relational animacy and the embodiment and spiritual analysis of relational data collected through the mutual gifting of stories among human and nonhuman relatives. Therefore, the need for an additional category to stand alongside qualitative and quantitative methods seems evident. The collective method satisfies this need by normalizing Indigenous ways of knowing, being, and doing, within the academy. We think this presents an alternative not mutually exclusive for all different stories disclosed by each method to be heard. So, rather than continue to integrate Indigenous collective methods into qualitative and quantitative frameworks, the authors of this paper maintain that the logical next step is to formalize the collective method as an autonomous methodological category that can be employed independently or in two-eyed seeing research for greater accuracy, efficacy, and equity in disclosing the complexities and perplexities of social-ecological systems.

**Acknowledgements**
We acknowledge the resilience and commitment of Niitsitapi in maintaining their ancestral knowledge and practices despite unspeakable traumas and impediments meant to disband them. We appreciate their generosity in sharing some of that knowledge with the academy.
## Glossary

<table>
<thead>
<tr>
<th>English</th>
<th>Blackfoot</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ai’stomatoominniki</td>
<td>ay-STOOM-uh-DOOM-in-ni-gee; embodying knowledge</td>
</tr>
<tr>
<td>Ahnoom</td>
<td>AWE-noom; this very place/this very spot</td>
</tr>
<tr>
<td>A’tso’tsi’kakimaan</td>
<td>uh-TSOO-tsee-guh-gee-mawn; combining our efforts</td>
</tr>
<tr>
<td>A’tso’tsi’kakiimatop</td>
<td>uh-TSOO-tsee-guh-gee-muh-DOOP; when everybody works on something together</td>
</tr>
<tr>
<td>Ihtsipaitapiiyopa</td>
<td>ITS-sub-a-dup-BEE-yo-p; Source of Life/Essence of Life/Creative</td>
</tr>
<tr>
<td>Isspi’po’totsp</td>
<td>iss-PEE-poe-dootsp, responsibility</td>
</tr>
<tr>
<td>Itsiipootsikimskai</td>
<td>IT-see-POOT-si-gim-skhu; where the water comes together as friends, confluence</td>
</tr>
<tr>
<td>Ksahkomitapiiksi</td>
<td>ksaw-goom-EE-duh-beegs; earth beings/people</td>
</tr>
<tr>
<td>Naatoyitapiiksi</td>
<td>naw-doy-EE-duh-beegs; a spirit animal</td>
</tr>
<tr>
<td>Natosi</td>
<td>naw-DOO-see; Sun</td>
</tr>
<tr>
<td>Niksókowaawák</td>
<td>NEEK-SOO-goo-WAG; all my relatives</td>
</tr>
<tr>
<td>Niitoyiss</td>
<td>NEE-doy-iss; painted tipis</td>
</tr>
<tr>
<td>Niitsipowahsin</td>
<td>need-SEE-boh-sin; real language, Blackfoot language</td>
</tr>
<tr>
<td>Niitsitapi</td>
<td>need-SIT-duh-bee; “Real People”, the name traditional Blackfoot people use to refer to themselves</td>
</tr>
<tr>
<td>Nitsiisstii</td>
<td>ni-TSEES-STE; I am listening</td>
</tr>
<tr>
<td>Poo’miikapii</td>
<td>BOO-ME-guh-bee, balance</td>
</tr>
<tr>
<td>Sokaapii</td>
<td>soo-GAW-bee; good</td>
</tr>
<tr>
<td>Soyiitapiiksi</td>
<td>soy-YEE-duh-beegs; water beings/people</td>
</tr>
<tr>
<td>Spomitapiiksi</td>
<td>sboom-MEE-duh-beegs; sky beings/people</td>
</tr>
</tbody>
</table>
References


The 5Ds of wRECK: A relational approach to sustainability and recreational use of National Parks that occupy Blackfoot and Hawaiian unceded lands

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The 5Ds of wREck: A relational approach to sustainability and recreational use of National Parks occupying Blackfoot and Hawaiian unceded lands

Many Blackfoot and Hawaiian ancestral sacred sites fall within the relatively new boundaries of national parks and protected areas in what are now the states of Hawai‘i, Montana and the provinces of Alberta and Saskatchewan. As these settings become increasingly popular with recreationists worldwide, overcrowding in addition to opposing worldviews lead to environmental degradation and conflict over the meaning and use (or non-use) of these contested places. Employing coproduction, Indigenous collective methods, and collective autoethnography, I alongside Blackfoot and Hawaiian co-investigators identify five general ways in which recreation and related activities contribute to social-ecological conflict and environmental degradation. We have dubbed these categories the 5Ds of wREck.

Keywords: Indigenous knowledge, Indigenous ecological knowledge, Blackfoot, Hawaiian, collective method, coproduction, sustainability, environmental conflict, collective autoethnography, recreation, National Parks, management, policy

Positionality: Sandra Bartlett Atwood is of Irish Canadian settler decent, Clan Kenney who traditionally hail from counties Galway and Ros Comáin, Central Ireland in the province of Connacht. She was born and raised in Blackfoot territory and has made life-long friendships with community partners among the Blackfoot and Hawaiian people with whom she is allied.

Introduction

For most Indigenous peoples, there are places within their ancestral territories that are understood and experienced to possess important spiritual properties. These sacred places have traditionally been governed by tribal protocols that have been observed, treaties that have been upheld, for millennia (Carpenter 2020; Nakachi 2016; Ninna Piiksii/Bruised Head 2022; Itsiipootsikimskai 2023; Pearce 2023; Sarfo-Adu 2022). The normative and legal settler privilege afforded to recreationists (Farrell 2015; Waldron 2018a) with
regards to access and use of environments believed and experienced to be sacred in Hawai‘i (Fisk et al. 2021; Keakealani 2016; Tuivaiti 2022) and the traditional lands of the Blackfoot Confederacy in Southern Alberta and Northern Montana (Murray 2022; Ninna Piiksii Bruised Head 2022; Miiniipokaa Weasel Moccasin 2022) has led to social-ecological injustices and environmental degradation as visitor use in these areas reaches critical thresholds (Buckley 1991; Carpenter 2020; LA Times 2017; Nakachi 2016; Waldron 2018b, 2022; US Department of the Interior 2021). These contested places have not only become a hotbed of conflicting views of what is sacred and profane (or at least mundane), but also competing notions of propriety and sustainability when accessing these disputed areas (Farrell 2015; Hajer 1997; Kealiikanakaolehaililani & Giardina (2016), Waldron 2018a, 2018b, 2022). The purpose of this paper is to better understand what Farrell (2015) calls the “sacred roots of environmental conflict” and explore the decolonization of recreation by considering various recreational activities through the lens of Indigenous ways of knowing and being (IWKB). While the effects of growth in recreation visitation to protected areas, exacerbated by settler colonial privilege (and the COVID 19 pandemic), is a global problem, I will explore this issue by focussing on two seemingly disparate cases in Native Hawaiian and Blackfoot homelands. Using Meadow et al.’s (2015) coproduction model in concert with collective methods (Itsiipootsinkiskmai 2023) and building on Walsh et al.’s (2021) relational paradigm, I present significant ways that recreation, as it relates to 1) division 2) desecration 3) disturbance 4)

20 Typically, “knowledge” is associated with epistemology and “being” with ontology. For this reason and because Indigenous knowledge isn’t static, some Indigenous Elders and scholars prefer the term Indigenous ways of knowing and being (IWKB) to Indigenous knowledge (IK).
development and 5) displacement, violates Indigenous environmental and cultural protocols (Ninna Piiksii/Bruised Head 2022; Paul 2018).

In the 1500’s, recreation started being used to mean “activity done for enjoyment when one is not working” but its Latin root *recreare* literally means “to renew” (Atwood 2018; Ninna Piiksii/Bruised Head 2022). This idea grew through the dark ages to include “mental, physical, or spiritual consolation or healing” and did not morph into the existing connotation of recreation being leisure time enjoyment until the late Renaissance. Many scholars currently addressing the impacts of recreation agree that natural areas are subject to increasing levels of recreation and tourist pressure that produce cultural and environmental impacts not only due to the recreational activities themselves but also those associated with travel, accommodation, and other hospitality industries (Devine & Ojeda 2017; Johnston 2000; Sæþórsdóttir et al. 2022). Therefore, this study will consider natural areas as tourist attractions and my treatment of recreation will involve all aspects of natural areas recreation and tourism.

Jones et al. (2018) estimate that one-third of protected lands globally are under intense human pressure. Sarfo-Adu (2022) suggests this pressure coupled with settler colonial privilege and the lack of adherence to sacred cultural protocols contributes to environmental degradation and biodiversity loss. This complicates the issue as the problem becomes not only a question of navigating competing views on use of natural areas, but also the sustainability of current use of public lands. A recent study by Schuster et al. (2019) found that biodiversity on Indigenous managed and co-managed lands in Canada, Australia, and Brazil was equal to or greater than that found on public lands in those countries. The causal mechanisms resulting in greater biodiversity were not clear.
Indigenous designations of sacred places and the associated protocols when using (or not using) those places appear to result in reduced biodiversity loss and may be something land managers and researchers should adopt to improve resource conservation and biodiversity worldwide (Pearce 2023; Sarfo-Adu 2022), though of course the strategies in these areas will vary with the culture. Recreation, if not properly managed or constrained, can threaten biodiversity (Newsome et al. 2012). This may help explain findings by Schuster et al. (2019). My study attempts to add to this discussion by listening to Blackfoot and Hawaiian Elders and community members share their stories and relationships with all the nonhuman relatives within their ancestral territories (IWKB or Indigenous ecological knowledge, IEK). Because of the collaborative and grounded nature of this approach, the problem gets defined by the Elders and community members who also serve as co-investigators, making the research and writing process more cyclic than the standard linear approach of classical Western methods.

I begin this paper with a literature review of sustainability because the ways sustainability gets conceptualized and defined can lead to very different outcomes, including recreational use or non-use, that sometimes lead to environmental conflict. I then describe my methods for collaborating with Indigenous community partners to discover this problem with recreation and tourism that they are concerned about and want to work on together. Following this, I share the findings of our collaborative effort to consider IWKB and relational sustainability within the context of recreation in National Parks (NPs) and Protected Areas (PAs). We conclude this paper with a discussion regarding barriers to decolonizing-Indigenizing sustainability and recreation and suggest next steps to overcoming some of those barriers.
**Conceptualizing sustainability**

Definitions of sustainability have varied over space, time and by context (Ramsey 2015). However, in most definitions, sustainability is summarily defined as meeting our needs today without compromising the ability of future generations to meet their own needs (Brundtland Report/UNESCO World Commission on Environmental Science 1987, 1). Sustainability is typically described and depicted as a societal goal with three dimensions or sub-indexes: social, environmental, and economic, referring to social equity and quality of life – healthy communities; environmental protection and ecological integrity; and economic viability (employment; goods such as food, shelter, clothing, and energy; and services such as transportation, communications, tourism and so on) (Brundtland Report 1987). More recently, some have added “human” or “social equity” as a fourth dimension (James & Magee 2016; University of Alberta: What is sustainability 2022). Still others have replaced social with equity, giving us the 3-Es of sustainability: environment, economy, and equity and there are the 3-Ps: people, planet, and profit (Elkington 2018). Because equity is implicit to Niitsitapi understanding of society and sociality (Glenbow 2013), I have chosen to stick with social, environmental, and economic, with equity as integral to the social dimension. Typically, the individual components of sustainability get described and visually represented as tripartite pillars (Purvis, Mao & Robinson 2019) or interactive spheres of equal weight and consideration or a triple bottom line (Elkington 2018) (see Figures 1., 2., and 3.) with sustainability emerging from the balance or overlap of the three components that comprise the goal of sustainably living in the world. Some scholars have characterized these models as “weak sustainability” favoring a nested model (“strong sustainability”) that prioritizes the
environmental component (Purvis, Mao & Robinson 2019; Research Institute for Humanity and Nature, 2022) and recognizes the asymmetry of the relationship among the three components and illustrates that society and the economy are constrained by environmental limits (Kotzé et al. 2022) (see Figure 4.).

Figure 1., 2., 3., and 4 (from left to right). Various Western constructions of sustainability.

In other words, because equity of perspectives is not always sustainable, some social and economic ideals and wants may need to be changed or curbed in order to achieve sustainability (Kuhlman & Farrington 2010; Scoones 2016).

As depicted in the progressive “multispecies sustainability” model in Figure 5., Rupprecht et al. (2020) address some Indigenous viewpoints on sustainability when they point out that “because nature is viewed only as a resource, sustainability fails to recognize that humans and other living beings depend on each other for their well-being... arguing that true sustainability can only be achieved if the interdependent needs of all species of current and future generations are met.” However, their model does not fully
represent Indigenous conceptions of sustainability as it fails to acknowledge the animacy of non-biological elements in the environment.

Figure 5. “Visual model of multispecies sustainability focused on interdependence. Elements depend on those containing them, and are affected by those they contain” (Rupprecht et al. 2020).

Because my study will primarily view sustainability through an Indigenous lens, I have represented the economic and environmental dimensions of sustainability as being nested within the social dimension (see Figure 6.) to more accurately (and equitably) represent the collective nature of most Indigenous worldviews/paradigms.

Figure 6. An Indigenous construction of sustainability grounded in Blackfoot worldview.
When we view the environment as a resource rather than a relative within our social network, we focus on environmental limits, scarcity, and mass extinction. When we focus on the non-hierarchical interdependence of multispecies, the focus shifts to relationships and alliances with the human and nonhuman persons or “societies” (as per Figure 5.) in the environment, abundance, taking only what we need, and the mutual gifting of surpluses as described by Bruised Head (2022), Crabtree and Dunne (2023), Frandy (2021), Kealiikanakaoleohaililani & Giardina (2016), and Kimmerer (2022). Kimmerer (2022) goes so far as to suggest: “What if scarcity is just a cultural construct, a fiction that fences us off from gift economies?”
For this study, Western sustainability and recreation will be interpreted through this Blackfoot lens as a representative case reflecting many Indigenous people’s ideas and experiences of “sustainability.” The widespread compatibility of this conceptualization of sustainability is found among many Indigenous peoples from diverse places around the globe (Dziba 2020; Frandy 2021; Hernandez 2022; IPBES 2019; Kimmerer 2022; Nakachi 2020; Prah & Prah pers. comm. March 8, 2023; Sarfo-Adu 2022; Trosper 2022; UNDRIP 2012). In a study that explores integrating Indigenous and Western conceptions and practices of sustainability, Kealiikanakaoleohaililani and Giardina (2016) concluded:

sacred relationship must be the foundation of any successful sustainability effort, with success achieved only when resource management practices and policies engage the spirit and are aligned with equitable and respectful interactions among human and non-human. By sacred, we refer to those sentiments, actions, and commitments that emerge from spirit-based relationships that are founded on love, respect, care, intimate familiarity, and reciprocal exchange. By spirit, we refer to that which gives life to the material body, the enigma that is our collective conscious, subconscious, and unconscious beings. (Kealiikanakaoleohaililani & Giardina 2016).

Frandy (2021) notes that Western conceptions and characterizations of sustainability have resulted in further social inequities which he considers a new form of colonization or “green colonialism”. Hajer (1997) describes the character of the modern environmental conflict in ways that inform the problem with definitions and depictions of sustainability when he explains, “As the existence of environmental degradation is now commonly accepted, the conflict has become ‘discursive’: it is not about a predefined unequivocal problem with competing actors pro and con, but is rather a continuous struggle over the definition and meaning of the environmental problem itself.” This has obvious consequences for sustainability as sustainability too, is an inherently normative concept (Berg 2020; Purvis, Mao & Robinson 2019; Harrington & Butler 2016), meaning it is
always contextualized by a particular individual or group’s values. This becomes important when considering the axiological (in addition to the onto-epistemological) inequities within current sustainability science and policies (and by extension recreation) especially given the fact that both the Brundtland Report (1987) and the Rio Declaration (1992) suggest the oversight for developing systems for monitoring and evaluating progress on sustainable development be administered by the governments of each country.

**Methods**

This paper emerged in response to coproduced research with Blackfoot and Hawaiian community partners from 2010-2023. The study weaves contextual research and library research, combining coproduction (Meadow et al. 2015) and Indigenous relational research methods (Chapter 2/Itsiipootsikimskai 2023) with literary and historical research. The specific approaches to collaboration I employed were action research (AR [McNiff & Whitehead 2005] – a type of community based participatory research or CBPR [Wallerstein & Duran 2008]) and rapid assessment process (RAP) (Beebe 2001) where the objective was to learn from Kānaka Maoli (Indigenous Hawaiian) and later Niitsitapi (Blackfoot) Elders (Awaaáhsskataiksi and Kūpuna) and community members. One goal of coproduction is to help effect change for communities by understanding how they “frame issues; what terms and knowledge systems they use to understand issues” (Meadow et al. 2015) in order to challenge and inform Western knowledge and normalize Indigenous knowledge within the academy. The process is a semi-structured qualitative approach that identifies “the most important elements of the local situation
from the perspective of the local participants” (Beebe 2001) so that problems can be
solved in ways that fit within local knowledge frameworks (Meadow et al. 2015) which
do not necessarily consider scientific information to be more important than other
knowledge (Cvitanovic et al. 2014; Gillette & Singleton 2022).

My role as a researcher was principally that of ethnographer (listening,
watching, and documenting) and ally (nitákkaawa, Blackfoot for lifelong friend;
hoaaloha, Hawaiian for beloved friend) as we developed a sort of collective
autoethnography (CAE) as a means of identifying a research problem to work on
together. In Pretorius’ (2023, 25) chapter titled A Harmony of Voices: The Value of
Collaborative Autoethnography as Collective Witnessing... she “highlight[s] the
knowledge which can be gained through purposeful exploration of personal experience
[autoethnography].” She then explains that “when multiple autoethnographers work
together, the resulting collaboration creates a profound synergy and harmony of voices
which cannot be achieved by an individual alone” (ibid.). This two-step process of each
participant engaging in purposeful self-reflection of their own lived experience and then
bringing our stories together in an equitable and harmonious way, to produce a
collective body of knowledge is an Indigenous way of knowing and being which
traditional peoples have engaged in since time immemorial. Niitsitapi have many
societies that function in this way. Some of these societies21 have ancient origins and
are sacred and other societies are more like the way I have described CAEs. Typically,

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21 Societies might refer to a group of relatives e.g., water people or the four-legged people. It also refers to
Indigenous sacred societies where the ceremonies, songs, and dances etc. are preserved and enacted by
those who have been initiated and endowed with those gifts and responsibilities. Societies also refer to a
group of individuals united in a specific cause or task who share their gifts and knowledge collectively as
equals to address a need in the community as we are using it in this instance.
these societies of people bringing their stories together for a specific purpose take a name for themselves. Because I am authoring the findings of our CAE focussed on relational sustainability and recreation, and I live in Blackfoot territory, we have taken a Blackfoot name for ourselves – Aawaatsimihkaasataiksi (people who put tobacco; undertake to restore balance).22 In Hawaiian Ho’okupu is the word for sacred offerings which restore balance. Literally translated Ho’okupu means “to sprout forth or cause to grow”. Therefore, the collective name we take for our multicultural collaborative work is Aawaatsimihkaasataiksi-Ho’okupu. CAEs are often an iterative process as well as collaborative, allowing for processes, ideas, policies, and practices to evolve and improve indefinitely over time in a spiral rather than be linear, static, and systemic.

I have spent roughly 900+ hours in each community observing, listening, watching, documenting group and one-on-one conversations in notebooks, conducting semi-structured interviews, building relationships, and learning in and from place i.e., learning on the land and from the land within the unceded territories of each group. The 1800+ hours include seven two-week trips to Hawai’i nei between 2010-2016, two years (2019-2021) of classroom and land-based learning in Blackfoot territory from Blackfoot mentors, as well as ongoing one-on-one and social setting learning from Elders and knowledge keepers-practitioners within each of these communities, to the present. Additionally, I have conducted social media research, collecting data from several Blackfoot and Hawaiian land protector and community Facebook groups and pages such as: Kainai Ecosystem Protection Association – KEPA, Paahmtahmsikimi Cultural

22 In many Indigenous cultures, it is a common practice to make offerings of tobacco or various other items before entering or engaging with land for such activities as travelling, harvesting plants and animals, renewing relationships with significant or sacred sites, seeking knowledge from the relatives etc.
Centre, Kainai Community Page, Idle No More Treaty 7, HE ALI‘I KA ‘ĀINA, LAND
BACK – Ho‘iho‘i ‘āina, sust‘ĀINAbility, Moku Protectors, E Mālama I Nā Iwi Kūpuna,
ETA Hawaii – Enough Tourists Already, that address various aspects of sustainability in
their respective territories. In 2021, I was also invited to participate in monthly meetings
with the Blackfeet Land Collective as well as an Indigenous-led NGO “Honouring
Traditions & Reconciliation” in 2023 which collaborates with industry partners from
health, energy, education, and tourism sectors. These conversations have contributed to
the CAE for this study as well. One of the things I contributed to the CAE, in addition to
my role as ethnographer, documenter, and ally, was perspectives I gained from library
research. I collected data from 126 peer-reviewed articles, archives, recorded conference
presentations, and academic books on the topics of IWKB; coproduction; sustainability;
and NP/PA policy, use, and management.

After listening, watching, and reading over the course of several years in both
communities and while coding the combined results of the CAE collaborative process,
some recurring themes emerged regarding the sacred roots of environmental conflict over
recreational use and management of traditional lands. While these five themes: division,
desecration, disturbance, development, and displacement are useful distinctions, they are
highly relational with pervious boundaries. Although I attempt to itemize them, there
remains a lot of interplay. For both Hawaiian and Blackfoot peoples, knowing starts from
older stories, then their collective stories as a people, and finally their personal stories –
their lived experiences. These stories are understood to be reliable sources of knowledge
production as new realities are generated in the telling and re-telling of the stories. We
considered these historical and personal stories as “data” (Murveit et al. 2023) that
informed the identification and development of each of the 5Ds which were the main result of this research.

Although the study areas for this research are described in detail in the next section, I have provided maps of the Kingdom of Hawai’i and Blackfoot Territory which are now known as the states of Hawai’i and Montana, and the provinces of Alberta and Saskatchewan.

Figure 7. Current relief map of the Hawaiian archipelago which situates my study areas of Maui and Hawai’i within the Island chain and illustrates where the mountain peaks are in relation to the shorelines.

Figure 8. Current map of the federally recognized reservations of the four tribes of the Blackfoot Confederacy: A) Siksika Reserve B) Piikani Reserve C) Kainai Reserve D) Blackfeet Reservation and their proximity to Waterton and Glacier NPs, and the Badger Two Medicine PA which fills in the area just south of Glacier NP and the Blackfeet Reservation that has “Heart Butte” written on it.
Findings: The 5Ds of wREcK

“You can’t value what you don’t understand” (Ninna Piiksii/Bruised Head 2022).

Division

Division is the act, process, condition, or instance of being divided, separated, or kept apart. This category will address NPs, PAs, and recreation in relation to traditional land divisions that worked with nature and contemporary land divisions – property lines that compromise the integrity of ecosystems and Indigenous cultures. In conversations about
land division, my community partners always talk about how the land used to be, before colonial land divisions were superimposed on their territories. In this section I weave their story “data” with historical data to further contextualize the stories and lived experiences they have shared.

*Traditional and contemporary Hawaiian land divisions*

The traditional Hawaiian system of land division “ahupua’a” is determined by island geography. Each ahupua’a is a wedge-shaped area of land extending from the uplands to the shore (mauka to makai). Ahupua’a follow natural watershed boundaries.

Figure 9. Maui traditional land divisions or ahupua’a which are grouped into mokus as depicted by the various colors below. Used with permission. http://www.islandbreath.org/mokupuni/mokupuni.html contrasted with current (2006) land divisions which fragment watersheds as depicted in Figure 10.
Figure 11. Hawai‘i traditional land divisions by moku and ahupua’a. Used with permission. http://www.islandbreath.org/mokupuni/mokupuni.html contrasted with current (2011) land divisions which fragment watersheds as depicted in Figure 12.
Kānaka Maoli-Samoan co-investigator, Cody Nemet Tuivaiti (pers. comm. March 15, 2019), explains that while all land is sacred, the Wao Akua (Realm of the Gods – see Figure 13.) is set apart and reverenced by Hawaiian peoples. It is an area that was only accessed for spiritual reasons. Many of these peaks and rims in Hawai‘i have now been designated National Parks which grant relatively unlimited access to scientific researchers studying environment, climate, and astronomy, as well as some development, and millions of recreational tourists annually.

Figure 13. Hawaiian land divisions https://www.pacificwhale.org/blog/moku-ahuapua%CA%BBa-with-scott-fisher/ and Figure 14. https://horizonguesthouse.com/2021/09/16/understanding-ahuapua%CA%BBa-ancient-hawaiis-unique-land-division-model/.

The County of Maui Planning Department stated in their 2006 General Plan that the traditional Hawaiian “land tenure and land use system [ahuapua’a] sustainably supported a population that in 1778 numbered in excess of 1 million persons. In 1853 there were almost 300 villages located in the twelve Moku on the island of Maui” alone. There are 1.4 million permanent inhabitants in the whole state of Hawai‘i with 6.7 million visitors annually (DLNR 2022). According to a Hawaii Office of Planning: Department of Business Economic Development & Tourism report (2012) 85-90% of Hawai‘i’s food
and other goods are imported even though there are fewer people living on the Islands today than there were historically. As a result of population decline due to colonial diseases such as cholera (1804), influenza (1820s), mumps (1839), measles, whooping cough, leprosy (1848-9), and smallpox (1853) (Chinen 1978), the traditional land system ended in 1848 when Kamehameha III was persuaded by foreigners to institute the Great Mahele (division). The Mahele which Kamehameha designed to preserve the sovereignty of Hawaiians and their land rights for future generations of Kānaka Maoli once the population rebounded, ultimately allowed land to be bought and sold by foreigners. Further convoluting the issue of division, the Kingdom of Hawai‘i was illicitly annexed by the United States fifty years later on July 7, 1898. The new land divisions, instigated to advance foreign industrial agendas and recreational development, fundamentally conflicted with Indigenous Hawaiian ways of knowing and being and their relationships with, and responsibilities to, ʻāina.

*Traditional and contemporary Blackfoot land divisions*

The traditional territory of the Blackfoot extends east from the continental divide (Backbone of the World) to the Great Sand Hills (Omahskispatsikoyii) in central Saskatchewan and from the North Saskatchewan River (Ponokasistahta, Elk River) to the Yellowstone River (Otahkootahtayi) in Montana. There were no divisions, all Blackfoot people had access to the entire territory which they roamed as clans in purposeful seasonal rounds like the buffalo:

We knew every detail of this land. Our people travelled constantly throughout it, and their trails were well marked across the grasslands [and mountains (miistikistsi)]. They lived by hunting game and collecting plants. By moving camp frequently, they were able to avoid depleting the resources in any one area. Our people knew the places where
different plants grew and where game was plentiful. Their lives were nomadic, but their movements were not aimless; they always travelled with a purpose. (Glenbow 2013)

A territory which once followed natural watershed boundaries and provided for all their needs was all but gone by 1887, just 32 years after the first and only ratified treaty was signed; their lands first cut in half by an arbitrary international border at the 49th parallel and eventually fragmented, leaving each band on isolated plots of land that were not adequate to sustain their way of life (McManus 2005). One final land cession in 1895, the “ceded strip,” took another 800,000 acres along the Backbone of the World. This spine of glacier-carved mountains now designated as Glacier National Park is the headwaters for

Figure 15. Blackfoot territory circa 1800. Figure 16. Blackfoot lands after Executive Order 1875 (the US ratified a treaty reducing Blackfeet territory in Montana 1856). Figure 17. Blackfoot lands after Canadian Treaty 7 (1877). Figure 18. Blackfoot lands after Act of Congress (1895). Maps are in the public domain. https://trailtribes.org/greatfalls/sites/showonecontent.asp@contentid3612.htm.
three major river basins, which flow to the Pacific Ocean, the Gulf of Mexico, and the Hudson Bay. No other landscape within the contiguous United States retains its full complement of native habitat and predators (NPS 2021). For the Blackfoot this land was their “church”. The high peaks offered the closest access to Creator (Ihtsipaitapiiyopa), Sun (Natosi), that one could experience while on Earth. Their vision quest sites can still be found today on these mountains. Although the Blackfeet rejected the U.S. Government’s offers to buy this part of their remaining territory on three different occasions, they continued to feel pressured to sell this sacred strip of land due to strategically withheld rations and subsequent starvation.\textsuperscript{23} With an agreement that the remainder of their tribal lands would not be subjected to allotment (Daschuk 2019) and that they would retain the right to access and utilize the newly formed public lands, John Two Guns White Calf, Chief of the Amskaapikâni Nation of the Blackfoot Confederacy agreed to sell the land. During the negotiations White Calf lamented the loss of one mountain in particular, Ninaistako (Chief Mountain):

Chief Mountain is my head. Now my head is cut off... we will sell you the mountain portion of our land... I shake hands with you because we have come to an agreement, but if you come for any more land we will have to send you away. We don’t want our lands allotted [divided]... These words that I have spoken are not my words only, but the words of all that are here. (U.S. Congress 1896, 18-19)

White Calf was “now willing to sell the land from Birch Creek north to the Canadian border for 1.5 million dollars. In addition to the asking price, he stated that Blackfeet wanted to be able to fish, hunt game, and cut timber on the land after it was sold” (Ashby 1985). These rights to full access and limited use to their lands once they became public

\textsuperscript{23} Winter had just taken 600,000; \(\frac{1}{5}\) of their population (Daschuk 2019).
lands were promised into perpetuity. However, fifteen years later when the Glacier National Park Bill became law May 11, 1910, it “made no mention of the rights reserved to the Blackfeet in the 1895 land-cession agreement. Nevertheless, there is no evidence that any Indians opposed the creation of the national park” (Spence 2000). White Calf’s words seem to indicate otherwise, at least in terms of lost access to and use of the area, if not direct opposition to the park itself. It is most likely that, because the Park Bill of 1910 neither mentions the renouncement nor continuation of the legal rights guaranteed by the 1895 land agreement, White Calf and his people assumed that their rights were everlasting regardless of the new designation from public lands to National Park, but their rights were not upheld. “The massif of Chief Mountain itself is bisected by the Glacier National Park and Blackfeet Reservation boundary. Therefore, it lies half in the park, half on the Reservation...and just 7 km from the international border [with Canada] that passes through [the heart of the Crown of the Continent Ecosystem and Blackfoot territory].” (Mathews 2015).

In a personal communication regarding division as desecration, project informant, John Chief Calf (November 14, 2018), added this insight,

Originally, before the settlers, the entire area was considered sacred. The treaty changed that and the Blackfoot then had to pick specific places as sacred. Today it’s confusing as our way of asking has changed, as well as our access and relationship to the land.

Figure 19. Ninaistako (Chief Mountain).
Even though the entire ecosystem was sacred, there were always places, organisms, and phenomena that embodied greater spiritual power than others. For example, “Ksiistikomm (Thunder) is one of the most powerful beings on earth. He is a very important Above Person” (Glenbow 2013). Ninaistako (Chief Mountain) is the home of Ksiistikomm and therefore considered to be among the most sacred and powerful places.
on Earth (Ksaahkomm\textsuperscript{24}). And “Aimmoniisi (Otter), Ksisststaki (Beaver) and other water beings have special powers they sometimes share with human beings” (ibid.).

\textit{Desecration}

Desecration is to violate the sanctity of; to treat disrespectfully, irreverently, outrageously. This category will address ways in which recreationists utilizing Waterton-Glacier International Peace Park, and Haleakalā and Maunakea Conservation Districts, violate Blackfoot and Hawaiian environmental and cultural protocols.

In a section titled “Desecration” of her larger study, \textit{Ninaistako/Chief Mountain: Oral documentation of cultural use by the Blackfoot people} Blackfeet scholar, Betty Mathews reports:

Chief Mountain represents an important source of life and guidance for the Blackfoot People... Improper use of the mountain disrupts the ceremonies and brings disorder to the landscape. If the area is not respected and treated with dignity, then the life’s balance will be altered and disrupted. Unfortunately, more than one informant related a story of being interrupted by people who were utilizing the area for recreational purposes. One story that was told by Wilbert Fish held incredible detail. Wilbert had gone through weeks of preparation and physical cleansing to ensure his ability to have a “successful fast”. When he was approaching the end of his spiritual quest, a tourist climbed upon the ledge on which he was fasting and began to ask questions. Wilbert asked that she be quiet and leave the area. She refused, demanding to know what he was doing. After the confrontation, Wilbert had to again spiritually cleanse himself to prevent the altercation from affecting the outcome of his spiritual journey. Much to Wilbert’s dismay, the cloth offerings he had tied to the trees as a gift to the spirits had been removed by the tourists to make flags... Because knowledge and guidance is received from the mountain, it is important to the continuance of the Blackfoot way of life. Loss of relationship and desecration of the landscape are believed to cause death and sickness within the Blackfoot People. During the interviews, several people told of a prophecy which had been passed on from previous generations. It was told that when the Blackfoot People and others disrespected the mountain and the spirit that lives there, the mountain would begin to disintegrate. (Mathews 2015)

\textsuperscript{24} Note the Blackfoot word for Earth implies animacy and includes the concept of sphere (komi) indicating they understood the world to be round or spherical.
Similarly, Tuivaiti (pers. comm. March 15, 2019) relates an incidence of being interrupted by a group of hikers drinking, laughing and talking loudly while he was returning from a mana-full sunrise pule (prayer). Haleakalā literally translated means “House of the Rising Sun” and the rim of the volcano, like Chief Mountain, is believed to embody one of the highest concentrations of mana (spiritual power) on Earth. As Tuivaiti explains,

Wao Akua are the highest peaks... The Wao Akua is the engine that keeps it all moving... To upset or disturb the balance from the Wao Akua, could very well upset and disturb the balance of the land and shore... A disturbance in the balance may result in [someone taking] a spiritual journey to this realm to ask for enlightenment and purpose, never one that is for self-gain, but always for the purpose of the health of our Honua [Earth] and the generations ahead... These peaks were never traversed except for very specific spiritual reasons, they’re not a playground and should only be accessed when the Honua is in danger. That is when we seek the understanding and the reminders of how creation began, and how it shall continue thru its natural manifestation of life through perpetual harmony… in order to restore the balance [renewal] through prayer and ceremony.

Blackfoot Elder Miiniipokaa Peter Weasel Moccasin (January 20, 2022) talked about renewal this way,
All the elements have life, spirit. There are both energies [positive and negative] in that equilibrium. If it becomes imbalanced, it will affect us. The land will cleanse itself, these fires [referring to the Kenow Fire that swept through Waterton National Park in 2017], fires aren’t bad. If there is too much of anything, it will affect the land and the balance, too many trees and all that, fire restores balance. We are disrupting the balance. We are overusing these places. I hear about “climate anxiety” and I reflect on all the things I have survived; my people have survived. We have a relationship with Life... The land has to heal and become whole, it’s experienced trauma. It bears the needs of all of us, babies, the old ones, the young. If an individual is broken, it creates imbalance. If a system is broken, it creates imbalance. We need to do a hundred percent inventory and heal ourselves to renew our relationship with all our relatives and restore balance. The spirit of the land needs to heal itself, restore; rejuvenate itself to restore itself.

In September 2021, Parks Canada rangers invited two Blackfoot Elders to accompany them by helicopter to document what they thought to be a very old vision quest site on top of Istikoyistako (Slide Out Mountain; Sofa Mountain) in Paahtómahksikimi (Lake Created From Ice And Streams; Waterton Lakes National Park). Ninna Piiksii/Bruised Head (September 14, 2022) recounts this experience renewing and revitalizing this ancient sacred site through prayer, songs, and ceremony. He also talked about how some recreationists had gone there to party and left beer cans everywhere and how other hikers he had met have started to understand and experience these peaks in ways more compatible with Blackfoot beliefs and practices:

“Miistakii, Mountain, give me your energy. Give me your spirit. Help me. Help me.”

When we jumped off that chopper, gee, it felt like a daze we were in. That’s a pretty powerful vortex point, you know. But other people will say, “hokus pokus”. Always been that way, we always heard that, but then these non-Natives that find it, don’t call it hokus pokus ’cause they have had something spiritually come to them or happen to them. Let me jump down [the list of values] ihpipototsp, the purpose for being there. I’ll use that mountain, what is their purpose really? And you know there is probably somebody climbing Waterton and Banff as I speak right now. What really, you know, is it to count “Oh I climbed in August, 20 mountain peaks?” But in that process, what drove you to that? And some hikers are starting to incorporate that as a spiritual experience... he’s putting tobacco up there, he’s a white man but he’s starting to feel something up there that you will not feel when you are down there. And so those kind of energy, metaphysical energies, whatever you want to call them, once you allow them to happen, it changes your thinking. It almost makes you more mature; makes you wiser. And the hikers that I met, they don’t have that conquering attitude really, they got more or less, “Geez you know I did pray up there.” And to me it’s interesting “But you’re a white kid.” “Well, ya I know, I prayed.” I said, “Cool, sokaapii [that’s good].” And so, if you look at
what I’m saying, all of us have a different perspective, how we see life, what we value, what we really value. (Ninna Piiksii/Bruised Head September 14, 2022)

Educational awareness of Hawaiian culture through signage and interpretive displays are meant to prevent and deter inappropriate behavior however, education and awareness may not be enough as these signs regularly get ignored.

Figure 22. Tourists disregarding signage to hike to the summit of Maunakea.

In 2019, a video went viral of three professional European athletes (one sponsored by Red Bull, an energy drink manufacturer whose marketing focuses on “high-octane” adventure) on skis and snowboards carving a path down the volcanic ash covered slopes of Mauna Kea. Hawaiians have been protesting the installation of telescopes on the mountain for decades as it is a place of profound cultural significance (Hawaii News Now 2019). “Maunakea is a deeply sacred place that is revered in Hawaiian traditions. It’s regarded as a shrine for worship, as a home to the gods, and as the piko [where life
begins; navel\textsuperscript{25} of Hawai`i Island” (Office of Hawaiian Affairs 2023). The ecological and cultural damage caused by these actions are irreparable. “Growing up in Hawaii, I consider Mauna Kea a sacred place,” said Kalihi resident Ke’olina Naulangi. “[I]t’s a place that has history and a place that was sacred to our ancestors. To the locals, when we see that, we’re like what are you doing? Why are you skiing down a place that’s sacred to us, a place that has mana, a place that just has power” (Hawaii News Now 2019). Another Kalihi resident, Lisa May adds, “[T]hey’re destroying the dirt and who knows, there could be burial grounds there. And they’re not from here. So I just don’t think they have any idea of what they’re doing” (ibid.).

Figures 23-25. Professional athletes skiing and snowboarding down the rocky slopes of Maunakea in disregard of Park regulations and posted Hawaiian environmental and cultural protocols.

\textsuperscript{25} Translation of “piko” taken from National Parks Service website Hawai`i Volcanoes National Park Pu`uloa Petroglyphs page (https://www.nps.gov/places/stop-4-puuloa-petroglyphs.htm).
Getting naked on top of peaks and posting it on social media is trending. In 2015, tourists stripped on sacred Malaysian mount Kinabalu. “Officials and tribal elders suggested the disrespectful act was linked to an earthquake that killed 18 people days later” (Miller 2015).

Figures 26-27. Naked hikers disregarding Malaysian laws and cultural protocols on Kinabalu. Figure 28. An April 28, 2019 article addressing this widespread new trend.

A government official stated, “Local guides who accompany climbers often brief them on the traditional ‘dos and don’ts’ which include no plucking of plants, no removal of stones from the mountain, no speaking loudly and inappropriately and do ‘ask for permission’ before relieving one’s self” (ibid.). It’s happened on Kilimanjaro, Machu Picchu, and
other significant protected areas worldwide. One of the hikers from the Kinabalu incident later posted other heritage sites where he had also gotten naked.

The sunrise view on Haleakalā has become so popular among visitors (e.g., a bucket list destination for social media “influencers” seeking the perfect photo op), that it’s led to overcrowding and subsequent restrictions. As of 2018, visitors must now book ahead and pay a small fee. This includes Kānaka Maoli who wish to pule (pray) there, as well. Similar trends have caused other NPs and PAs to follow suit in recent years requiring permits for day use.

Figure 29. Maui Now article March 14, 2017. Figure 30. Associated Press article February 2, 2017.

In December 2018, the United States federal government shut down for 35 days. These furloughs included National Parks employees. Parks were left open but were severely understaffed and some were not staffed at all, and a result was significant damage to ecologically and culturally sensitive areas. As most staff were not being paid during this time, these employees understandably stayed home, although some continued to provide
emergency services and volunteer their time. In the case of Haleakalā, the absence of government employees to enforce the visitor limit permits, day-use only, stay on trails only, and other regulations, there were all night parties and other Park violations and cultural offences occurring during the federal shutdown. In the absence of Park staff, Kānaka Maoli mobilized voluntarily to fill the gap in stewardship out of mālama āina (responsibility to the land) and aloha āina (love for the land) and as Aunty Joyclynn Costa points out in her reply to Tuivaiti (see Figure 35.) even aloha for the recreationists who don’t share their views on land.

Figure 31. During shutdown, Kānaka Maoli from Kula Moku set Kapu (forbiddances; prohibitions) which constitute the universal laws of traditional Hawai‘i. Figure 32. Kānaka put offerings (Ho‘okupu) at the rim and called for local support to protect their “most sacred mountain, Hale‘akalā.”

Figure 33. Hand-made signage at the entrance to Haleakalā PA during government shutdown. Figure 34. Typical tourist picture from sunrise to contrast with Kānaka in the adjacent figure. Figure 35. Facebook post by co-investigator, Tuivaiti calling for reinforcements to protect Haleakalā.
Blackfoot Elder and career law enforcement officer, Morris Little Wolf, speaks to this Indigenous perspective on stewardship and leadership when he says, “The people [including the human and nonhuman people; relatives] are the reason for leadership, leadership should care for all members as if they are their own children” (as quoted by Kyle Grier, pers. comm. March 6, 2023). Grier also shared with me about a time he served on Piikani Chief and Council. The Canadian Government had been withholding or reallocating Blackfoot funds in such a way that there was no money left for the council to complete the last few months of the fiscal year. Grier said the situation culminated in a unanimous vote among Piikani council members to continue to serve explaining, “We were ready to do it on a voluntary basis.” One of the sacred societies of the Blackfoot who traditionally held the role of leadership before Chief and Council structures were instated by the Canadian Minister of Indian Affairs, is the Horns society. After a series of protocols and years of service, Horn members become the sacred parents and grandparents to other Elders and take the whole tribe as their children, holding themselves responsible for the physical and spiritual wellbeing of those children for the rest of their lives. This kind of relational stewardship and leadership differs from, and
perhaps transcends Western definitions and expectations of employment and occupational responsibilities which most often are attached to monetary compensation.

**Disturbance**

Disturbance is the interruption of a settled or peaceful condition. This category will address recreational activities that involve disturbing rocks, water and sand, as well as vandalism.

Traditional Hawaiian understanding and experience are that rocks guide them where to place each stone and, in this way, the heiaus (sacred altars or temples) and fishpond walls like the ones at Kaloko-Honakonau have stood for hundreds of years with little maintenance and no mortar. In the past, rocks have been taken from the heiaus by developers and non-Indigenous land owners to build decorative features at resorts and to build fences and cattle pens. A 60-foot-tall pyramid heiau (temple) in Hilo was dismantled in the 1800’s to use as base for road building and to fill a fish pond in order to create Liliuokalani Park and Botanical Gardens. Terri Napeahi’s (Figures 36-37.) Kūpuna took the remaining stones that were being desecrated and hid them on their properties for decades to protect them and restore spiritual balance.

Figures 36-37. Recovered rocks from ancient Hilo Heiau.
Tuivaiti (pers. comm. May 4, 2019) shares his experience and perspective while visiting one of the sacred sites in Kula Moku to renew his relationships with āina. He explains that there are protocols for placing of rocks in Hawai‘i and that moving and placing rocks should always be done with proper intentions and purpose:

So, I may be wrong, but I hope that people are not adding things on to and inside the heiau and hale wa’a or other structures without the proper protocols and training to do so. I find it kind of odd that this massive Ko’a [rock] amongst others was placed on this structure and inside. I do not think it was placed here with bad intention, but I have learned that with intention, must also come purpose. So, what is the purpose here? Hopefully it is a Ho’okupu [gift or offering] of some sort to honor Kanaloa [God of the sea and long-distance sailing voyages], but I pray that it is not just random tourist walking into Keone’io’io [NP] playing Jenga. With so much cultural significance here, it is scary to think what the tourist and those who do not get it are doing that may disrupt the spiritual balance. Maybe more signage and more attention should be shown here in one of the last untouched cities of refuge\(^\text{26}\) we have left on Maui.

Figure 38-39. Rocks added on top of and inside the Heiau at Keone’o’io National Park.

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\(^{26}\) A place where in ancient times, those whose broke the law (Kapus), defeated warriors, and those who refused to fight, found sanctuary. The places of refuge were found on each of the Hawaiian Islands and are considered sacred.
Tuivaiti’s comments about purpose, and his question, “What is the purpose here?” are akin to Ninna Piiksii’s earlier teaching about the Blackfoot value “ihpipototsp, the purpose for being there” and his reference to the mountains in Blackfoot territory, “[W]hat is their purpose, really?” The New Yorker recently published an article by Sophie Haigney (2018) *How Stone Stacking Wreaks Havoc on National Parks*. In the article Haigney explains the “havoc wreaked” by stone stacking saying, “The movement of so many stones can cause erosion, damage animal ecosystems, disrupt river flow, and confuse hikers, who depend on sanctioned cairns for navigation in places without clear trails” (ibid.). Tuivaiti (pers. comm. March 17, 2019) posted the article on his Facebook profile and reflected on the cultural harm caused by unsanctioned casual rock stacking and an altercation he had with some visitors while he and a friend were kicking down some of the stone cairns erected by tourists at Keone’o’io (La Perouse Bay) NP:
These stacks are almost like mocks of a tourist culture they try to leave behind, but for who? Us? To know what? That they were here? What about those who have always been here and their prints already etched in the sand and stone? Is that not meaningful enough now you have to create your own print behind to distract and confuse us? ... Stone stacking is more of a form of attention then any spiritual significance. What is the connection? What does it represent? Where is the lesson in any of it?

Figure 40. Tuivaiti’s March 17, 2019 Facebook post. Figure 41. Local educational signage of problem.

In Blackfoot territory, Waterton NP issued a similar message last year regarding the way building casual rock structures contributes to cultural and environmental harm.

Figure 42. Waterton Lakes National Park’s September 28, 2022 Facebook post about rock stacking in relation to their long-standing “Leave no trace.” policy. Figure 43. BBC Travel January 10, 2022 article regarding Blackfoot sacred site Iniskim Umaapi (Majorville Medicine Wheel) in Alberta.
Similarly, Zion NP social media coordinators posted this hashtag on Instagram:

#StoneStacking can cause erosion and damage ecosystems” in an attempt to counter the negative role of social media in promoting these activities. They peld with tourists:

“Please, enjoy the park but leave rocks and all natural objects in place.” The post noted the “curious but destructive practice” of building small stone towers, and said, “stacking up stones is simply vandalism” (Haigney 2018). Cultural appropriation of rock cairn building to add meaning or entertainment to our own lives can have consequences that desecrate and sometimes destroy sites of meaning for local Indigenous peoples we emulate by stacking rocks in the first place, like in the case of the ancient petroform in Manitoba’s Whiteshell Park where rocks that were in the shape of a snake had been rearranged into inukshuk by park visitors (Figure 44.), and tourists building stone stacks
using rocks from Iniskim Umaapi (Figure 43.), a sacred Blackfoot medicine wheel which predates Stonehenge by nearly a thousand years. Furthermore, this site has been used continuously for thousands of years by Blackfoot people and is still used today for ceremony, healing, and guidance.


While rock stacking is being considered a type of vandalism by NPs and PAs, standard vandalism continues to persist as a current problem with a long history. For example, “[a]rtifacts from Áísínai’pi, Writing-on-Stone Provincial Park] suggest people have been living there for at least 3,000 years...There are...many Blackfoot carvings in the rocks, with their art indicating the area was a spiritual place for them. In 1889, a North West Mounted Police Post was established...[and] Over the years, the Mounties stationed there carved their initials into what is now known as Signature Rock... Although carving your name into the cliffs is now illegal these carvings are considered historical graffiti and are embraced as part of the park’s history” (Dixon 2017). Needless to say, while this historical graffiti might be considered a progression of settler culture being overlayed onto the older Indigenous culture in a way that enriches the meaning of this ancient site, for the Blackfoot people it is not only disrespectful but it upsets the spiritual balance. However, on September 14, 1924, after nearly 50 years of being confined to the
Blackfeet Reservation in Montana, Blackfoot Elder, Bird Rattler is escorted by government officials across the border to return to this sacred place of his boyhood to renew his relationship with this part of Blackfoot territory that had been denied him. Appropriately, he carves his story of return and renewal in the stone alongside his ancestors. Once again, it is the purpose and intention that distinguish these actions – writing on stone as vandalism or ceremony.

Figure 47. Signature Rock where Mounties added their signatures. Figure 48. Bird Rattler adding his “signature”.

On March 28, 2019, Hawai‘i’s Department of Land and Natural Resources (DLNR) in Hawai‘i reported this act of vandalism to a culturally significant protected sight which they attribute to social media influencers and tourism websites for promoting this closed sight:

Around Valentine’s Day, vandals carved a heart-shape into a wall at Kaniakapūpū, King Kamehameha III’s summer palace. Three-years ago vandals carved a series of crosses into another wall on the opposite side of the ruin’s entrance... Kaniakapūpū, while promoted on some social media and tourism websites, has long been closed to visitation due to its cultural significance... Ryan Keala Ishima Peralta, a forestry supervisor with the
DLNR Division of Forestry and Wildlife expressed his emotions about past and the current vandalism, saying, “I’m sad, I’m angry, I’m disappointed. While the vandal’s intentions perhaps were in their mind innocent, they are defacing an irreplaceable feature of our host culture’s history. It’s hard to imagine what’s going through someone’s mind when they intentionally deface or destroy this important part of Hawai’i’s legacy.” ... In 2016, after vandals carved the series of crosses into the ruin’s walls, DLNR contacted numerous travel and tourism websites and bloggers who were promoting visitation to Kaniakapūpū, asking them to delete web references and directions to the ruins. Many websites did drop references to the site, though additional items have now appeared on the web and DLNR is again contacting social media sites asking them to remove references to Kaniakapūpū. As Peralta said, “In this case and many others, where we’re trying to protect sensitive cultural or natural sites, social media is not necessarily our friend.”

In a September 10, 2022 Facebook post, Tuivaiti shares an 1853 map of villages on Maui as found in the 2006 Maui General Plan. He notes,

Interesting how Kula, the true name for Kihei, is the only Moku where villages in the past were not along the shoreline. Maybe they knew something we obviously still trying to figure out, that the shorelines were for the wetlands and windblown sand. Dunes. The fishponds of Kula Kai were abundant because villages were aware of how their Moku functioned. While the major villages lived Mauka [upcountry], only those who worked in the taro patches and fishponds were living near the shorelines in Kula.

In another video he shows water bubbling up and forming a stream and sink hole on one of the Kihei resort’s lawns which had been filled in with dirt when the resort was built. He talks about how the water is telling its story and reclaiming its purpose i.e., being a coastal wetland.

Figure 49. Map of Maui from John Wesley Coulter’s report *Population and Utilization of Land and Sea in Hawai‘i*, 1853. Honolulu: Bishop Museum, 1931.
On March 28, 2023, the DLNR reported (DLNR 2023) that their Division of Conservation and Resources Enforcement (DOCARE) referred 33 dolphin harassment cases to federal law enforcement agents. The 33 tourists actively pursued and harassed a pod of dolphins in the South Kona District without understanding the relationship Hawaiians have with the water beings in their traditional territory and in violation of federal marine laws, specifically the Marine Mammal Protection Act, which prohibits coming within fifty yards of a Hawaiian spinner dolphin that’s within two miles of the shores of Hawai’i.

Figure 50. Tourists pursuing spinner dolphins in the South Kona District March 28, 2023.

In Blackfoot territory, reservoirs have become popular recreation areas without acknowledgement or understanding of how dams violate the rights of a river to be a river,
their purpose for being there, and the alliances they have made with the soyiitapiiksi (water beings) they are responsible for. Ninna Piiksii/Bruised Head (March 21, 2023) referred to these dams and reservoirs (as well as water treatment plants) as “water prisons”. James C. Scott made a similar observation about dams and retaining walls in his March 2022 lecture given at Utah State University, *In Praise of Floods: The Study of Rivers and Civilization*, when he posed the question, “How many things can you do to a river and have it still be a river?”

For Kānaka Maoli and Niitsitapii, sand hills or dunes have a special purpose for being there. It is where the bones of ancestors (Iwi Kūpuna) have been buried for hundreds of years in Hawai‘i and where the spirits of ancestors (‘Aumakua, in Hawaiian and Akawatoiitapiyyaa/ Natoiiyapiiyaa – they are now spirits, in Blackfoot) live. Since the 1950’s and the advent of international tourism in Hawai‘i, sand has been extracted from the central Maui sand dunes and used as beach replenishment for resorts on Maui and Oahu. Although these dunes are known to hold the bones of millions of ancestors, the incentive to harvest these dunes for recreational use overrides the protocols of the host culture to leave the dunes in situ. As the demand for sand to replenish beaches has grown exponentially in recent years (see Figure 51.), Kānaka Maoli have been pushing back. For example, on March 11, 2023 (see Figure 52.), after receiving local testimonies against the Ka’anapali Beach Nourishment Project, the Board of Land and Natural Resources (BLNR) Commission voted unanimously against giving the hotels $5 million to start the project, saying, “We are not here to protect private property.”

Figure 51. Graph of historical sand extraction and exports
Figure 52. March 11, 2023 post on the Access Denied! Surf?Fish?Dive? Facebook group page.
The Great Sand Hills on the eastern boundary of Blackfoot traditional territory in modern day Saskatchewan are the place where the spirits of their ancestors go. Today it is a PA that welcomes recreational activity. So important was this place that the last Indian battle to occur on Canadian soil (1870) was between the Cree and Blackfoot over access to these sacred sand hills – a landscape that was neither visited nor utilized and yet fiercely protected by Blackfoot people.

Figure 53. Image Credit: Mélissa Cloutier Schulze (Instagram: @rockieschick22) as used in https://playoutsideguide.com/2021/03/camping-in-western-canada-bc-alberta-saskatchewan-in-2021/
Development

Development is to make available or usable; to make suitable for commercial or residential use or purposes. This category will address the upheaval of sacred environments to make them suitable to build infrastructures and provide services for visiting recreational and residential tourists.

The injunction issued on Maui Lani April 6, 2019 for improper handling of burial sites [well over 1000 skeletal remains] is one example of how cultural protocols get ignored when they stand in the way of development that supports the demand of tourism in Hawai’i’s. Tuivaiti who participated in protesting the development shared in a Facebook post, “I was once told that when Kūpuna reveal themselves from the soil, it is a Ho’ailona [sign or omen] ... that reveals a great imbalance.” While social media often negatively contributes to the overcrowding of NPs and PAs, it has also provided a platform for Indigenous peoples to advocate for their ancestors and sacred lands as well as provide proof of violations of cultural requirements for developers.

Figure 54. April 6, 2019 news report announcing the injunction. Figure 55. Developers claiming to have found donkey bones being called out by a local Hawaiian with a camera and social media account.
In Blackfoot territory there has been some outside pressure to develop one of their last primordial hunting grounds, Badger Two Medicine, as a Tribal Park (Wheeler 2019) in order to create revenue for the Blackfeet Tribe and reduce overcrowding in nearby Glacier National Park by the ever-increasing numbers of recreators. This area is almost
entirely devoid of roads and is the same area previously mentioned where White Calf secured access and hunting rights to the 1895 ceded strip of land of which the majority later became designated as Glacier National Park.

Figure 58. The Badger Two Medicine as situated between the Blackfeet Reservation and various NPs and PAs, in northwestern Montana.

Blackfoot Elder and long-time protector of Badger Two Medicine from oil and gas development, John Murray, shared with me a conversation he had with a Forest Service negotiator who essentially said to Murray, “Just tell us where your sacred sites are and we’ll fence them off and put gas and oil everywhere else” (Murray March 10, 2022). Similar attitudes exist when outsiders talk about opening up Indigenous lands to recreation (Andersen 2021). What is not well understood is that traditional Niitsitapi do not primarily think of land in terms of revenue. Blackfoot Chief, Crowfoot, at the signing of Treaty 7 with the Canadian government in 1877 tried to explain Blackfoot land tenure
when he said to government officials, “Our land is more valuable than your money. As long as the sun shines and the waters flow, this land will be here to give life to men and animals. We cannot sell the lives of men and animals. It was put here by the Great Spirit and we cannot sell it because it does not belong to us.”

A local tribal member who lives on the Badger Two Medicine explains, “I’ve lived nearly my whole life on the Two Medicine. You can go back in there and get lost. It’s like going back in time. It’s always been a place where you can go back and pray. It’s very spiritual. It speaks to you. It speaks to your very core, and I know I’m not the only one who feels that” (KRTV 2022). As Blackfeet and other voices formally objected to oil and gas development for decades, in 2015, the Department of the Interior listened and cancelled the drilling leases and on June 25, 2020, the Blackfeet Nation successfully petitioned Congress to permanently protect Badger Two Medicine as a Cultural Heritage Area. Tribal Historical Preservation Officer for the Badger Two Medicine, John Murray (2019) asserts,

Badger Two Medicine is relatively undisturbed and we need that land. We need it to remain that way. We’ve been fighting this fight for a long time... and people say, ‘Where did you get your education? Where did that knowledge come from?’ It come from the land, from the mountains. The land, it is an epistemological source of knowledge for us [and a source of healing] ... That land at Badger Two Medicine is that important to us, and for mankind too.

The neo-colonial settler notion/solution of putting up cultural interpretive signage or being able to “fence off” sacred areas to protect them from desecration and make the rest of the land available for economic and recreational development is absurd and offensive to Indigenous peoples who don’t locate spirituality in a fixed structure like a church or
shrine. Yet this is often how these conflicts are mitigated like the burial shrines that dot the built environment in Hawai‘i.

Figure 59-61. Kānaka Maoli “Supaman” shares images of fenced off burial shrines in the city and at the dunes in his YouTube video Maui Sand Dunes https://www.youtube.com/watch?v=4VDGm3x74NI.

Figure 62. Blackfoot Elder Makoyiippookaa (Wolf Child) sharing the story of the sacred Beaver Bundle with local elementary school children ahnoom (in the very spot) where the “wetland creatures shared their power with the Blackfoot” vis-a-vis Figure 63. The interpretive plaque which commemorates the site’s significance to Blackfoot people.
**Displacement**

Displacement is to remove from the usual or proper place [similar to disturbance in this sense]; to expel or force to flee from home or homeland; to remove from a status, job, or role [e.g., kuleana to mālama aina in Hawaiian or Kiitomohpiipotokoi\(^27\) in Blackfoot]; to drive out or banish; to move physically out of position like a floating object displaces water; to take the place of. This category will discuss ways in which NPs and PAs, recreation, and tourism inhibit Niitsitapi and Kânaka Maoli access to sustenance resources, medicines, and places of worship; and the renewal of relationships with their human and non-human relatives – the fulfillment of their ontological responsibilities to their ancestors and land.

Recently I encountered a young Hawaiian boy who had just moved to Alberta. When I asked him what brought him to the snow swept plains of Lethbridge he simply replied, “My family got priced out of paradise.” On March 22, 2023, one Kânaka Maoli posted a question on the *ETA Hawaii – Enough Tourists Already* Facebook group page “What are your opinions? Two most negative impacts from tourism. Two most positive impacts from tourism.” I have created a table of the comments.

Table 1. Negative and positive impacts of tourism in Hawai’i, in the opinion of thirteen local Hawaiians.

<table>
<thead>
<tr>
<th>Hewa (Negative) impacts of tourism in the opinion of some local Hawaiians</th>
<th>Maika’i (Positive) impacts of tourism in the opinion of some local Hawaiians</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tourists who visit, then come back to live here</td>
<td>There are a few culturally sensitive and genuinely respectful visitors</td>
</tr>
<tr>
<td>Entitled tourists who ignore the culture and private property</td>
<td>Tourists who eat and shop at our local restaurants and businesses</td>
</tr>
</tbody>
</table>

\(^{27}\) “What you have been put here with” – This comes with the assumption that what you are put here with is what you are responsible for (Bastien 2004, 227).
Enables those who promote divisiveness to promote divisiveness | It’s about the money, and it’s about more money [this informant means tourism is a positive impact to those who are promoting Hawai’i for monetary gain]

Establishes a disparity on how our resources are used and excessively depletes what resources there are | Does support some small businesses, even tho most $ goes to big business and corp...

Too many people = land cannot recover... animals too | Respectful tourist who truly want to learn about the culture

Housing crisis [for Kānaka Maoli] | Economic, though most $$ goes to the hotel industry and doesn’t benefit locally owned businesses (less then 1% of our family business comes from tourist)

Overtourism, not managed [overcrowding] | Tourism provides jobs for some locals.

Impact of too many tourists becoming residents. | Now and then you meet some [tourists] who are nice, respectful, and want to learn

The negative impact on our limited resources, especially housing and medical care. | Some Kanaka Maoli have businesses that in part benefitting from sales of their goods, services, and foods

The effect of transplants who don’t assimilate into local culture & instead try to force their mainland social and political ways on us | A better future for Kanaka Maoli and their Ohana [families]

Traffic | Money

Profit off the Host Culture – Greed | I suppose the rare kind and respectful ones you meet

Strain on our already limited resources – [fresh] Water | 1) $ and 2) $

Using our resources to rescue from trails and the ocean when they should not be there in the first place because they are out of shape and ignorant of dangers | I imagine the businesses make money. Even though very little are locally owned [anymore] and very little of that money stays in the local economy

Brought disgrace to our land(s) | Brought us lots of money

Traffic | Some tourism provides revenue and jobs

An economy of crowds, with all that brings | Money

In my areas, it’s lucrative to rent a home as a vacation rental rather than to residential housing

Massive amounts of houseless kanaka

Zero affordable living

Cost of living is outrageous

Everyone that visits wants to stay as per usual and that causes more displaced Indigenous Hawaiians

There are still boats shipwrecked due to weather and negligence [tourists who don’t know what they are doing]

Entitlement

Filth

More revenue for the state to waste

Negative attitude

It’s not the tourists, it their extreme numbers, on an annual basis they far outnumber us [year-round]

Displacement due to tourists who crowd their land and sometimes become new residents, the resulting housing shortage, increased traffic, and a loss of access to land that provided subsistence, are perceived and experienced as the primary negative impacts in this exchange of opinions on social media and it is representative of the many other exchanges I have had with my Hawaiian community partners as well. Note the positive impacts comment “A better future for Kānaka Maoli and their Ohana” which received
several frowny emojis and the reply from another contributor, “tourism does/is definitely NOT a positive for the betterment of kanaka. It is a negative aspect and extremely opposite.”

Several Blackfoot informants and partners shared similar concerns about housing shortages as well, but for a different reason. Reservations in Canada are considered Crown land and the First Nations are technically the legal occupants. This means they don’t own the land and cannot obtain conventional financing to build a home and the Bands have limited resources for funding more housing. This results in many of the Band members having to live with several families to one home or to leave the reservation to live in nearby urban centers which leads to further disconnects from culture. In terms of overcrowding of NPs and PAs, Blood Tribe Member, Lee Healy had this to say on the Kanai Community Facebook group page:

Figure 64. March 2020 Facebook post by Lee Healy regarding overcrowding of Waterton NP.

White Calf, Bird Rattler, and other former Blackfeet warriors and their families were invited to set up a tipi camp in West Glacier where they were professionally photographed and paraded as a tourist attraction (ca. 1915). While they felt the
humiliation of being a spectacle, it allowed them to be in the mountains and to live their culture which was not permitted on the reservation (Heavy Runner 2021). Therefore, it was a price they were willing to pay to carry out their traditional lifestyle, speak their language, and have access to their beloved mountains from which they had been displaced.

As a consequence of social media and travel books like Maui Revealed, private landowners have prohibiting access due to increased pressure from recreation and tourism.

“Maui Revealed” Kills Again. Over the last two decades Maui Revealed has been a serial killer for out of the way spots on Maui. For example: remember blue pool. The land owners at the end of the road got tired of cars clogging the road. The trash. The attitude (“It’s in the book... I’m entitled to cross your land.”). The car that got stuck in the stream thinking it was okay to cross. Venus Pool. Now add Bamboo Falls and the painted eucalyptus. Passed by there today. Entries blocked. Trees tightly wired. Too many people too many cars. Too much used toilet paper. Too much rubbish. Closed by the private owners. A volunteer ranger was out there. Maui PoPo out their too leaving tickets on windshields. The death toll rises.

Figure 65-66. Social media and guidebooks lead to closure of once little-known favorite spots for locals.

“Quiet Title” is a legal loophole that forever displaces Hawaiian families from their traditional kuleanas that were promised into perpetuity by King Kamehameha III in the Great Mahele, often without them even knowing. And when these families are aware and
stand up against the newcomers and developers who seek to quiet their traditional titles, developers often use force and intimidation tactics to remove these families from their homelands.

Figure 67-68. Hawaiians posting private property on their kuleana lands repeatedly as they are torn down.

With wealthy tourists becoming residents and driving the cost of living up, many local Hawaiians continue to practice sustenance living by growing gardens and hunting wild boars. As more and more of their kuleana lands get developed or become private recreational properties, some locals hunt private properties as both an act of defiance and out of necessity. Familiar hashtags among these hunters include things like:

#HuntingYourRanch #BehindYourHale [House] #HuntingYourPasture

#OutlawKineTings #NoHuntForTeeth #HuntForMeat.

Figure 69-71. Some examples of Instagram posts by Kānaka Maoli hunters.
Niitsitapi who have been displaced from utilizing the parts of their territory that have been designated NPs and PAs have lost some of their medicinal knowledge and practices. For example, there are twenty-nine medicinal plants found in Waterton NP that don’t grow anywhere else in Canada. Although Parks Canada now has policies in place that allow for limited harvesting of these plants for cultural use, after a hundred years of displacement, some of the medicinal knowledge has been lost. Likewise, the criminalization of the Blackfoot language (as codified in the Indian Act of 1876 and reinforced by residential schools until the ban was officially lifted by the Indigenous Languages Act of 2019) and colonial settlers re-naming the landscape, some of the place names in Blackfoot territory are lost.

Discussion

“Trouble is, white people don’t listen. They never learned to listen to the Indians, so I don’t suppose they’ll listen to other voices in nature. (Stoney Nakoda Elder Tatanga Mani/Walking Buffalo 2022).
The findings of this study suggest that perhaps language and failure to listen are the greatest barriers to understanding the sacred roots of environmental conflict and decolonizing-Indigenizing sustainability and recreation. Little Bear (2000) sheds light on the relationship between language and culture, the way languages create conflicting logics and contribute to communication problems when Western and Indigenous worldviews collide or come into dialogue with one another:

Language embodies the way a society thinks. Through learning and speaking a particular language, an individual absorbs the collective thought processes of a people. Aboriginal languages are, for the most part, verb-rich languages that are process- or action-oriented. They are generally aimed at describing “happenings” rather than objects. The languages of Aboriginal peoples allow for the transcendence of boundaries. For example, the categorizing process in many Aboriginal Languages does not make use of the dichotomies either/or, black/white, saint/sinner. There is no animate/inanimate dichotomy. Everything is more or less animate. Consequently, Aboriginal languages allow for talking to trees and rocks, an allowance not accorded in English. If everything is animate, then everything has spirit and knowledge. If everything has spirit and knowledge, then all are like me. If all are like me, then all are my relations.

These diverging worldviews (particularly the discrepancy in what is considered a living being) not only become a barrier to genuine communication about the problem but also lead to vastly different solutions in terms of how landscapes get conceptualized, defined, utilized, and protected. While the incompatibilities between Indigenous, non-Indigenous, and nonhuman “stakeholders”28 may seem impossible to reconcile, the data collected throughout this study provides some next steps to approaching, if not overcoming these onto-epistemological barriers.

Kidwell and Velie (2005, 37) address these barriers concluding, “It is difficult in contemporary [North] American society, and particularly in the highly structured

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28 On March 28, 2023, Indigenous soil scientist Lydia Jennings tweeted “Stop calling tribal nations stakeholders! We are rights holders.” I use this word because it is understood by environment and society scholars and managers but as a discipline we should probably move away from using it.
environment of an academic institution, to comprehend the emotional and cognitive understanding of a landscape from which one can draw both physical and spiritual substance.” In a *Policy Matters* panel discussion by the MacEachen Institute for Public Policy and Governance titled *Whose Nation? Navigating a New Era in Crown-Indigenous Relations*, Ingrid Waldron (2018b) describes barriers that are deliberately kept in place to impede communication and maintain control regarding environmental policy. For example, she asserts that “failure to consult Indigenous communities from the get go and throughout the process and failure to acknowledge Indigenous worldviews and timelines [are often born of] fear and anxiety about the abandoning of Euro-Western frameworks and processes [that would] cause many projects [and activities] to halt... [and also] fear of going into communities [and getting] screamed at [because Indigenous people] don’t understand that there are some things we can’t do.” Sharing a similar experience, councillor Keani Rawlins-Fernandez stepped out of the first meeting of the new Maui County Council to post live on her Facebook page January 27, 2023 tearfully reporting, “The first order of business for our first regular Maui County Council meeting is to stifle testimony [against the development of kuleana lands], and silence our community members.” She encouraged people to watch the recorded meeting and “listen to how shameless the new majority is in taking away people’s ability to provide oral testimony.” Whether it be an inability to listen or an unwillingness to listen, listening is what the community partners for this project suggest as the most important next step to overcoming barriers between the opposing philosophies, values, and behaviors.

Little Bear (2000, 4-5) suggests a more transparent and equitable 4-step approach explaining that wholeness rather than dominance leads to social order and good relations.
His thoughts on wholeness seem relevant to overcoming these theoretical and practical barriers to the decolonial Indigenization of sustainability and recreation:

Wholeness [consists of] strength, sharing, honesty, and kindness. Together... these create balance, harmony, and beauty... The value strength speaks to the idea of sustaining balance. If a person is whole and balanced, then he or she is in a position to fulfill his or her individual responsibilities to the whole. If a person is not balanced, then he or she... cannot fulfill his or her individual responsibilities... The quest for balance manifests itself in what Rupert Ross calls the ethic of “noninterference.” Noninterference is respect for others’ wholeness, totality, and knowledge. The Aboriginal value of sharing manifests itself in relationships. Relationships result from interactions with the group and with all of creation. Sharing speaks not just to interchanging material goods but also, more importantly, to the strength to create and sustain “good feelings.” ...

In Hawaiian, I mohala no ka lehua i ke keʻehei `ia e ka ua is an oʻlelo or saying that means, “People respond better to mild words than to chidings.” and I ka ʻolelo no ke ola, i ka ʻolelo no ka make meaning “In speech is life, in speech is death.” Robert Keakealani (pers. comm. December 6, 2010) shared with me that words can heal or destroy so we have to be careful because words that carry light can sustain good feelings and also literally heal broken bones etc. but words can also carry darkness. Blackfoot Elder John Murray (March 10, 2022) spoke about sustaining good feelings when he taught me that spoken words have being, “When you’re upset at someone, don’t say anything. Don’t give it [bad feelings] life.” Another Blackfoot Elder, Francis First Charger (November 3, 2022), taught me that the hardest value to follow is aayististaak which means to stay calm, do not react in the moment but later respond in a positive way when you can be more diplomatic and not cause any state of anger but come back later with the right words to speak your truth without harming the other person or causing them to feel shame, demonstrating how relationality applies to words and ideas themselves which
becomes interesting when you consider this in the context of policy, law, and treaty making with humans and nonhuman peoples. Little Bear (2000, 5) continues:

Because the shared heritage is recorded in the minds of the members of a society, honesty is an important Aboriginal value... It is based on being aware that every being is animate and has an awareness that seeks to understand the constant flux [of dynamic systems and energies] according to its own capabilities. Aboriginal people seek to use such understandings to maintain their balance and to sustain harmony and cooperation. Under the custom of noninterference, no being ought to impose on another’s understanding of the flux. Each being ought to have the strength to be tolerant of the beauty of cognitive diversity. Honesty allows Aboriginal people to accept that no one can ever know for certain what someone else knows. The only thing one can go on is what the other human being shares or says to you or others. And, in all of this, there is an underlying presumption that a person is reporting an event the way he or she experienced it.

The CAE method we actionized for this study drew on this way of honoring what an individual knows from where they stand to be valid and a part of the understanding of the whole of nature. Little Bear (ibid.) proceeds to explain how honest lived experience is not just qualitative but it contributes to the creation and understanding of the whole and reality itself:

For the purposes of social control, there is a strong expectation that everyone will share his or her truth (actually, “truthing” is a better concept) because people depend on each other’s honesty to create a holistic understanding of the flux. Lies result in chaos and establish false understanding. A reciprocal aspect to honesty exists. If people come to know another person as untruthful and a liar, they will eventually not use that person’s actions and talk as a basis for their relationships and interactions. In other words, the liar’s expectations will not be fulfilled. The message is, “If you want to be part of the spider web of relations, speak the truth.” Kindness is a value that revolves around notions of love, easy-goingness, praise, and gratefulness. If love and good feelings pervade the group, then balance, harmony, and beauty result. This is a positive rather than a negative approach to social control. If individuals are appropriately and immediately given recognition for upholding strength, honesty, and kindness, then a “good” order will be maintained, and the good of the group will continue to be the goal of all the members of the Society.

The kind of personal truthing Little Bear describes exists within many Indigenous peoples’ ways of knowing and being and it always begins with listening, watching,
observing and engaging one’s environment with all six senses (spirit being the sixth sense). It is through this spiritual connection that one aligns themself with all the relatives and comes to “hear”, understand, and honor the vantage points of all the nonhuman relatives in nature who must necessarily be included in the policy/treaty making and “management” of sacred environments. Little Bear speaks to this equal and shared stake we all have saying, “For the Indians, land is not purchasable, but it can be shared. Land cannot be purchased because ‘all my relations’ have interests in the land, as humans do” (as quoted in Belanger and Hanrahan 2022, 40 – my emphasis). From this perspective, the scientific method of inquiry can be construed as yielding lies or half-truths. Because hypotheses and theories are continuously being disproven and modified, Indigenous people often view science as a less reliable way of knowing despite the fact that science has led to important discoveries that benefit humans and environments and contribute to our understanding of the whole of nature – typically by investigating its parts in isolation and then attempting to reconstruct a more intelligible whole. Some of the comments regarding the positives of tourism and recreation in Hawai’i (Table 1.) indicate Hawaiians don’t mind sharing their islands with visitors that are respectful.

After sharing the results of this study with Hawaiian Kūpuna and community partner, Roberta Ku’ulei Keakealani, I received this generous reply from her:

Aloha e Sandi, this gift you give, in the sharing of your paper, is one that is felt deep within, perhaps so deep, it stirs and excites the DNA. Your topic is one that is necessary, especially today and in today’s world as I believe the perspectives, ways, practices, beliefs and knowings of indigenous peoples is what can save our planet- mother earth. It is the mindset and actions of those with such intimate relations with our environment, elements and ecosystems that exemplifies the righteous ways to exist with earth, most say on earth, but we believe it’s how we live with her, in a way that enhances both lives, hers and ours. People call it balance, we know it as our practices, ancestral knowledge, succession as we continually assume our places in the time line of stewardship. This is beauty and beautiful. All the best to your journey, it is good. Mahalo for elevating and
honoring these ways of being, someday, perhaps, science will catch up! Mitakuye Oyasin, to all my relations. Ola, life!! Mahalo e Sandi

The words for “responsibility” in Indigenous languages are often difficult to translate into English because there is so much embedded in the meaning of the words. And yet, their words for responsibility are typically the best corollary for what Westerners call “stewardship”. For example, “Kūleana is a uniquely Hawaiian value and practice which is loosely translated to mean ‘responsibility.’ The word kūleana refers to a reciprocal relationship between the person who is responsible, and the thing which they are responsible for... Kūleana is to remove yourself from ego and selfishness and remind yourself instead what your role may be, and how best to acknowledge your roles amongst the roles of others. Your purpose is your role, and your role is to contribute to your ohana, your village, and to your ‘āina” (Hawaii News Now Hawaiian word of the day April 17, 2015). Isspi’po’totsp is a Blackfoot word for responsibility and as mentioned in Chapter 2 of this dissertation, for Niitsitapi, environmental conflicts and land degradation are seen as imbalances, breaches in treaty relations and responsibilities by Natives and non-Natives with the natural and cosmic relatives. Aisstainhkiakii/Sandra Manyfeathers (February 6, 2021) explains that whether an individual, community, or environment becomes imbalanced “it’s the responsibility of the collective to restore that balance.” Little Bear (2000), talking about differences between Indigenous and Western laws and policies that lead to vastly different social[-environmental] behaviors and outcomes, shared this:

[T]he philosophy, the values, and the customs in Aboriginal societies are also the law. Law is not something that is separate and unto itself. Law is the culture, and culture is the law. Another factor that minimizes deviations and abrogation of the law is equality. Equality pervades Aboriginal societies because of values such as sharing and generosity,
the importance of the group as opposed to the individual, and in general the concepts of wholeness and totality. These values and mechanisms neutralize disparity between individual members of the society and therefore reduce wants, desires, and aspirations that may result in the abrogation of the law. In other words, if no person has more than any other does, then no one has feelings of exclusion or being cheated or short-changed. Internalization of knowledge is another major factor that minimizes deviation from socially acceptable behaviour. Internalization means everyone carries around the societal code, whereas in Western society everything is externalized. (Little Bear 2000, 7)

Perhaps the most important and potent philosophy-value-custom that is internalized by Blackfoot and Hawaiian peoples is Kimmapiiyipitsinni and Aloha. Each of these values often get oversimplified to mean being loving or being kind but both communities have extended my understanding of these ideals to include “humbling yourself to become equal” with all the human and nonhuman people in a given place, whether a specific territory or ecosystem or the global environment. In this way ego and gluttony get rooted out of us individually and thereby as a society as well. As we internalize humility and equality rather than externalizing it i.e., compliance out of fear of punishment or nature humbling us with extinctions, pollution, climate change, and so on resulting from the imbalances and inequities we have embodied as a Eurocentric, individualized, industrialized, capitalist society. Even if the ideal seems or perhaps is unattainable, as Westerners we can begin to change our trajectory slightly and move forward together with Indigenous partners in this direction.

For example, in a sustainable recreation context, Mark Zuckerberg purchased 700 acres vacation home on Kauai’s North Shore. When he discovered that the Kuleana Act of 1850 granted land ownership rights to native Hawaiians, rights that descend to subsequent generations without the formal transfer of deeds or titles, he decided to sue them in order to prevent them from accessing “his” property. Those who had been sued had a choice, they could sell their partial shares or try to outbid a billionaire in a public
auction. If they lost, they could be forced to pay Zuckerberg’s legal fees. January 27, 2017, Duane Shimogawa, reporting for Pacific Business News, stated, “Zuckerberg and his wife, Priscilla Chan, said that they are dropping their quiet title actions and will work with the community on a new approach. Zuckerberg and Chan wrote that they ‘understand that for Native Hawaiians, kuleana are sacred…’ and that ‘...large portions [of the land] will be maintained for farming by the community.’” Unfortunately for Kānaka Maoli, this is rarely the outcome and more often they have to fight in court for the rights to their own land.

Figures 72-73. April 5, 2023 and November 1, 2021 Facebook posts of Kānaka Maoli who fought and won their land rights back from quiet title actions.

The Vatican’s recent repudiation of the attitudes and policies that permitted colonizers to seize land from the sovereign nations of the Blackfoot, Hawaiian, and other Indigenous peoples worldwide demands that settler-colonial societies and institutions reconsider their attitudes and policies which remain rooted in the once church-sanctioned
authorizations. In a statement issued March 30, 2023, the Vatican stated that the Doctrine of Discovery (and its many iterations e.g., Manifest Destiny), which still informs government policies and laws today, was never part of the Catholic Church’s teachings. Some recreationists seem to maintain similar neocolonial attitudes of Manifest Destiny and the Doctrine of Discovery as they visit NPs and PAs without acknowledging the rights and responsibilities of host cultures and sometimes in direct opposition of locals’ rights.

Figure 74. April 4, 2023 Facebook post of an interaction between a tourist and a local on social media.

Decolonizing-Indigenizing sustainability and recreation with greater humility, equity, and genuine collaboration is a responsibility that as settler-colonial peoples, we must
Indigenous peoples have the right to maintain and strengthen their distinctive spiritual relationship with their traditionally owned or otherwise occupied and used lands, territories, waters and coastal seas and other resources and to uphold their responsibilities to future generations in this regard. Indigenous peoples have the right to the lands, territories and resources which they have traditionally owned, occupied or otherwise used or acquired. Indigenous peoples have the right to own, use, develop and control the lands, territories and resources that they possess by reason of traditional ownership or other traditional occupation or use, as well as those which they have otherwise acquired. States shall give legal recognition and protection to these lands, territories and resources. Such recognition shall be conducted with due [and I would add long overdue] respect to the customs, traditions and land tenure systems of the indigenous peoples concerned.

This chapter demonstrates the significance of considering how sustainability gets conceptualized and defined, especially in the context of recreation, and illustrates how different conceptions and definitions of sustainability drive policy and environmental behaviours that lead to very different outcomes.

Conclusion

It is not the intent of this chapter to describe in detail every Aboriginal custom; anthropologists have done enough of that. They have done a fairly decent job of describing the customs themselves, but they have failed miserably in finding and interpreting the meanings behind the customs. The function of Aboriginal values and customs is to maintain the relationships that hold creation together. If creation manifests itself in terms of cyclical patterns and repetitions, then the maintenance and renewal of those patterns is all-important. Values and customs are the participatory part that Aboriginal people play in the maintenance of creation.” (Little Bear 2000).

This paper demonstrates how the 5Ds of wRECk: 1) division 2) desecration 3) disturbance 4) development and 5) displacement, violate Indigenous environmental and cultural protocols and interfere with their relationships with, and ontological responsibilities to, all the relatives in their homelands. It also presents a way forward
together by first, better understanding the sacred roots of environmental conflict and adopting some of the attitudes and behaviours of Indigenous peoples. When we do this, as recreationists, managers, policy makers, and scientists, we are more readily welcomed by host cultures. There is a need for greater co-management of protected areas. We need to look at some of the places where this is already happening with some degree of success. Some examples include the Haida co-managing Gwaii Hanas, the Anangu co-managing Uluru-Kata Tjuta National Park, and the co-management of Bear’s Ears with Navajo partners. There are also ongoing efforts to train Indigenous people to monitor parks, protected areas, and traditional territories, like the Coastal Guardian Watchmen Network. 29 “Every society has many deep-rooted and implicit assumptions about what life and reality are all about. These assumptions are the guidelines for interpreting laws, rules, customs, and actions. It is deep-rooted and implicit assumptions upon which attitudes are based and that make a person say ‘This is the way it is.’” (Little Bear 2000). Western ways of protecting and engaging with these areas are only one way and likely not even the most effective way considering the endangered state of society and environments today. Indigenous ways of protecting and engaging with natural areas by understanding and experiencing them to be sacred has been equally and in many cases more effective (Ninna Piiksii Bruised Head 2022; Pearce 2023; Sarfo-Adu 2022; Schuster et al. 2019).

Acknowledgement

29 https://www.iiliationhood.ca/publications/backgrounder-a-national-indigenous-guardians-network
I acknowledge the resilience and sovereignty of Niitsitapi and Kānaka Maoli in maintaining their ancestral ways of knowing and being despite colonial oppression, and their generosity in embracing me as an ally and sharing some of that knowledge with me and the academy.
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Complementary worldviews aligning: A relational approach to STEM education

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Complementary worldviews aligning: A relational approach to STEM education

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Educators in Canada face new mandates at the national and provincial levels to incorporate First Nations, Métis, and Inuit (FNMI) perspectives across the curriculum. Yet it is not uncommon to hear K-12 educators as well as some university faculty asking, “How do I incorporate Indigenous culture into science? Is it even possible?” This paper not only describes how it is possible but also explains why it is necessary, providing a theoretical framework and practical/concrete methods for pairing/braiding current Western approaches to STEM knowledge with Niitsitapi and other non-Western treatments of these knowledge categories and disciplines. While primarily employing Blackfoot ways of knowing to demonstrate how Niitsitapi worldview complements, challenges, enlarges, and informs prevailing Western scientific paradigms, the ideas presented here are likely translatable to other Indigenous perspectives and applicable to other academic disciplines. Western STEM education and inquiry have a long history of being reductionary, linear, singular, static, and objective (Little Bear 2000). STEM disciplines have consequently been limited by the narrow and somewhat rigid parameters of their prevailing epistemologies. Meanwhile, Niitsitapi and other Indigenous worldviews which tend to be holistic, cyclic, dynamic, and spiritual have historically been both systematically and systemically dismissed by the sciences and primarily confined to the humanities. Therefore, if we are to move beyond merely learning about Indigenous cultures and lean into learning from Native cultures (or learn through the lens of Indigenous cultures), we must 1) teach Niitsitapi and other non-Western stories beyond the humanities classroom; 2) better engage the etiological, ontological, epistemological, axiological, and practical traditions of Niitsitapi and other non-Western peoples; and 3) operationalize pedagogical and methodological models that acknowledge, respect, and embody non-Western ways of knowing and being, in STEM education.

Keywords: FNMI; Indigenous knowledge; Indigenous science; relational science; worldview; pedagogy; STEM; decolonization; truth and reconciliation; critical education; land-based education; collective methods

Positionality: Sandra Bartlett Atwood is of Irish Canadian settler decent, Clan Kenney who traditionally hail from counties Galway and Ros Comáin, Central Ireland in the province of Connacht. She was born and raised in Blackfoot territory and has made lifelong friendships with community partners among the Blackfoot people with whom she is allied.

Introduction
For centuries Indigenous ways of knowing, being, and doing have been dismissed, if not suppressed by Western science (Battiste 2013; Burkhart 2019b; Cajete 1994, 2000; Chambers and Gillespie 2000; Kimmerer 2013; Little Bear 2000, 2011, 2015, 2016; Smith 2012; Treaty-Based Education 2021; Wilson 2008). With the European Enlightenment came the idea that spirituality and ‘supernatural’ phenomenon could not be investigated by scientific methods (Strevens 2020). Consequently, Western science and religion (and with it, spirituality) were deemed mutually incompatible and eventually became regarded as epistemologically distinct domains with science being seen as the more accurate and reliable of the two. Colonial expansion spread this Eurocentric worldview and episteme abroad contributing to hegemonic agendas to not only assimilate Indigenous peoples and eradicate Indigenous knowledge systems, languages, and practices but also, in many cases, eliminate Indigenous peoples altogether. After decades and for some Indigenous groups, centuries of subjugation, a tipping point came in 1999 with Section 35 of the Declaration on Science and the Uses of Scientific Knowledge (2000) which declares, “Modern science does not constitute the only form of knowledge, and closer links need to be established between this and other forms, systems and approaches to knowledge, for their mutual enrichment and benefit” (UNESCO and ICSU World Conference on Science 2000, my emphasis). Section 36 elaborates:

Traditional societies, many of them with strong cultural roots, have nurtured and refined systems of knowledge of their own, relating to such diverse domains as astronomy, meteorology, geology, ecology, botany, agriculture, physiology, psychology and health. Such knowledge systems represent an enormous wealth. Not only do they harbour information as yet unknown to modern science, but they are also expressions of other ways of living in the world, other relationships between society and nature, and other approaches to the acquisition and construction of knowledge. Special action must be taken to conserve and cultivate this fragile and diverse world heritage, in the face of globalization and the growing dominance of a single view of the natural world as
This paper responds to this appeal to establish closer links between Western science and other knowledge systems (including nonhuman peoples’ ‘knowledge’ systems or vantage points – stories) and explores some of the advantages to both sides.

I begin with a literature review of Indigenizing STEM. I then describe my methods for collaborating with Indigenous community partners to disclose and address this problem with education they are concerned about and want to work on together. Following this, I share the results of our collaborative effort to develop a framework for decolonizing-Indigenizing STEM in elementary, secondary, and post-secondary education by sharing what this looked like in my own practice. I conclude this paper with a discussion which generalizes my lived experience applying the Elders’ teachings to my own STEM instruction, for others who may wish to apply these methods to their own practice.

While many scholars, tribes, institutions, and agencies are talking about Indigenizing STEM with a focus on increasing Indigenous representation in STEM disciplines and fields (Salvador 2016; Stantec 2021; Conference Board of Canada 2022), it is also critical to address the underrepresentation of Indigenous worldviews in STEM, in addition to the underrepresentation of Indigenous people pursuing STEM degrees and working in STEM fields (Battiste 2013; Battiste et al. 2002a; Cajete 2000; Chambers and Gillespie 2000; Deloria 2004; LaDuke 1996; Little Bear 2000, 2011, 2015, 2016; Murray 2022; Tsosie pers. comm. April 4, 2022). Gaudry and Lorenz (2018, 218) draw attention specifically to the way “Canadian universities and colleges have felt pressured to [I]ndigenize their institutions. What ‘[I]ndigenization’ has looked like, however, has
varied significantly” (ibid.). After surveying 25 Indigenous academics and their allies, they developed a three-part spectrum for differentiating what Indigenization means, with *Indigenous inclusion* on one end, *reconciliation Indigenization* in the middle, and *decolonial Indigenization* on the other end. “Conceptually, [I]ndigenization represents a move to expand the academy’s still-narrow conceptions of knowledge, to include Indigenous perspectives in transformative ways” (ibid.). They conclude, “that despite using reconciliatory language, post-secondary institutions in Canada focus predominantly on Indigenous inclusion” (ibid.) (i.e., increasing the number of Indigenous bodies in the academy without changing the structure of the academy).

Some postcolonial scholars (Dotson 2011; Fricker 2007; Nadasdy 1999; Spivak 1988) have approached the historical (if not general) disregard for non-Western ontologies and epistemologies in terms of “epistemic violence [and] practices of silencing” (Dotson 2011, 236). Fricker (2007) contends that epistemic justice goes beyond making information and education available to marginalized groups. She maintains that to understand epistemic justice we must consider what epistemic *injustice* is, suggesting that epistemic injustice involves being wronged expressly in one’s capacity as a knower. She classifies such injustices into two categories, testimonial and hermeneutical injustice:

Testimonial injustice occurs when prejudice causes a hearer to give a deflated level of credibility to a speaker’s word. Hermeneutical injustice occurs at a prior stage, when a gap in collective interpretive resources puts someone at an unfair disadvantage when it comes to making sense of their social[-environmental] experiences. (Fricker 2007, 1)

An example of the first might be a scientist not taking someone seriously because they don’t have a Western degree or because their knowledge of the world is based in creation
stories and relationships with seemingly inanimate “objects” and phenomenon; an example of the second might be suffering from a sense of incoherence and spiritual disconnection from having to navigate in a culture that lacks the critical concept of comprehensive relational animacy. Fricker (2007, 1) speaks of the first being caused by “prejudice in the economy of credibility and the second by structuralist prejudice in the economy of collective hermeneutical resources.” Burkhart (2019a, 2) further explores the sources of epistemic violence and the problem with a single privileged or dominant explanation for how the world exists, contending that knowledge systems where land is a living, breathing relative and the continual creative source of life, thinking, knowing, feeling, and being… [can actually trigger] the operations of epistemic guardianship within the settler colonial epistemologies… [which] hold up and justify the false [or at least incomplete] worlds of white supremacy and Euro-supremacy… This delusional [or limited] epistemic world serves settler colonial power because it presents the imaginary [or incomplete] world of Euro-supremacy as the entire world. Settler colonialism, then, is not any particular historical event or set of historical events but rather a structure, as articulated in Patrick Wolfe’s work—a structure of power that produces subjugating effects in a myriad of ways, including the subjugation of the production and recognition of Indigenous knowledge.

When Indigenous worldviews are solicited or welcomed by science, the focus is most often on ecosystem, medicinal, and climate knowledge (Ninna Piiksii/Bruised Head November 22, 2021). Traditional knowledges are seen as having relevant contributions to make to these fields in terms of millennia of observations and experiences with the natural world. However, traditional knowledge (TK), Indigenous knowledge (IK) or Indigenous ways of knowing and being (IWKB) often get decontextualized and generalized in the process and the more profound contributions of Indigenous knowing go unnoticed or intentionally ignored. For example, some scientists can accommodate things like plants and animals being agentive, but aren’t interested in Indigenous
understandings and experiences of entities such as words, numbers, energies, subatomic particles, rocks, and water, also being alive, sentient, and interrelated to each other and humans. In Piikani Elder and scholar Betty Bastien’s (2004) book *Blackfoot Ways of Knowing* she explains that Blackfoot epistemology “begins with sacred knowledge held in the stories and ceremonies that have been handed down through a web of kinship alliances… [and that] Ihtsipaitapiiyo’pa (the Source of Life) is the great mystery that is in everything in the universe” (ibid., 77).

Classical Western approaches to science are often reductionary, linear, and objective. A problem is observed through a zoomed-in lens (often literally a microscope), a hypothesis is developed and experiments are carried out with the intent to falsify the hypothesis. If the results support the hypothesis, the new theory is embraced (often without any immediate concern for how the specific theory relates to a general theory or the whole) until a more reliable understanding can be procured through future developments. In this way, Western thinking is continually moving from an older understanding towards a newer, presumably more accurate understanding or knowledge of the world. In contrast, as explained to me by Blackfoot colleague, John Chief Calf (pers. comm. November 2018), the Blackfoot approach to a problem is holistic, cyclic, and relational. Relationships with nonhuman relatives of whom nature is comprised guide the discovery process rather than individual intellect or preconceived theories. Problems are observed from the wide-angle lens of Eagle as he soars above Earth. From this vantage point, the past, present, and future can be viewed at once and patterns emerge. In this paper I submit that Indigenous science is informed by relationships with Níksókowaawáïks (“all my relatives”) and the stories they give, and that a genuine and
non-hierarchical consideration of Western STEM subjects through the ontological and epistemological lenses of Indigenous peoples will produce new and important insights for describing complex systems and solving wicked problems.

**Methods**

For this study, I paired the collective method (Itsiipootsikimskai 2023 or Chapter 2) with coproduction (Meadow et al. 2015) in order to identify, define, and begin to solve a problem that Niitsitapi (Blackfoot) community partners cared about and wanted to work on together. The collective method is a research method that allows investigators to ground their work in the axiomatic foundational Indigenous understanding that everything in the world is alive and interrelated. The method not only allows for intuition and spiritual analysis of relational storied data but requires it. I engaged with this method of inquiry for discovery purposes but the method also proved to be the essence of Niitsitapi science, which we used to decolonize-Indigenize Western STEM subjects/disciplines and pedagogies (see Table in Chapter 2). I address this further in the results section of this chapter. From 2019-present I have spent 900+ hours learning from Niitsitapi Elders, scholars, and community members as I participated in a Master of Education program which was taught by Elders using Blackfoot methods and pedagogies, on the land, in the classroom, in ceremony, and many one-on-one conversations. During that time, I received permission to document some of their teachings and conversations with the intent that I should embody the knowledge and share it in a good way.

Coproduction allows researchers to begin research without specific questions or problems in mind (Armitage et al. 2011; Latulippe and Klenk 2020; Meadow et al. 2015).
The method is grounded in relationship building and listening. This method seeks to observe how community partners frame an issue and to understand the terms and knowledge systems they use to interpret an issue (Meadow et al. 2015). As a problem emerges, the researcher brings their skills and knowledge to the table and allows the community to guide the research and put those skills and knowledge to use in order to facilitate positive change together for the benefit of the host community and society as a whole (Latulippe and Klenk 2020). Latulippe and Klenk (2020) emphasize the importance of not only “making room” for Indigenous partners and their perspectives and practices, but also moving over. In some cases, knowledge is shared with a researcher by the community and other times knowledge is coproduced by generating new synthetic knowledge or braiding Western and Indigenous knowledges together (Armitage et al. 2011). Some issues that came up repeatedly in our conversations included: 1) the way IK or IWKB are not taken seriously by the sciences/scientists and are often confined to the humanities; 2) a lack of engagement by educators and scholars to understand the fundamental differences between Indigenous and Western ways of knowing and being; and 3) curricula and pedagogies lack Indigenous perspectives and methods, particularly in the sciences.

In order to address concern 2, I simultaneously conducted semi-structured interviews and conversations with over two hundred elementary, secondary, and post-secondary educators as we met in various professional development meetings, staff lunch rooms, classrooms, and social media chat groups regarding the decolonial Indigenization of curricula and pedagogy. As I became more knowledgeable about local Niitsitapi perspectives and pedagogies and with the encouragement of Blackfoot Elders and
mentors, I began to address concerns 1 and 3 by creating spaces for IWKB in my own practice which over time consisted of a grade five science and social studies class, a grade three class where I taught all subjects, and a community college introduction to Indigenous studies course. Following my ethnographic and participatory action research with these two study groups (i.e., the Niitsitapi community and the teaching community here in southern Alberta which lies in the heart of Niitsitapi traditional territory), I used my own teaching practice in the classroom, professional development presentations, and conference presentations to explore the application of IWKB to science curricula and pedagogy. In order to address Niitsitapi partners’ concerns as well as educator partners’ questions – How do I incorporate Indigenous culture into science? Is it even possible? – I developed a theoretical framework for decolonizing-Indigenizing standard curriculum and pedagogy in ways that permit and foster greater equity and inclusion of diverse ways of knowing and being across the curriculum. Phenomenological research of this sort is becoming an increasingly prominent part of the scholarly traditions of education and geography as phenomenological approaches tend to align with and make room for IWKB, allowing for greater complementarity when collaborating with Indigenous research partners and braiding Western and Indigenous research methods and knowledges. In education, “phenomenology has been used primarily as a methodological approach to illuminate lived experience... it has also occasionally provided possibilities for articulating theories of teaching and learning in close relation with concrete practice” (Brinkmann and Friesen 2018). For example, SoTL (the science of teaching and learning) research.
Many educators find it fairly easy to incorporate IWKB into social studies, language arts, music, art, and even fitness-wellness subjects but say it’s more challenging with STEM subjects. From a Western perspective, IWKB appear to have three epistemologically distinct or non-interrelated components: observation; stories from the Elders; and a spiritual or revelatory process of some kind. Many science scholars and educators then conclude that only observation can be considered valid because it is the only component that aligns with Western scientific methods. The other two components of Indigenous knowing are left to the humanities and social studies to consider. However, for Niitsitapi their words for knowing, like kakyosin, necessarily include all three of these elements and one doesn’t actually know something until they have been observant of their surroundings, learned the stories of the nonhuman relatives they are observing and aligned themselves in relationships that ultimately lead to “thinking like a tree” or a river or a rock and so on – knowing the vantage point and positionality of those relatives. For these reasons, we focussed on reimagining STEM subjects in our study but the reality is that IWKB are holistic. There are no distinctions between what Western education consider individual subjects or disciplines. As such, the methods for understanding any “subject” are the same: observation (listening and watching), relationship (being on and with the land experiencing the spiritual connection with “all my relatives” and caring for them as you would a small child), and renewal (prayer, ceremony).

Allen et al. (2018) acknowledge the importance of these emotional and holistic aspects of Indigenizing education:

Indigenization requires that equitable space for Indigenous knowledges and perspectives be held and explored in the classroom. Many institutions have defined Indigenization on the basis of current, authentic relationships, and there are nuances and different approaches to Indigenization. What a teacher needs to be mindful of is that Indigenizing
one’s practice is an emotional journey as well as an intellectual examination of how systems of knowledge can complement and coexist in any field of study.

The declaration by the UNESCO and ICSU World Conference on Science (2000) maintains the importance of learning from Indigenous knowledge systems for the mutual benefit of Western and Indigenous peoples. In *The Metaphysics of Modern Existence* Deloria (1977, viii) explains why Indigenizing the sciences is so critical for Indigenous learners, saying “No matter how well educated an Indian may become, he or she always suspects that Western culture is not an adequate [complete] representation of reality. Life therefore becomes a schizophrenic balancing act wherein one holds that the creation, migration and ceremonial stories of the tribe are true and that the Western European view of the world is also true.” The theoretical framework we developed accommodates this problem by making epistemological space for students to make their own relational meanings while learning and applying Western science, technology, engineering, and mathematics.

I also employed library (including educational and historical) research to further contextualize, respond to, and corroborate the ethnographic or story data shared by Blackfoot and educator partners and to inform the coproduction of the theoretical framework, pedagogy, and examples we developed.

**Results**

“Some other tribes [and non-Indigenous people] think of ‘supernatural’ beings but not the Blackfoot. Everything is reality, it’s science, it’s objective, we see the world as it is. Our ways are based in science, not just faith. The Societies guard this science. There is science behind the supernatural.”

Blackfoot Elder, Aahsaopi (State of Being)/Laverne First Rider (April 4, 2021)
Decolonial theoretical framework

Kainai Elder, Ninna Piiksii (Chief Bird)/Mike Bruised Head (October 12, 2019, 2022) taught me that all teaching begins with creation stories, pitsistoyi (from the outset).\textsuperscript{30} When teaching about Niitsitapi culture or any other topic, including STEM, every teaching is grounded in foundational stories. He also instructed that in Niitsitapi pedagogy one should then situate themselves within those stories by sharing their own story niinohkanistssksinipi (this is the way I know it [the world or reality] to be; speaking personally).\textsuperscript{31} This became a guiding principle for developing a decolonial theoretical framework and pedagogy.

Because Indigenous worldviews are holistic and grounded in interpersonal relationship with nature, the framework I developed is cross-curricular/interdisciplinary and each worldview (Western and non-Western) is presented non-hierarchically (i.e., not arranged according to level of importance, on an equal footing). This framework, as exemplified by the notion of a concept wall in the following figures, is a result of the research I conducted among Niitsitapi and educator communities. It addresses their concerns and questions in regards to the decolonial Indigenization of STEM education as well as the federal and provincial mandates requiring educators to incorporate FNMI foundational knowledge into the curriculum and the appeal of the UNESCO and ICSU World Conference on Science to establish closer links between Western science and other knowledge systems. I started with an overarching question that honors the way Niitsitapi Elders talk about all knowledge deriving from relationship with land, “How might

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\textsuperscript{30} As given to Atwood by Blood Tribe Chief, Makiinima (Curlew) Roy Fox, January 27, 2023 while Fox was sharing the story of his name.

\textsuperscript{31} As defined in Bastien (2004, 211)
diverse world perspectives help us describe and solve complex social, economic, and environmental problems?” and the concepts of “perspective” and “worldview”.

Perspective is also a grade three science and art concept so it allowed me to present that concept in more holistic and connected ways. Conceptual learning is effective because it allows students to create a big “file folder” in their minds in which they can store related facts rather than creating new “folders” for each isolated fact they learn. Once students understand a concept, knowledge transfer becomes easier and they can creatively use old knowledge to solve new problems as they make connections and see relationships between concepts.

Figure 1. Overarching question and concepts from my grade three concept wall.

I then extracted all the main concepts from the grade three curriculum and put them down the Y axis and put the worldviews we would be studying throughout the year across the X axis and designed the wall-sized graph. I then began with Blackfoot origin stories and perspectives to present an alternate worldview by which to compare Western knowledge. In this way, Western knowledge becomes one way of knowing, rather than the primary,
only, or most valid way. Things like “rocks” show up in multiple concepts from origin stories to wayfinding to structures.

Figures 2-3. Partially filled in concept wall as the year progressed.
Here is an example of one grade three objective “time” and how rich that concept becomes when considered across cultures. For example, some Blackfoot medicine wheels, such as the one in Big Horn Montana are known to accurately align with the annual heliacal rising of celestial beings like Sirius, Aldebaran, and Rigel when they first become visible on the eastern horizon. I also talk about how each group celebrates New Year at a different time as each culture has reasons for when the new year begins.

Similarly, wayfinding gets complicated as students compare and contrast Western curriculum objectives on map reading and cardinal directions with Indigenous peoples’ notions about the four directions and how, many IWKB privilege East rather than North as the primary coordinate. Boroditsky’s (2017) research on how language shapes the way we think allows for conversation about how knowledge is embedded in and shaped by languages. She describes how the Kuuk Thaayorre people of Pormpuraaw, on the west edge of York, Australia use cardinal directions for everything except wayfinding, as they are continuously aware of their spatial location and direction. For example, if you wanted to tell someone they had an ant on their left leg you would say, “You have an ant on your southwest leg”. To say hello, you would say, “Which way are you going?” to which one would report their heading replying, “North-northeast and the far distance.” Perhaps most interesting for the comparison purposes of my class, for the Kuuk Thaayorre, time doesn’t get locked onto the body, it gets locked onto the landscape. For example, when given a series of pictures of the same person as a baby, child, teen, adult, and elderly person, they didn’t arrange the pictures from left to right the way Westerners typically do unless they were facing south. However when they were facing north, they organized the pictures from right to left. When they were sat facing west, the pictures were lined up
moving away from the body and when facing east they arranged the pictures coming
towards the body. These are just a few examples of how a worldview approach can enrich
and decolonize STEM concepts.

Figures 4-5. Concept of time as viewed by Niitsitapi vis-a-vis Westerners.

Considering Ninna Piiksii’s teachings that all learning and knowledge production
begins with creation stories, I put that concept first which allows students to compare and
contrast the origin stories of various Indigenous peoples with the “creation stories” of
Western science e.g., rock and water cycles, big bang, and the evolution of species. Origin stories help students imagine the world through the eyes of other peoples. For example, Ukrainian pysanka eggs depict ancient origin stories which describe the cosmos. Hindu traditions speak of everything coming into existence by thought and sound vibrations (students often make connections with the physics unit on sound energy as they reason through the possible compatibility of the two accounts of sound vibrations). Niitsitapi origin stories necessarily begin with Ihitsipaitapiiy’pa (The Essence or Source of Life). Bastien (2004, 200) explains how this knowledge relates to what Western science calls natural laws,

Ihistsipaitapiiy’pa — Sacred power, spirit or force that links concepts; life force; term used when addressing the sacred power and the cosmic universe; Source of Life; sun as manifestation of the Source of Life; great mystery; together with Niitpaitapiiyssin identifies the meaning and purpose of life. Ihitsipaitapiiy’pa is that which causes or allows us to live. The term “natural law” does not have a direct Siksikatsitapiwahsin equivalent; however, it is through Ihitsipaitapiiyopa that all “natural laws” are governed. It is Ihitsipaitapiiyopaa that orchestrates the universe. Its laws govern the universe and including human life.

By leading with Niitsitapi (or Kainai, one of the four tribes of the Blackfoot Confederacy) worldview, all students understand that one way the world exists is that everything in nature is alive and interrelated to each other and humans in non-hierarchical ways. Then as we move into learning the Western STEM content for the rest of the year, students can think about how Western science, technology, engineering, and math might be informed by comprehensive relational animacy and students can make their own meaning of how the world exists. I have also done this in the reverse, weaving in the sciences while teaching college-level Indigenous studies courses to Euro-settler,
Indigenous, and international students who are earning degrees in nursing, education, criminal justice, agriculture, social work, and environmental science. One Blackfoot student from the course provided me with this feedback which seems to indicate the effectiveness of the framework and pedagogy, “You’re the perfect person to teach this course because you understand my people and you understand your people and you know how to make your people understand my people.” A local colonial-settler student who had attended schools where many Blackfoot students attended, reflected about how this course was different,

As we discuss the effects of Western colonization, I reflect on my Indigenous classmates over the years [and how it must have felt for them to live in two worlds]. Knowing more truth of [their ways of knowing and being] brings it close to home knowing how this must be affecting people close to me... I have noticed a change in the Indigenous students in our class. They seem more willing to speak up and tell us their [perspectives], a noticeable difference from other past classes, giving the rest of us a more in-depth understanding [of their knowledge]. Hearing first-hand accounts from the students around me and the emotional response they have makes you flip the script and look at Western colonization [and worldview] as nothing short of domineering and incomplete.

Each of the following STEM subheadings in this section include some story data from the Elders that illustrate Niitsitapi perspectives on science, technology, and math respectively, historical data representing overlapping perspectives of various Western scientists, and vignettes of my experiences applying the decolonial framework in my own teaching practice.

**Relational Science**

While teaching the chemical formula for water (H₂O) to a grade five class, one Blackfoot student exclaimed,
Oh, I get it now, hydrogen and oxygen are our relatives and they must have made an alliance so we can have water, it’s hard to break the hydrogen and oxygen apart now because the relatives honor their alliances. They don’t break their promises, it’s their responsibility to be water. They agreed to do that for all the other relatives who need water to live and grow.

The only thing I had done to Indigenize that particular course was to discuss on the first day of class that for many Indigenous peoples, nature is alive and interrelated. This simple opening gave Blackfoot students permission to think like a water molecule and make meaning of Western knowledge in a way that was consistent with their own ways of knowing. Interestingly, Henry Eyring a renowned physical chemist, “often talked about ‘living’ among molecules… getting acquainted with the molecules as if they were your friends and knowing what their nature is and what they will do… [stating that] Unless [a chemist] just gets lost in his work and feels that knowing molecules is like knowing people, he probably won’t get far” (Eyring 2008, 193-195). This method of imagining oneself, or as the Elders would say, aligning oneself with atomic particles is similar to Albert Einstein’s imagining/aligning himself with a beam of light (i.e., discerning the vantage point of atomic particles or light and thereby knowing their stories). Einstein credits this activity and other “thought experiments” as he liked to call them, for lending critical insights to the development of his revolutionary theories of special and general relativity.

The following statement by Tewa scholar Gregory Cajete’s (1994, 102) suggests that scientists may have these experiences because all the relatives “are alive; and you must give them good talk”, implying that if we acknowledge, respect and align ourselves with them, the relatives will gift us their knowledge – their stories. Theoretical quantum physicist Jim Wheeler shared this with me, “Space, unlike time, requires the existence of
a multiplicity of conscious beings that trust one another” (Personal communication with quantum physicist Jim Wheeler 2010). And while he was merely sharing his scientific research on space-time, his conclusions complement Indigenous understandings of relationality.

When I teach the water cycle, I teach the Western science content but then to encourage a relational understanding of water’s story and knowledge, I have students depict the water cycle in a story, tracking a particular entity of water throughout the cycle. I have had one student tell the story starting from dinosaur pee, another imagining they were a cloud, aligning themselves to describe those final moments when they could no longer hold the moisture before letting it fall onto a mountain where a tired and sweaty hiker took his hat off and lifted his head to feel the rain on his face, and so on. Perhaps the most poignant and yet therapeutic example was a young Blackfoot student who, in one year, had lost each of her parents, then a beloved aunt and finally her grandmother who was her legal guardian. The circumstances surrounding each loss and the resulting trauma had really impacted her. She chose to write about the tear that welled up in her eye until it spilled over her eyelashes onto her cheek the moment they lowered the lid of her mother’s casket. She proceeded to depict a journey for that tear drop that was at times exciting and joyful and other times scary and dark until it finally evaporated into the sky one hot summer day and the tear was happy to be closer to heaven for a while. Each of these students developed a relationship with water and water’s story that day which deepened their scientific understanding of the water cycle. Some of these students have since found me and said they can never forget the water cycle after that.

Relational Technology
Little Bear (2015) makes an observation regarding the history and evolution of modern science and the way science used to be principally about “delv[ing] into the unknown… stretching out there a bit, extending knowledge” whereas science today is now defined and driven primarily by technology and what science can do. This shift away from science’s “stronghold as the knowing enterprise that explains how the natural world works” (Dear 2006) is something I would like to research further and incorporate into a philosophy of decolonial Indigenized STEM education as the shift in what science is and does has further alienated Native sciences. Because most Indigenous peoples consider things like water, fire, and rocks etc. to be alive and relatives, through alignment, one can be in relationship with fire and come to think and act like fire. The Karuk tribe whose territory in what is now the State of Oregon have taken Fire’s story and use it to create a landscape that ensures they have enough food and promotes their culture, health, and sovereignty while maintaining the spiritual and ecological balance of their homeland (Reed and Norgaard 2021). When Blackfoot people harvest a buffalo, it is not just for food. Traditionally they used every part of the buffalo out of respect for this relative who gave his life for their survival. Through relationship with buffalo, aligning themselves with this relative and learning his stories, they were able to use this knowledge to develop many technologies. Today, the process is the same. One buffalo will step forward and offer itself (I personally witnessed this happen), the animal is taken with only one bullet. The animal is harvested on site within three hours to ensure the meat is good and the intestines are usable. Even today, every part of the buffalo is “vowed” for. Nothing is
wasted. This may be a feature of relational technology that could inform Western technology, nothing is discarded or seen as not having value or purpose.

This often leads to a discussion about ethics and how different worldviews inform our ideas about technology, natural resources, and subsequently the ways we use them. In another example, Ninna Piiksii (November 22, 2021) shared how once the Blackfoot were confined to reservations, they were given equipment and encouraged to be farmers: “Agriculture began the separation, changed the relationship with nature... the old people didn’t want to touch that, ‘We cannot cut the land, this is not right. Something’s gonna come back on us, something’s gonna disrupt the animals who live there and the chemicals, it’s not good.’ These are things we shouldn’t mess with.”

Relational Engineering
When teaching about bridges in grade three, I encourage my students to think like a river. I also combine the bridge unit with animal adaptations. We explore how various adaptations make animals well suited to their environments. We talk about what to consider in order to make a built structure suitable to its environment and consider examples and non-examples. We talk about Blackfoot understanding and experiences of relationship and alignment and how it helps them to think like an animal or a tree or a mountain etc. Some students have asked, “Do Blackfoot people know how to think like a bridge? Maybe they could help me design my bridge.” Some of their creative solutions to the final project of building the strongest or tallest or longest bridge they can out of simple materials are pretty imaginative. In the oral presentation they often say things like, “If I could learn from spiders how they make their silk, I would use that for the cables on my bridge then it wouldn’t matter how hard the wind blows, the bridge would just swing without breaking. I’ve seen that with spiderwebs, the wind blows hard but they don’t break.” We discuss how some scientists and engineers call this method of designing structures patterned after nature, “biomimicry”. We talk about Kakyosin which is not only the Blackfoot word for knowledge and knowing but also, observing one’s surroundings and aligning oneself with all the relatives. Bastien elaborates on this type of biomimicry that is based in observation like engineers do, but also relationship,

The English terms ‘to align’ and ‘to balance’ refer to the Siksikaitstapitsi [Blackfoot] understanding that there is an order of things or pattern that we can discern if we are observant (Kakyosin). We can see this in animal behaviour, weather cycles, etc. Through Kakyosin we align ourselves with these patterns and are thus capable of achieving the same things the observed beings can. To give an exaggerated illustration: If we behave like a cat, think like a cat, etc., we eventually become cats. This is the idea behind alignment, alliances, and Kakyosin. We are adopting the order of things observed to such an extent that we may even become it... Kakyosin isstaokakitsotsip [means] “Observation gives us intelligence knowledge and wisdom” (Bastien 2004, 205-206)
Then I show them examples of biomimicry that have been successful and others that have failed because their observations of animals weren’t accurate and from a Blackfoot perspective, they weren’t aligned enough to understand the story the relatives were giving them. A local non-Indigenous construction engineer Pierre Bolduc unsuccessfully tried to build a dam on his property a few years ago. Then, he thought back to his youth trapping beaver with his father and wondered if beavers might be able to help him. After observing some beavers and bringing to his property what seemed to be a family of five, he let them go to work. He had observed how beavers seemed to instinctively go to work building when they hear running water so he played music of running water near the spot where he hoped they would build. He cut down trees and branches and put them in proximity of the spot where he wanted a dam and the beavers did the rest. Bolduc humbly concluded, “It turns out we were the wrong kind of engineers to tackle this” (May 2022).

In terms of relational science and its applications to engineering, the Blackfoot tipi is something we study in my classes. These tipis have a four-pole construction compared to the three-pole construction of most other Plains Tribes. This further stabilizes it to withstand the heavy gales of the local west winds. Recently there was a tipi that stayed standing while the Bow River flooded its banks leaving a waterline half way up the tipi covering. These tipis are often painted and considered to have a life of their own. “Blackfoot ways are embodied in Tipi... the whole universe is right there” (Ninna Piiksii/Bruised Head and Murray as quoted in Itsiipootsikiskai 2023 or Chapter 2). The whole universe from the sky beings to the earth beings and the occupant’s power is represented by a spirit animal who has given them access to their powers to help them in their lives (Glenbow 2013). There are transfer songs and ceremonies specifically
associated with that design. There are protocols for setting them up and for being inside of them. It is considered disrespectful to even step over the lodge poles, one should go around them. There are protocols for harvesting the materials to construct the tipi such as the poles and pegs. There are stories that go way back regarding which types of wood, and the construction of the dwelling is a kind of ceremony itself. There are ceremonies too which involve blessing these relatives, talking to them like in the case of the Ookan being constructed during Akoka’tssin (the big camp or Sundance) “We’re gonna take you and use you for the center pole” (Ninna Piiksii/ Bruised Head December 28, 2020). Tipis and other Blackfoot structures illustrate how, for many Indigenous peoples, a structure is not simply a structure but involves relationship and reciprocity.

**Relational Math**

Blackfoot scholar, Dr. Leroy Little Bear (pers. comm. October 11, 2019) shared with me his perspectives about math and measurement, concluding Western science relies on math to quantify the natural world and the cosmos so because Indigenous people are not thought to be mathematical, Western-oriented people think Indigenous people are not scientific. He said that from a Western perspective that may be true but, “When you have a very different type of science that is not based on quantification but is based on relationships, do you need all that math?” He argues that “Math arises out of a need,” out of lack or loss of relationship with natural and cosmic beings – all my relatives (Little Bear 2011, 2015, 2019). Number is only one kind of being with whom Indigenous people have relationships, and as such for Niitsitapi, math is only one part of their science rather than the foundation of all STEM knowledge and proofs as it is in the West.
Ihtsipaitipiyo’pa lives in every form of creation – including numbers, as all life forms contribute and participate in giving life and knowledge. Bastien (2004) confirms Little Bear’s views that knowing is relational explaining that “knowing is dependent upon relationships, which create and generate knowledge.” This is fascinating and powerful; the idea of knowledge not just existing waiting to be discovered but rather knowledge being created and generated in an ongoing way as a result of participation and relationship with all our relatives; expanding like the universe itself. In his autobiography *The Meaning and Limits of Exact Science*, nineteenth century physicist Max Planck makes a connection between relationship and measurement stating, “An experiment is a question which science poses to Nature, and a measurement is the recording of Nature’s answer” (Planck 1949, 110). Bastien continues, describing the role of dreams and lived experience as a means for knowledge to be revealed, once again tying knowing with being and doing and the inseparability of knowing and observations, stories, and spiritual revelation:

All our life experiences are a source of knowledge. As an example, dreams are a primary source of knowledge... Often dreams are prophetic, contain warnings, or reveal knowledge. Such dreams are passed on through the oral traditions among the people and are repeatedly found in stories and ceremonies... Dreams like this provide guidance and protection. The individual is shown gifts that can be pursued. If they are accepted, then the individual will be protected. More importantly, dreams reveal knowledge that guides us in our personal responsibilities (Kiitomohpiipotokoi) in life. (Bastien 2004)

In *The Spiritual Imperative of Native Epistemology: Restoring Harmony and Balance to Education*, Hawaiian scholar, Peter Hanohano (1999) submits that without acknowledging and engaging spirit, there can be no meaningful Indigenization of education explaining, “Calls for reforming our educational systems to better meet the needs of Native students always include Native culture and language. And the most
distinguishing feature of Native culture and language is its spirituality. However, this is the one aspect of Native culture that is often missing, neglected, or dismissed in western educational models.”

Reflecting on Niitsitapi numeracy, Little Bear (2019) asks the question, “What is the deep meaning of 7? Is 7 a name for anything? In Native counting systems the numbers are actually names for things. They are named numerals.” He explains that Blackfoot and other Native languages are verb-rich, “action is embedded in nouns” The action of counting fingers and toes gives them a base-ten system, the name/story for Six translates as “cross over to the other hand”, Nine’s name/story is subtractive “one before the end of the hands.” Nii means one (whole), 1, or only; niit means real; niitsii means truth; niitaapi means the way it is, it is real, or it is true. Four represents balance and wholeness but one is wholeness, truth, reality and this is reflected in the way all other numbers to infinity are always in relation to 1 or oneness. He differentiates modern math as a subject and tool from the essence of math saying, “The cosmos is mathematical, if we are talking about mathematics as beauty, simplicity, unity.” Citing Michael P. Closs’ *Native American Mathematics*, Little Bear shares the story of the conflicting perspectives surrounding the James Bay hydro-electric project where an Elder was asked to tell how many rivers there were in the area and he couldn’t. The scientist thought he had made his point but it turns out the Elder had a relationship with each river, knew them intimately by name and character, he therefore did not need to count them. Little Bear summarizes, “assembly lines demand counting, relationships don’t” maintaining that Blackfoot reasons for math are relational not mechanical. Little Bear submits that even the Greeks
had the Golden Ratio which suggests their math began as Greeks noticing relationships in nature. Little Bear (2015) then postulates that “what is possible in Blackfoot may not be possible in English” implying that without the Blackfoot language, numbers lose their meaning/stories and become little more than symbols of specific quantities as math gets superimposed on nature rather than math being inherent to nature.

Werner Heisenberg, father of quantum mechanics, in a correspondence with Albert Einstein, expressed how shocked, frightened, and unprepared he was to discover the wholeness and relationship which nature presented to them:

If nature leads us to mathematical forms of great simplicity and beauty—by forms, I am referring to coherent systems of hypotheses, axioms, etc.—to forms that no one has previously encountered, we cannot help thinking that they are “true,” that they reveal a genuine feature of nature…. You must have felt this too: the almost frightening simplicity and wholeness of the relationships which nature suddenly spreads out before us and for which none of us was in the least prepared. (Heisenberg 1990, 65, my emphasis)

In my classroom, I found that students were generally more engaged and successful with applied and conceptual math than with facts and formulas. When they could experience numbers not only as abstract equations, measurements, and quantities but names that describe relationships in nature, and when there were practical real life applications for doing math.

Discussion

“All group that wishes to be regarded as the authority in a human society must not simply banish or discredit the views of their rivals, they must become the sole source of truth for that society and defend their status and the power to interpret against all comers by providing the ‘best’

32 The golden ratio, also referred to as the divine proportion, is a special attribute denoted by the Greek symbol ϕ. It is approximately equal to 1.618 and appears often in nature, mathematics, geometry, art, architecture. For instance, the Parthenon and the Great Pyramid of Egypt.
The UNESCO and ICSU World Conference on Science’s (2000) claim that “Modern science does not constitute the only form of knowledge” may seem innocuous enough, yet the greatest opposition to fundamentally decolonizing-Indigenizing or transforming STEM curriculum and pedagogy is the concern that acknowledging the spiritual processes and spiritual realities which are indispensable to IWKB, will compromise the “purity” of Western science which has been achieved by approaching nature as objectively as possible. Consequently, overcoming entrenched stigmas that IWKB are unreliable become an obstacle. Another obstacle can be gaining access to Indigenous Elders and knowledge keepers, or even vetted cultural resources needed to meaningfully and respectfully Indigenize STEM instruction. There is also the question of time constraints that limit adding new content to already distended curricular outcomes for each grade. Deloria (1977) asserts that the “fundamental factor that keeps Indians and non-Indians from communicating is that they are speaking about two entirely different perceptions of the world” (ibid. vii). Little Bear (2000) refers to this ontological-epistemological impasse as “jagged worldviews colliding”. The results of this study – the theoretical framework and concrete examples from my lived experience in the classroom – suggest that these very different worldviews can align in complementary ways that establish closer links between these and other “forms, systems and approaches to knowledge, for the mutual enrichment and benefit” of all learners (UNESCO and ICSU World Conference on Science 2000).

With the relatively new mandates and directives such as those found in the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) in 2007, Canada’s
Truth and Reconciliation Commission (TRC) Calls to Action (2012), and the subsequent Alberta Teacher Quality Standard 5 (TQS 5) enacted by Ministerial Order (2020) in response to those calls to action, K-12 and post-secondary educators are looking for ways forward to transform Western education. This study presents one way. One Elder recently said to me, “You suspended your Western thought to learn our ways. Now you know your way and our way. What you’re doing now is creating a third way” (Ninna Piiksii/Bruised Head 2021). Without overgeneralizing this third way, there are some key steps I will highlight. Too often educators try to supplement or append the curriculum with Indigenous worldview “content”. This leads to the “jagged” results Little Bear (2000) talks about. In order to align Western and Indigenous worldviews in more complementary (combine in such a way as to enhance or emphasize the qualities of each other) ways, my research suggests starting where Indigenous people start: relationship and alignment with each other and all the relatives.

Relationship is always the first step. Blackfoot scholar Tsuaki Marule (2012) confirms, “For education to be meaningful, students and educators must form substantial relationships with one another as well as with the knowledge being transferred.” Building a sense of community among students is key but also encouraging personal connection and reflection with the subject matter or knowledge itself is indispensable.

Next, search out the concepts embedded in the objectives of a subject area in the curriculum. Imagine these concepts as being universal rather than focussing only on the Western connotations and contexts associated with the specific objectives. Then teach those concepts from the perspective of at least two worldviews, Western and whichever Indigenous territory in which one is teaching. Even if the Indigenous population no
longer occupies that territory, one should find out whose land they are on. The Alberta grade 3 curriculum includes multiple worldviews so I included them also. Likewise, when I have students who have immigrated from somewhere or international students, I include their worldviews as well to create space for them to make meaning of the subject that is consistent with their own ways of knowing and to further enlarge understanding of other knowledge systems. Think of an over-arching conceptual question that encompasses all of the concepts in the curricular objectives, or borrow my question. This helps to overcome the way curricular objectives are often linear or organized in silos.

Adding the word relational to each subject (e.g., relational science) signals and reminds students to consider their relationship with the knowledge and the relatives who gift their knowledges. Finally, whenever possible one should seek out Elders who can come into the classroom or at least share with the educator about their culture-specific understanding of comprehensive relational animacy and the protocols for initiating and renewing relationships with all the relatives. Indigenous learning is land-based, language-based, and culture-based so relationships with Elders and community members is important. However, the framework I developed can still be effectively adopted by simply creating space for things in nature to be alive and interrelated. This is enough to get started. I recently co-presented with Blackfoot knowledge keeper and environmental scientist Lowell Yellow Horn at a divisional professional development session where thirty high school science teachers attended. Many saw the value in simply explaining to their students that for Blackfoot and many other Indigenous peoples, everything is alive and interrelated to each other and humans in non-hierarchical ways. They welcomed the idea of encouraging their students, while learning about physics, biology or chemistry to
imagine what it might be like to be a beam of light or a beaver or a water molecule, and to try to predict their behavior and understand why they behave the way they do through the Indigenous practice of aligning oneself with nature. This is the method in its essence, although it will and should vary from context to context.

**Conclusion**

Establishing closer links between IWKB and Western science requires teaching Niitsitapi and other non-Western stories beyond the humanities classroom; better engaging etiological, ontological, epistemological, axiological, and practical traditions of Niitsitapi and other non-Western peoples; and operationalizing pedagogical and methodological models that acknowledge, respect, and embody non-Western ways of knowing and being. This study presents a theoretical framework for STEM educators who don’t typically engage with IWKB to weave relational ways of knowing into STEM concepts in the course objectives. It demonstrates through concrete examples actionable steps to begin engaging with non-Western knowledge systems in science, technology, engineering, and math.

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References


Conclusion

My research sought to better engage with Indigenous ways of knowing and being (IWKB). Specifically, I collaborated with Blackfoot Elders (and Hawaiian Kupuna) to better understand 1) their perspectives towards land, 2) what factors instigate and perpetuate these perspectives, 3) how these perspectives play out in terms of identity; wellbeing; daily life; education; environmental concern, behavior, and stewardship, and 4) ways that these perspectives towards land can inform and transform Western perspectives on land and perhaps lead to better and more equitable social-ecological outcomes. I approached this from three angles. First, I described a method for braiding Indigenous and Western scientific approaches to broaden the ways we might think about the human-environment relationship. Then I explored how IWKB (Blackfoot and Native Hawaiian) regarding nature are disrupted by recreation use, to the detriment of both Indigenous experience of their native lands and of the land itself. Finally, I described how K-12 STEM educators may be able to effectively accommodate both Western and IWKB in their teaching and how this broader perspective could lead non-Indigenous persons to treat the land differently as well as create greater continuity for Indigenous learners.

When I approached Blackfoot (and other Indigenous) Elders for knowledge, their first instruction was always, “Listen, watch, and humble yourself before the source of life.” Affective listening is valued in Indigenous cultures. Often in Western culture we are preparing our response as we are listening, whereas in Indigenous culture it’s expected to listen to someone’s full story before considering how and if to respond. This took some practice but as I listened and watched, and was open-minded, I began to get answers to some of the guiding questions for my research. The first data chapter
Niksókowaawák as axiom: The indispensability of comprehensive relational animacy in Blackfoot ways of knowing, being, and doing is in response to my first two questions – What are Niitsitapi perspectives toward land? and What factors instigate and perpetuate these perspectives?. As I listened and watched, and participated in Blackfoot ways of knowing and being, it became clear that from a Blackfoot perspective everything is alive, imbued with Spirit, agentive, and interrelated in non-hierarchical ways. This meant that for Blackfoot people land isn’t just rocks, water, soil, microbes, plants, and animals, it’s a network of family relations. When they talked about stewardship, they often spoke of land being the oldest of the relatives which meant she had the most stories and knowledge but also, their responsibility to care for land as one would care for their own child. These perspectives are rooted in and perpetuated by their language, protocols, ceremonies, songs, and stories which serve to initiate and renew their relationships and alliances with niksókowaawák (all my relatives) in their territory and the cosmos including ancestors who are ever-present in their language (e.g., “Niitsi’powahsinni” meaning, the words that carry the breath of the ancestors). This seemed to corroborate with Sarfo-Adu’s (2022) conclusions regarding the significantly greater biodiversity found in culturally important “sacred groves” maintained by tribes Native to Ghana. Blackfoot people not only understand and believe the world to be comprised of nonhuman beings who are interrelated to one another and humans but they experience it to be so. This lived experience is considered the most reliable way of knowing.

The second data chapter *The 5Ds of wRECK: A relational approach to sustainability and recreational use of National Parks that occupy Blackfoot and Hawaiian unceded lands* is in response to these parts of my third research question –
How do these perspectives play out in terms of identity; wellbeing; environmental concern, behavior, and stewardship? Because Blackfoot, Hawaiian, and other Indigenous peoples consider the world to be comprised of living beings to whom they are related through ancient alliances, their understandings and practices of stewardship look different than Western conceptions of stewardship and land management. This chapter highlights how these mostly opposing perspectives towards land lead to environmental conflict and possible cultural and environmental harm.

The third data chapter *Complementary worldviews aligning: A relational approach to STEM education* is in response to the remaining parts of my third research question – How do these perspectives play out in terms of identity; wellbeing; education (e.g., knowledge production and pedagogy)? As with the previous chapter, all aspects of identity, life, and learning become grounded in ‘ecology’ writ large, that is, relationship with all the agentive beings that make up the world and cosmos. For Blackfoot and many other Indigenous peoples, every Western discipline becomes grounded in relationship and renewal of alliances with the human and nonhuman relatives in one’s environment. Learning and knowing require relationship and alignment with all the relatives.

Altogether, these chapters triangulate how integral Blackfoot and other Indigenous peoples’ perspectives on land are to every aspect of their lives. Each of these chapters also begin to address the fourth research question -- How might the coproduction process disrupt and inform Western methods and pedagogies and lead to better and more equitable social-ecological outcomes? By recognizing Elders as experts and acknowledging IWKB as valid, coproduction processes allowed me to engage with Indigenous communities in respectful and productive ways. Western natural
philosophies, methods, and ways of knowing are only one way of knowing about the world (UNESCO and ICSU World Conference on Science 2000), coproduction provided a vehicle whereby I was able to understand Blackfoot and other Indigenous knowledge systems and practices and together with these community partners develop closer links between their ways and Western ways, and in the words of one Blackfoot Elder, create a third way that honors IWKB and informs Western ways of knowing and being, a way that potentially leads to better and more equitable social-ecological outcomes, including biodiversity and the unifying experience Allen (2018) calls “awe”. As many Indigenous people throughout this research have shared, when recreationists and settlers understand and respect the spiritual value that these places hold for Indigenous people, they have been more readily welcomed to visit or stay. Therefore, if Indigenous ways of knowing and being are truly integrated into curricula from kindergarten to college by applying relational approaches to STEM and other subjects and disciplines, then over time those lessons should become ingrained in visitors and settlers as they recreate and otherwise occupy Indigenous territories.

Next steps for this research might include scholars from other territories replicating this research but through the lenses of their Indigenous partners. While this research illuminates Indigenous perspectives and practices in relation to land and how these attitudes and behaviours may contribute to greater biodiversity on Indigenous stewarded lands, other scholars may be able to connect how this work relates specifically to the findings of biodiversity research. For example, Do the Indigenous perspectives of animacy and relationship, and the different understanding of one’s environment that results, lead to management approaches that provide greater protection of biological
diversity? As for myself, I plan to find ways to make the findings of these chapters more accessible and actionable for scholars, educators, and National Park and Protected Area land managers. Having embodied some of the knowledge shared with me by the Elders, I will continue to look for appropriate ways to disseminate these teachings as I have been instructed to do and have a responsibility to do. “What you’re hearing, share it. Don’t be hesitant to share it, I’m giving it to you. It needs to be shared” (Ninna Piiksii/Bruised Head November 22, 2021).
References


CURRICULUM VITAE
Sandra Bartlett Atwood

CAREER OBJECTIVE:

To maintain my position at Lethbridge College as a full-time continuing instructor of Indigenous Studies until I complete my mandatory probationary period in May 2024. I seek opportunities to apply my research to real life social-ecological problems in Southern Alberta which will require continued relationship building within the local Blackfoot community, leadership, and communication skills. Special areas of interest: applications for relational animacy in the education, health, environment, and energy sectors.

EDUCATION:

BA in French Major, History Minor, Utah State University, Logan, Utah. (6/96) GPA: 3.39 (4.0=A) Emphasis in French Literature, History, and Secondary Education.

EXPERIENCE:

INSTRUCTOR INDIGENOUS STUDIES, College of Business, Arts, and Sciences, Lethbridge College, Lethbridge, AB (8/2023-Present).