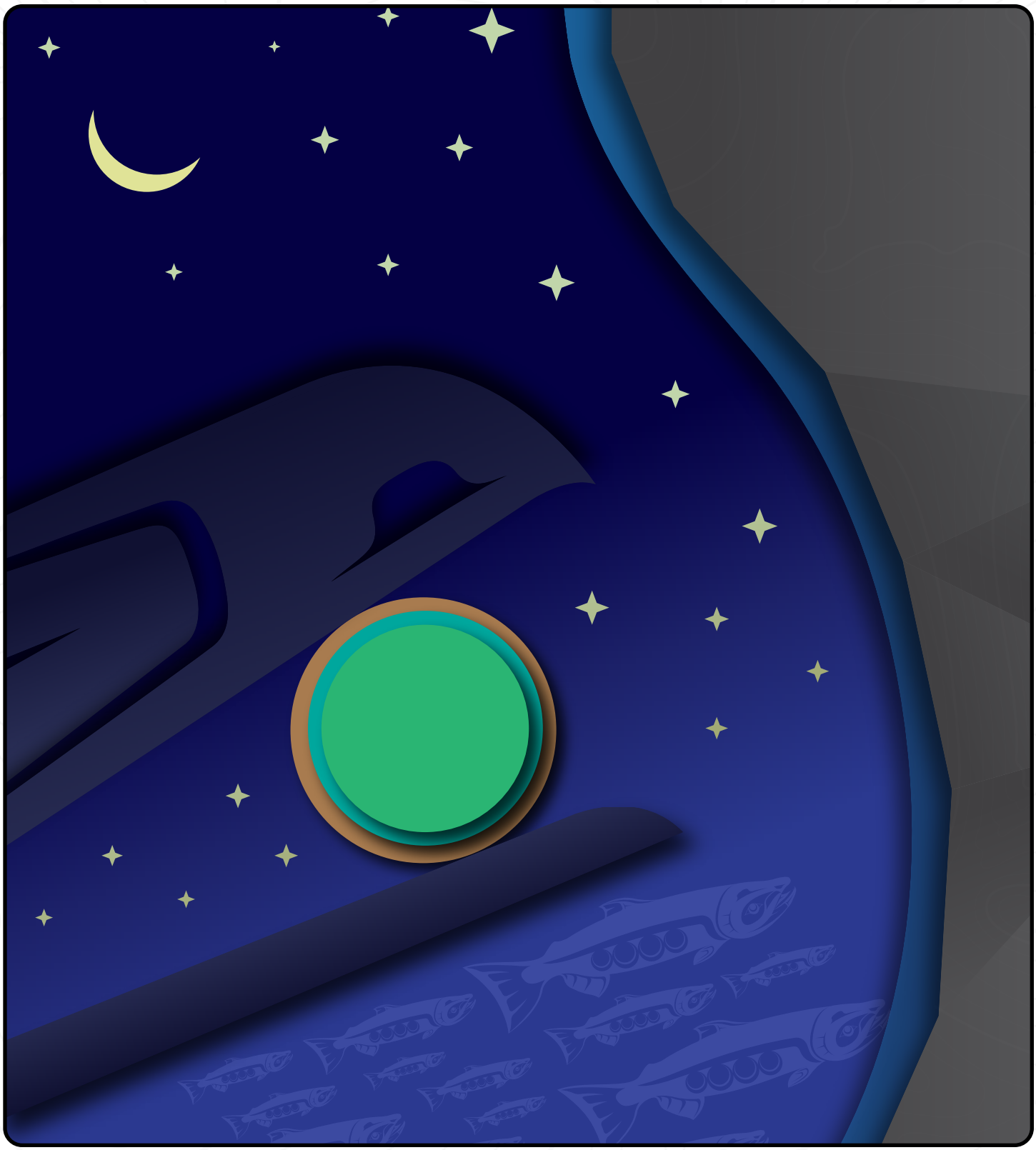
# FROM RISK TO RESILIENCE:

## Indigenous Alternatives to Climate Risk Assessment in Canada

by *Janna Wale* and *Brett Huson*



SEPTEMBER 2024 • A YELLOWHEAD SPECIAL REPORT

Yellowhead Institute

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**ACKNOWLEDGEMENTS**

Janna would like to acknowledge her friends and family who support her, as well as those who came before and those who come after.

Brett would like to thank his wife Jerilyn and children Warren and Ruby for being patient with him as he works day and night, often not leaving much time for them. He would also like to thank his teachers, mentors and colleagues who continue to support his endeavours and success.

**ABSTRACT**

Canada's current provincial and national risk assessment frameworks focus predominantly on the built environment and infrastructure, neglecting the more extensive social-ecological system. This narrow focus fails to capture the full extent of climate risks or contexts, particularly those affecting Indigenous communities, and excludes the social and political structures that compound risk within Indigenous communities.

While Canada is grappling with applying a standard risk assessment framework, Indigenous communities, nationally and globally, are deeply concerned that such limited understandings of "risk" could contribute to neglecting climate impacts within the larger ecosystems. These limited risk narratives could have genuine impacts on our climate resilience and our abilities to practice our culture holistically, but they also fail to account for the interactions and interdependencies that exist within the natural world. Since Indigenous communities are socially, economically, spiritually, and culturally dependent on continued reciprocal relationships with their territories, many Indigenous people are concerned about climate risks and that "future generations will not have the same opportunities and experiences out on the Land as they had growing up" (Cameron et al., 2021). The inclusion of Indigenous knowledges and a different way of looking at risk assessments is not just a suggestion but an urgent necessity to ensure a comprehensive understanding of climate risks that builds holistic resilience to climate risks and to climate change.

**ARTIST STATEMENT**

This artwork embodies the Gitxsan perspective of our place in the universe. At the center of the composition is the Raven, a pivotal figure in Gitxsan cosmology, traditionally known for bringing light to the world by stealing the sun. The Raven cradles a sphere in this representation, symbolizing the Earth, our deep spiritual connection to the land, and our intertwined existence within the cosmos. Surrounding the Raven are formline salmon, depicting life cycles vital to Gitxsan culture and survival. The backdrop is adorned with stars, signifying our place among them. This cover art beautifully weaves together the past, present, and future, highlighting the resilience of Indigenous knowledge in the face of modern challenges.

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# Introduction

**FIRE SEASON HAS RETURNED**. As with previous years — perhaps most notably in 2023, when record-setting wildfires, the most destructive ever recorded, affected all 13 provinces and territories — communities across Canada are witnessing an early start to the annual wildfire and smoke. Many of these communities, who are often Indigenous communities, are wondering what other climate impacts or seasons we will see as the year unfolds and how to address them. One partial answer to that question is the climate risk assessment — processes increasingly recognized as essential in adapting to climate change. Risk assessments are designed to identify the likelihood of future climate hazards and are a theoretical tool to apply to real-world scenarios.

**However, current risk assessment methods are incomplete: They only consider natural ecological processes as risks to the built environment, which leaves space for maladaptation.**

Meanwhile, under current climate projections and the intensification of climate impacts, it is likely that local climate risks will only escalate (Assembly of First Nations, 2023).

Planning for and responding to climate risk has been recognized as a priority internationally through the United Nations Framework Convention on Climate Change (UNFCCC) and its Warsaw International Mechanism for Loss and Damage (L&D) through the Sendai Framework on Disaster Risk Reduction (SFDRR), the International Panel on Climate Change's (IPCC) Special Report on Extreme Events, and the Fifth Assessment Report of the Intergovernmental Panel on Climate Change.

Risk assessments have also been highlighted as key to developing and implementing targeted adaptation strategies and coordinating risk governance (Adger et al., 2018).
However, creating risk assessments to include more severe climate change impacts is challenging because the impacts in the future will be dependent on the success or failure of current climate adaptation and mitigation policies (Assembly of First Nations, 2023). Risk assessments can no longer be static but must adapt, change, and flow — dependent on actions, reactions, and interactions within our social-ecological system.

**"Risk assessment and adaptation strategies that include local and traditional knowledge, and associated sustainable management practices, can help with understanding and addressing complex climate change risks."**
- Simpson et al (2021)

Despite this modest recognition, little progress has been made in including Indigenous knowledge systems as equally valid within "western science and policy dialogues" (Reed et al., 2024). This has resulted in a "system of knowledge that prioritizes advances in technology, markets and science at the expense of the natural balance of life" (Reed et al., 2024). This Special Report argues that Indigenous approaches to relationships to the land and water can indeed offer an alternative but more effective approach to understanding and responding to climate change and the corresponding risks.

## Contrasting Risk Landscapes

Within Canada, there is no standardized definition for how risk is understood, but there is a general theme.

According to many scholars and academics, risk arises from the interaction between hazards, vulnerability, and exposure (Figure 1). Under the International Panel on Climate Change (IPCC), hazards are derived from climate systems and result from natural variability and anthropogenic actions (International Panel on Climate Change 2014). Exposures, meanwhile, are associated with locations and settings of people, places, and systems that could be adversely affected. Vulnerability reflects the susceptibility to harm and the capacity to cope and adapt (Oppenheimer et al. 2014).

on climate trends, impacts, and adaptation options. Similarly, National Climate Change Assessments (NCCA) are periodically done by the Government of Canada and include information on Western climate science, impacts, and vulnerabilities. They also released the National Risk Profiles report (NRP), which focuses on impacts prioritized according to cost under five sub-categories: people, economy, government, environment and social. In addition, many provinces and territories in Canada also conduct their own climate risk assessments; for example, the British Columbia Risk Assessment evaluates climate risks to various sectors, largely focusing on infrastructure, ecosystems, and communities.

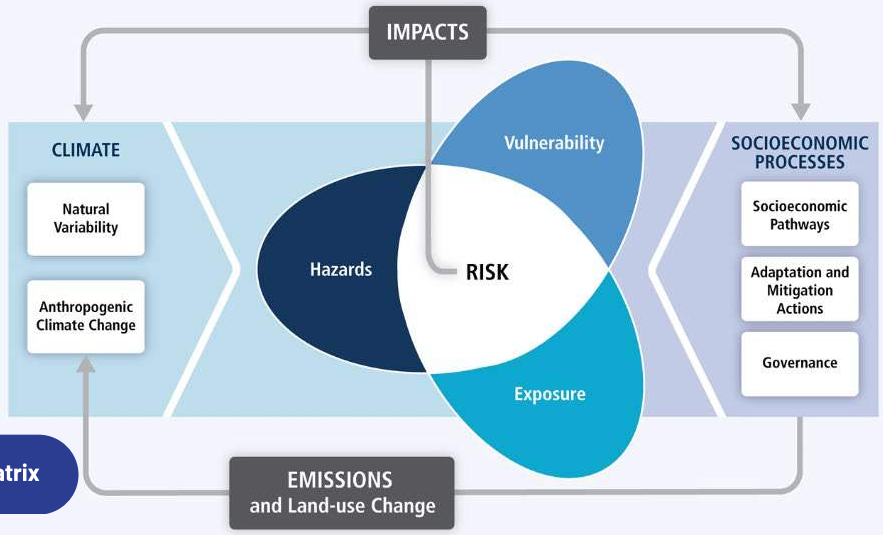



Figure 1: IPCC's Risk Matrix

The process for applying, evaluating, and prioritizing each of these tenets of risk varies geographically and jurisdictionally. For example, Canada's Changing Climate Report (CCCR), produced by Environment and Climate Change Canada (ECCC), assesses past, current, and projected climate change impacts at a federal scale. Their method synthesizes Western research

Commonalities throughout these risk assessments include that they are based on historical data, evaluate the probability, severity, frequency, and impact of future events based on experience from past events, and largely evaluate risk by most costly disasters and costly disasters that impact Canada. The environmental category is mostly related to infrastructure and repair (Government

of Canada 2023; Adger et al. 2018). Current risk assessments are purposefully designed to inform decisions or actions to avoid the most expensive impacts and disasters (Adger et al. 2018). Given our governments' fixation on dollars, this prioritization makes cents.

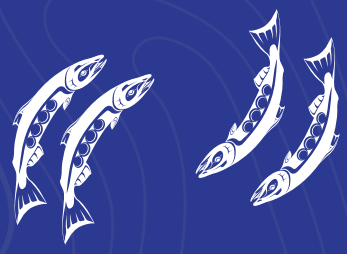
However, risk is understood differently by different people. "Risk" itself holds many meanings across disciplines, as well as across time, space, and cultures. At its core, one possible understanding of "risk" is the potential for adverse consequences for human or ecological systems by "recognizing the diversity of values and objectives" (Simpson et al. 2021).

**Within Indigenous communities, environmental risks primarily focus on interactions within our larger social-ecological system, rather than monetary losses and gains.**

In other words, our relationships and context influence how we perceive what 'risk' is. To an experienced hunter, "what constitutes dangerous conditions is tempered from over- and underreaction to changing climatic conditions by experience. Their perceptions of risk, in other words, are specific to their experience, traditions, and what they know" (Rosales and Chapman 2015). For Indigenous knowledge holders, "perceptions of risk are not only physical changes, but are a part of more complex understandings, notions of self, and worldview" (Rosales and Chapman 2015). Risk, therefore, is dynamic, complex, and continuously changing, with new risks emerging constantly, which are largely dependent on the increase or decrease of risks.

With this understanding, there is growing recognition internationally, nationally, and provincially of the need to integrate and include Indigenous knowledge, worldviews, and practices within disaster risk to strengthen risk policies and practices (Kenney et al. 2023). In addition to the ratification of the Sendai Framework on Disaster Risk Reduction (SFDRR) in 2015, the UN has recommended inclusive approaches, including integrating culturally diverse knowledges and including Indigenous communities in risk and disaster planning and implementation (Kenney et al. 2023). Both the NRP and the Government of British Columbia, which are essentially leading the charge of risk assessment in Canada, have acknowledged there is currently a gap in integrating Indigenous knowledge. As B.C. has noted, "As a high-level assessment, the results are intended for use at a provincial level and do not fully capture risks at other levels, such as local or Indigenous communities or a specific sector or region of the province." (Government of British Columbia 2024)."

Meanwhile, Canada has stated, "Given the disproportionate impacts of disasters on their communities, emergency management can differ for Indigenous peoples. This results in different types of programming to respond to their unique needs." (Government of Canada 2023). Others have made the point, too: Indigenous ways of life have unique risks, and this merits further assessment through "an inclusive and reflective process of risk assessment and prioritization" together with Indigenous Peoples (Council of Canadian Academics 2019). Despite this recognition, there continues to be a lack of support for Indigenous-led and Indigenous-relevant climate research in Canada (Reed et al. 2024), which includes risk assessments.



**Indigenous communities impacted by climate events in the last few years have been hit the hardest and continue to fall through risk assessment gaps because the risks they have faced have been largely institutional rather than natural.**

## The Colonialism of Climate Change & Risk

Current approaches to risk assessment do not consider equity, discrimination, or the inclusion of diverse opinions, experiences, and voices. Written from a perspective that privileges financial loss and related values and priorities, risk assessments prioritize one segment of society, and remain inaccessible, incomplete, and inadequate for many groups and communities across the country. Indigenous peoples, when considered, are positioned as facing greater climate risks as a matter of happenstance or simply bad luck (Whyte 2016). This false Indigenous victimhood narrative is often perpetuated through climate policy, which can and does inform how we think about and approach climate risk assessments.

While it is true that Indigenous people experience disproportionate impacts of climate change, victimhood and vulnerability are not one and the same. Indigenous victimhood narratives have long been perpetuated and supported by Western society, which further attempts to remove agency, sovereignty, and decision-making power from Indigenous communities. By contrast, when thinking about communities that are particularly vulnerable to climate change, there are often racial, ethnic, gender-based, and socioeconomic considerations that can influence community climate resilience, which includes Indigenous communities (Wale 2023). To quote Reed et al., "It wasn't until 2022, more than three decades after its establishment, that the IPCC acknowledged colonialism as a driver of climate change"1 (Reed et al. 2024).

[1] "Vulnerability of ecosystems and people to climate change differs substantially among and within regions (very high confidence), driven by patterns of intersecting socioeconomic development, unsustainable ocean and land use, inequity, marginalization, historical and ongoing patterns of inequity such as colonialism and governance (high confidence)" (IPCC, 2022, p. 12).

**In reality, Indigenous people face disproportionate climate risks because of how colonialism (as well as capitalist economics) has shaped socioeconomic and environmental conditions (Whyte 2016).**

In addition to the trauma, the land theft, and the cultural genocide, Indigenous peoples and their knowledges have largely been left out of building climate policy and, by extension, how we think about and assess climate and disaster risks (Reed et al. 2024). Rather than simply being listed as a driver, historic discrimination must be understood as a compounding impact. Colonialism, genocide, discrimination, and racism have contributed and continue to contribute to unequal power relationships and intergenerational injustices that influence how communities can adapt and respond to climate risks (Johnson et al. 2021).

The legacies of colonialism range from "poverty to marginalization," and have created conditions within Indigenous communities that render them unable to respond to climate risks and threats adequately (Whyte et al. 2016). Indigenous communities in general have been left out of urban and infrastructural planning, with many communities today struggling with housing, infrastructure like roads, services, and even essentials like clean, running water (Assembly of First Nations 2023; Whyte et al. 2016). Since most risk assessments focus on capital and existing infrastructure, Indigenous communities are already left out of the risk assessment process because many lack basic infrastructure and support. In essence, the value and prioritization of many risk assessments conducted nationwide focus on community assets, which influences how communities are prioritized for funding. Indigenous communities have experienced historic discrimination through underdevelopment, and

with the values and costs of infrastructure tending to be lower within Indigenous communities, they are not seen as a high priority compared to areas with higher-value government-based assets.

In this way, current risk assessment processes essentially reinforce discrimination by placing greater value on areas that have been developed, such as white middle-to-upper-class areas and more densely populated urban areas.

In 2024, we can see this playing out with how easily communities affected by wildfires can access emergency government support during a crisis. While safety considerations for wildfire fighters are crucial, so are the needs of Indigenous communities like Fort Nelson First Nation — deprioritized and offered limited resources, they are left to fight the fires themselves. One community member posted on Facebook, "Where are the water bombers? Fort Nelson needs resources to fight this fire — this is really disheartening."

Indigenous communities impacted by climate events in the last few years have been hit the hardest and continue to fall through risk assessment gaps because the risks they have faced have been largely institutional rather than natural. For example, some communities that were forcefully relocated under the Indian Act were moved to areas more exposed to climate risks, with limited ability (due to outlawing and banning) to manage those risks using traditional methods like planned burning. Other communities are disproportionately exposed to man-made risks, such as industry and extractive-based risks, which are more likely to be exacerbated by climate change, more costly to remediate, more often placed within Indigenous territories, and yet are seldom included in risk assessment frameworks. For example, the Mount Polley Mine disaster still impacts surrounding communities and will likely continue to do so for generations. When governments omit legislative and man-made risks from risk assessments, Indigenous communities experience discrimination by omission, and any negative impacts on community resilience are obvious by products of neo-colonialism.

## Gaps, Limitations, & Harms of Risk Assessment Practice

In addition to the general colonialism of risk assessments as they are conceptualized, several discrete practices exclude, marginalize, or erase Indigenous peoples from current approaches to understanding and responding to risk. They include:

1) Lack of Representation;
2) Clashing Worldviews;
3) A Human-Centric vs. Life-Centric Paradigm;
4) A Related Artificial Separation of Humans from the land and
5) A Failure to Appreciate Scale.

Together, these practices demonstrate significant challenges in effectively including Indigenous voices in climate change policy.

## 1) Limited Representation

First, risk assessments at federal and provincial levels are limited representationally and do not reflect the range of knowledge and experiences that make up the fabric of our society. In Canada, policy-making and planning with respect to Indigenous people and values are generally limited by a lack of sociocultural representation (Raikes et al. 2022). Indigenous people are not represented, included, or listened to in substantive terms. While this has been a common theme across climate policy, this is particularly problematic within the risk assessment process because of how prioritization impacts what is actioned within adaptation planning.

For example, community members hold place-based knowledge, and, therefore, hold values tied to context, local culture, and knowledge. However, high-level standardized risk assessment frameworks written by policy-makers frequently lack the level of detail that would inform good, values-based decisions. Often, it is only a few people (who often themselves have abundant access to disaster risk and emergency planning resources) who make decisions for communities they might not have ever visited — communities that have already faced a historical lack of access and representation at decision -making levels.

Currently, risk assessments are largely informed by Western science and Western scientists. Identifying and establishing who an "expert" is can and does influence the priorities and outcomes of assessment processes (Donatuto et al. 2020). For example, Indigenous Elders, knowledge holders, 2-Spirit persons, women, and girls all hold different knowledge and roles within communities.

**Intersectional identities are not captured in risk exposures because risk assessments are not designed to capture a range of experiences and identities. Despite some acknowledgement of sectors of increased vulnerability, there is no mechanism to account for feedback and compounding impacts.**

For instance, "low-income workers are often employed outdoors and live in poorly ventilated housing, spend a greater portion of their income on healthcare, and lose relatively more from missing a day of work, all making them more vulnerable and exposed to morbidity and mortality from heatwaves" (Simpson et al. 2021).

In effect, certain folks were at higher risk of physical and economic risks of the heatwave, depending on variables like age, race, gender, and income level. Current risk assessment processes are ill-equipped to capture the range of lived experiences within different parts of society and, therefore, varied exposure levels to climate events. Because of this, while a risk assessment may yield "heatwaves" as a priority risk in general, they may be considerably riskier for members of certain communities or groups within the larger population.

Further, risk assessments are often undertaken under the assumption the risk assessment process will lead to risk reductions that are then shared among stakeholders. In reality, disaster risk reduction is a collective responsibility that should (but often does not) include contributions from each stakeholder. Specific groups are asked to contribute to the assessment processes, while others are simply consulted or engaged with, or left out entirely. Because of historical injustice and how communities are engaged or included, the benefits from risk planning are distributed unevenly, ranging from somewhat helpful and applicable to not at all relevant or useful for Indigenous communities and contexts (Raikes et al. 2022).

When Indigenous peoples are included (now that Reconciliation is trending within governments), the low levels of inclusion and lack of reciprocation place additional risks of knowledge extractivism on community members and their knowledge systems. Because risk assessments are not inclusive, they will have limited success in terms of how applicable and relevant they are, which will limit their contributions to overall community resilience.

## 2) Differences in Worldview

Within standard risk assessments, risks are prioritized according to values decided on by governments and policy-makers. Western risk assessments are commonly conceptualized through an economic lens, with valuations, predicted losses, and cost-benefit analyses translating "value" into a numerical figure that policy-makers can use to rank decisions.

However, for many Indigenous communities, inherent and cultural values are often not captured within these assessments and are therefore not fully accounted for within risk frameworks (Johnson et al. 2021).

**These "intangibles" may be more challenging to measure but are no less important in deciding where to prioritize adaptation planning and resources, especially within Indigenous communities.**

For many communities, social and cultural values dictate ways of life, governance, and how we, as Indigenous people, interact with the world around us (Donatuto et al. 2020); while it is difficult (and often incorrect) to attempt to monetize these values, their lack of inclusion within risk assessment processes means we are only getting part of the story of true climate risks that face a community. To quote Reed et al., "Our perspectives and experiences have often been constrained within non-Indigenous frameworks of climate change policy and research," which can be extended to include the mechanisms of risk and valuation being commonly used across the country (2024).

Technical information about what changes will likely occur and how much they will cost differs greatly from values-based approaches informed by community perspectives and prioritization, or "how important these changes are" (Donatuto et al. 2020). While necessary, this adjustment in practice is difficult; it requires decision-makers to understand community values as a method for developing and evaluating risks, rather than identifying risks and association actions in economic terms (Reid et al. 2024). Because most risk assessments are written outside of community contexts, they often fail to include community values, which leads to an inaccurate prioritization of risks and impacts community buy-in and use of the assessment itself.

For Indigenous communities, Land-based values drive subsequent actions. For example, pre-contact, many Indigenous nations held balanced and reciprocal relationships with fire and fire-keeping. They would strategically burn off areas of land to reduce future risk of forest or bush fires. However, settlers perceived this traditional burning as a "risk" despite its long history and cultural and ecological benefits, outlawing the practice and starting the long history of fire suppression nationwide.

**Western scientists now confirm what Indigenous nations have long known: fire suppression does not make fire less of a "risk"; it quite literally fuels the flames.**

Many years later — in the era of megafires — many Westerners continue to villainize fire, but it is through settler distortion of the fire cycle by banning traditional burning practices that many communities have been and continue to be traumatized by fire.

Today, many communities are actively reclaiming their relationship with fire and revitalizing traditional burning practices. To them, and to many Indigenous nations, the risk was never the fire itself but the misuse and broken relationship that we hold with it, which is responsible for creating adverse impacts. Thus, risk assessments that deprioritize both community values and understandings of value are misaligned with how communities perceive and understand risk.

### 3) Human-Centric vs. Life-Centric

Current risk assessment processes are often anthropocentric, or focused only on risk, benefits, and costs to human life and livelihoods. As such, Western understandings of our shared environment are startlingly linear and do not reflect the nuanced reality of living within a social-ecological system: the web of interactions between societies and ecosystems, or human beings and the natural world. And even when aspects of the larger web of life are included in risk assessments, it is often in the context of how they can benefit humans: extractively, rather than reciprocally.

**Indigenous knowledges related to the Land and climate are inherently founded on local contexts and how people live as caretakers and stewards within the environment including space for all living beings, or non-human kin, that both share the ecological spaces we inhabit and support our ways of life.**

Erroneously ignored or overlooked in risk assessments, Indigenous knowledge includes governance and management of "human-environment relationships, based on environmental ethics of care and reciprocity between human and non-human beings (Johnson et al. 2021). For example, for the Gitxsan, salmon are vital ecologically and extremely important to their culture and way of life. Within Gitxsan culture, everything has otsin (energy or spirit). Risk assessments must consider that our lives come from and depend upon the life around us. Therefore, a risk to the salmon through overfishing or pollution is a risk to the Gitxsan.

Within Indigenous communities, clan structures, governance, gender, and status within community life or land-based activities reflect an understanding of responsibility to the otsin of plants, animals, and non-human and human kin (Whyte 2016). While we highly value the otsin around us, it is not considered by policy-makers when discussing and planning for climate risks.

Indigenous peoples worldwide have cultivated a deep-rooted connection with the natural world, drawing from generations of knowledge, long-term observations, and sustainable practices that foster a balanced coexistence with their homeland's surrounding environments. This relationship is ingrained in a perspective that differs significantly from the views often prevalent in industrialized Western societies. At the heart of this general Indigenous perspective is "cultural infrastructure," which embodies the interdependent relationship between human communities and their natural surroundings. Unlike traditional infrastructure, which frequently places human needs above ecological harmony, many Indigenous perspectives on infrastructure are designed to promote ecological and economic well-being.

Throughout history, Indigenous communities have demonstrated a keen understanding that progress and sustainability are contingent on aligning human needs with the rhythms and limits needs of the land. This foresight is evident in practices such as the deliberate preservation and enhancement of oolichan breeding habitats by certain coastal Indigenous groups. The oolichan, a fish of significant nutritional and economic value, is more than a mere resource; it is a vital link connecting people, land, and water (Johnston 2022). By proactively improving conditions for oolichan breeding, these communities secured their economic future and contributed to the biodiversity of both marine and land flora and fauna (Johnston 2022). This practice exemplifies a core tenet of cultural infrastructure: fostering development that bolsters ecological resilience as much as it does human prosperity.

Likewise, the intentional guidance of bison into specific regions by Indigenous peoples of the North American plains exemplifies another aspect of cultural infrastructure. This strategy was not simply aimed at ensuring a reliable food supply; it constituted a sophisticated ecological intervention intended to enhance the diversity of the land. Bison, as a keystone species, plays a critical role in preserving the health of grasslands by supporting numerous other species and ecological processes (Johnston 2022). By influencing their movements through planned cyclical controlled burns, the inhabitants of the plains acted as landscape architects, shaping environments teeming with life and resources.

The concept of cultural infrastructure invites us to re-evaluate our interactions with the natural world. It starkly contrasts the Western development paradigms that advocate for controlling or altering nature to human needs and concepts of "progress" advance. Instead, cultural infrastructure presents a holistic way of life that values and respects all living beings while recognizing the interconnectedness of human and ecological well-being.

**For its sophistication in practice, the concept is stunningly simple: take care of the land, and the land takes care of us. This approach offers a hopeful path toward sustainable development that is in harmony with our environment.**

Weaving Indigenous knowledge and practices into contemporary dialogues on infrastructure and development is not solely a matter of cultural appreciation and acknowledgment but an essential step toward addressing our current global environmental challenges. By drawing insights from Indigenous perspectives on cultural infrastructure, we can begin to chart a course toward genuinely sustainable and equitable development models.

### 4) Artificial Separations

Generally, Western science operates by breaking society and the environment down so that they fit into boxes or silos that can be managed according to the constraints of the created boundaries. This is reflected within Western policy, decision-making, and governance structures and has permeated collective consciousness. Many within Western society, by and large, (and especially within urban centers) see nature as a place to visit on weekends, rather than as a dynamic and interrelated part of many aspects of our daily lives. This distancing contributes to the "paradigm of 'progress'" and the capitalist model of extractive economic growth, which has resulted in the "failure of the last thirty years of climate policy" (Reed et al. 2024). "For convenience and tractability, analysts and managers tend to break risk assessments into silos, often taking a component-oriented approach" at the expense of an interaction-oriented view (Simpson et al. 2021).

**By contrast, Indigenous knowledges are fundamentally founded on interconnectedness and the relationships between living and non-living things.**

"Our health comes from our culture and our culture comes from our lands, our waters. To make good decisions, these connections must be acknowledged" (Donatuto et al. 2020). Many similar cultural teachings and protocols across Indigenous nations reinforce the understanding of our place as humans within the larger social-ecological system and our need to return to balance within that connectedness in how we approach and understand resource management and decisions and effectively how we understand risk and risk assessment processes.

Similarly, many communities understand that climate change will cause "serious disruptions not just to the environment and economy, but also to culture, language, knowledge transfer, ceremony, identity, health and wellbeing. These impacts are interrelated and intersect with other crises that First Nations, Inuit and Métis face" (Reed et al. 2024). Risk assessment, as its stands, is unable to consider compounding effects and feedback loops of climate impacts. Namely, climate change compounds challenges that Indigenous communities already face, such as food insecurity, historical injustice, and continued inadequate access to safe housing and essentials like clean water (Johnson et al. 2021; Raikes et al. 2022). Therefore, the idea that we can parse down the problem into more manageable chunks is a false one. In order to truly begin to address climate change and create effective understandings of risk, we need to understand the interconnections.

Within a risk context, artificial separations that have been created and perpetuated by colonial governments distort the reality of potential climate impacts by failing to acknowledge connection points and dependencies within the greater social-ecological system. Western risk assessment processes often ignore interactions in part or in full. In doing so, they significantly "misestimate risks," such as how extreme heat may impact transportation or agricultural sectors, which, in turn, will impact human health (Simpson et al. 2021). Not addressing interconnections exposes us to a fundamental miscalculation of risks (Dawson 2015). In order to create practical and comprehensive risk assessments, we need to use a big-picture view of interactions, relationships, and interdependencies within human and environmental worlds.

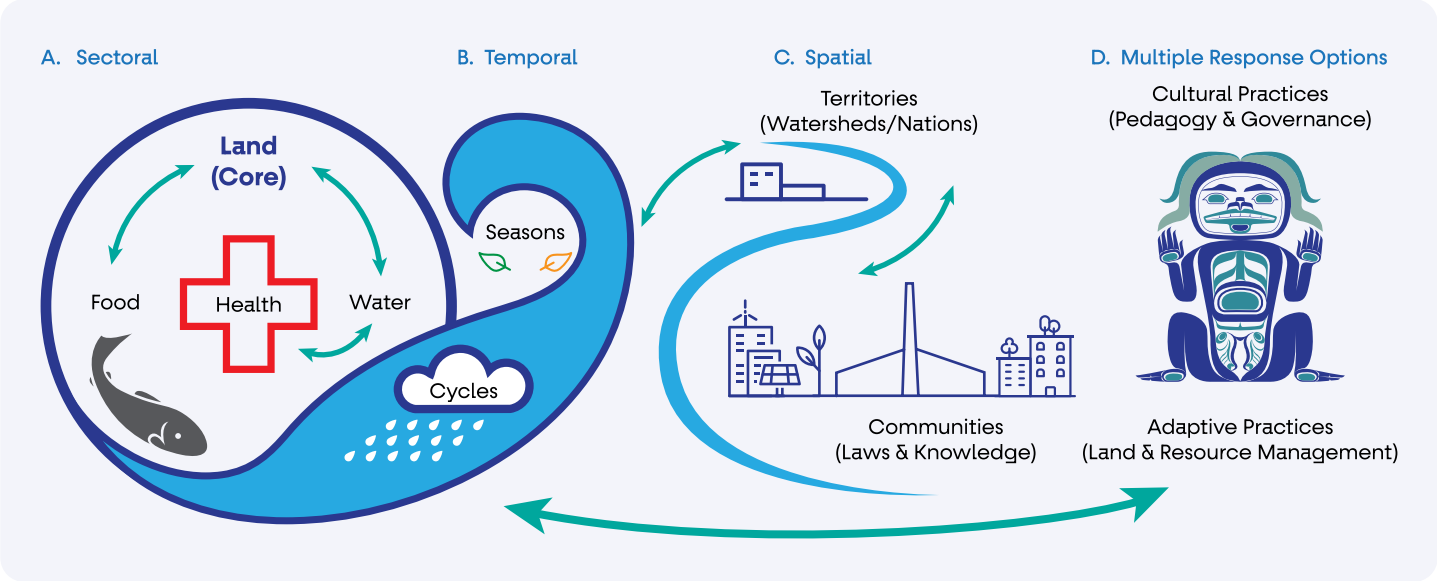



**Figure 2.** Gitxsan philosophy contrasts with the segmented, linear thinking often seen in Western frameworks. These contrasts are visible in the (A) sectoral relationships between the reciprocal and cyclical core elements such as land, water, food and health; for example, healthy water sources lead to healthy food sources, which leads to healthy people, and all are dependent on the health of the land. (B) Understanding the temporal elements in Gitxsan philosophy, such as seasons and cycles, is crucial. This understanding is not just about knowing when to plant or harvest, but also about predicting changes in the environment and managing resources sustainably. For example, traditional knowledge of weather patterns informs when to fish or harvest, ensuring that activities are in balance with natural cycles. Management of Territories and Communities (C) is interconnected, highlighting that decisions made in one area affect others; in the Western world, spatial awareness usually focuses on human and economic impacts, whereas the Gitxsan will focus on land and water. Many from the Western colonial perspective view cultural practices of Indigenous peoples as performative and only to preserve lore, when in fact (D) cultural practices and adaptive practices are sophisticated methods to teach and reinforce balance and respect for the land; they respond to environmental changes to take proactive measures to ensure the sustainability of resources. This is only attained by a deep and refined understanding of the environment through experience and observation. **Note: The graphic on (D) is formline artwork of a grandmother representing culture, observation and teaching.

## 5) Scaling Down

Risk assessment processes do not include space to discuss differing understandings of time, space, and scale. Differences in interpretation and experience of these things can influence how risk assessments are created and how useful they will be as they age. From a Gitxsan perspective, for example, time is understood to be non-linear. In this way, time mirrors the web of ecosystem processes — it is a web of connected pasts and futures, with many branches and connection points (Figure 2). This is upheld and reinforced by the coexistence of the physical and supernatural worlds — in other words, the fourth dimension that involves spirituality. Time is understood as continuous.

Understanding time and space as non-linear, cyclical, and continuous can be challenging because Western societies, which are predominantly focused on processes and outcomes, have conditioned us to believe that time has a beginning, a middle, and an end. Western policy-makers are under pressure to create risk assessments that "intersect with many other policy domains and have both immediate, short-term consequences and perhaps more profound, long term implications," neglecting space for differences in time, space, and scale (Adger et al. 2018) It is easier to think about time and space as linear, definitive, and predictable because it makes creating strategies and plans that much more simple. However, relating these principles to climate change, it becomes easier to see both the flaw in Western understandings and the opportunity that Indigenous or Gitxsan understandings of time creates.

Since risk assessments do not distinguish between continuous or seasonal risks, resources to address and adapt to these threats are not being used as efficiently as they could be by diversifying the kinds of support offered throughout the year.

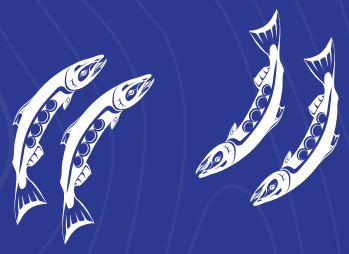
For example, in British Columbia, many communities are vulnerable to impacts from flooding during the spring. Flooding is consistently ranked as Canada's most expensive hazard, but flood risk tends to ebb during summer as communities move into drought and fire impacts. Flood risks remain, but their prioritization and rank of importance shift as communities move from one season's hazards to the next. Put differently, the risk assessment's usefulness shifts depending on the season of focus, rather than creating and supporting year-round resilience.

While human-created climate change is a problem for us all, we often focus only on its "start" (industrialization) and its inevitable "end" (global climate-related disasters).

**By viewing climate change as linear and its effects as unavoidable, we forget — and so neglect — our present role and responsibilities in shaping what the next generation will inherit.**

In so doing, we reduce our agency in developing and informing the processes that support climate action, such as ongoing and updated risk assessment processes.

When we consider that our reality is a web of connections with a matrix of potential futures informed by many pasts, it becomes clear that conventional risk assessments are "ill-equipped to deal with interaction effects and multiple time scales," as well as the differences between how we all experience time and space (Adger et al. 2018). Since climate change is effectively happening across temporal and spatial scales, risk assessments that focus only on specific timeframes or regions will likely overlook aspects of risk, creating the potential for maladaptation, which can be amplified through "societal preference and values, as well as the interaction of multiple risks" (Adger et al. 2018).



**Resilience is deeply rooted in governance, ways of life, and worldviews, emphasizing interconnectedness, reciprocity, and adaptability.**

## Telling the Full Story: Trail Maps Towards Transformative Risk Narratives

Risk assessments and costs are only part of the larger climate change story. The National Risk Profiles report and many other assessment methods emphasize costs and human-centric values while the larger view is deprioritized. Since we are working with an incomplete dataset, or fragments of the bigger picture, our understanding of risk will be incomplete. With Western risk assessments' limited scope and patchwork approach by government bodies, we are making climate decisions with only a partial view of how our ecosystem is shifting under climate change.

Looking at any one aspect of risk will create a negative trade-off. If we want to optimize our levers, we cannot focus on one specific thing (which is how the government typically operates). To avoid detrimentally limiting our scope, we need to take a systems approach. Put differently, we want to maintain the processes inside the ecosystem that function by working together; therefore, effective climate policy needs to prioritize relationships and connection points rather than focusing solely on impacts on people and individuals.

For Indigenous peoples, resilience is deeply rooted in governance, ways of life, and worldviews, emphasizing interconnectedness, reciprocity, and adaptability. On our path through colonialism, many Indigenous people are actively healing and recovering tools that support resilience. This resilience manifests through several core principles and practices.

### Interconnectedness and Reciprocity

Indigenous communities have long viewed the world as an interconnected web where humans, animals, plants, and the land are interdependent. This holistic perspective fosters a sense of responsibility and care for the environment, supporting community resilience.

### Adaptability and Innovation

Indigenous peoples have a history of adapting to changing environments, which includes using cultural knowledge and laws to manage natural resources sustainably. For example, controlled burns to manage forest health demonstrate a proactive approach to environmental stewardship; enhanced aquaculture and agricultural practices are sophisticated ecological interventions to increase biodiversity.

### Cultural Continuity

Maintaining cultural practices, languages, and laws strengthens community bonds and identity, which are crucial for resilience. These cultural elements provide a foundation for coping with and adapting to challenges, including climate change.

### Community Cohesion and Support

Indigenous communities' robust social networks and communal support systems are a testament to their strength and resilience. These enable collective action and mutual aid in times of crisis. This communal approach ensures that knowledge and resources are shared, enhancing overall resilience.

### Sustainable Living Practices

Indigenous ways of being often emphasize sustainability and living in harmony with all beings that are part of the community's surrounding ecosystem. This includes using resources to ensure their availability for future generations — a key aspect of resilience.

By urgently incorporating these principles into broader risk assessment frameworks, we can develop a more comprehensive understanding of resilience that incorporates Indigenous communities' rich, adaptive strategies. This holistic approach is not just beneficial but essential for addressing the complex and interconnected challenges posed by climate change.

As practitioners, scientists, and policy-makers, we need to include context, values, and importance rather than only focusing on cost and likelihood forecasts based on Western models. "This includes recognizing that climate policy must prioritize the Land and emphasize rebalance with the Land, operate on a nation-to-nation basis, recognize the right to self-determination, prioritize and generate Indigenous Knowledge and governance, and advance integrated and interdependent climate actions (Reed et al. 2024)". In this way, rather than an assessment, we must focus on telling the full story of risks: risk narratives.

When communities are involved and are able to tell their stories about how they see and experience risks, containing morals and context and offering insights, adaptation actions can be designed to address more than one value at a time. There are often multiple pathways toward each value that communities want to prioritize.

**We must be able to take one action knowing that it will reduce many consequences and better use the limited government resources and community capacity available — this can only be done with a big-picture view.**

For example, revitalizing traditional burning offers many co-benefits while addressing a major risk to many communities. For other communities, mitigating wildfire risk could involve creating firebreaks by selectively participating in forestry.

Risk narratives that are founded on an understanding of the big picture can enhance resurgence, revitalization, and reconnection to cultural practices while supporting self-determination and decolonization. By creating space for narrative within understandings and evaluations of risk, we arrive at a more inclusive, connected, and values-driven approach, supported by "Indigenous people's knowledge of, relationships with, and responsibilities towards places, ecosystems, species of importance," which will create risk narratives that center "Indigenous people's role in directing adaptation research, action and decision-making in line with their capacities and aspirations for self-determination and cultural continuity (Johnson et al. 2021).

## Conclusion: Notches in the Trees

To quote Secwépemc Elder Uncle Mike, "Sometimes you find a place and it reminds you where you're going. You put a notch in the tree to remind you and your children who follow after you…"When thinking about risk narratives, several notches in the trees need to be followed to walk down a better path together toward building climate resilience.

### 1) Risk narratives need to be inclusive and equitable

Incorporating diverse understandings of risk promotes inclusivity and equity in the assessment process. It acknowledges the rights, knowledge systems, and agency of Indigenous peoples, local communities, and other marginalized groups who are disproportionately affected by climate change. By valuing and respecting different ways of knowing, climate risk narratives can contribute to more equitable and just outcomes in climate adaptation and decision-making. Further, including multiple understandings of risk enhances the accuracy and validity of risk assessments by triangulating information from different sources.

### 2) Risk narratives need to be comprehensive and holistic

Local expertise and community insights provide valuable insights that complement scientific data and models, capturing nuances and complexities that may be overlooked in standard Western risk assessments alone. The case for adaptation actions that are inclusive and holistic rather than reactive, as well as the case for the resurgence of Indigenous traditional stewardship practice, is founded on the idea that we are meant to be actively involved in taking care of the land through a lens of holism. Creating space for varying understandings of risks, impacts, and values creates a better baseline for understanding what, where, and how communities want to see risk planning and adaptation actions. Further, Indigenous knowledge includes adaptive strategies and cultural resilience mechanisms that have sustained communities for centuries in dynamic environments, which should, but currently are not, included within risk narratives. From a Gitxsan perspective, we need to look at risk as Naadahahlhakwhlinhl (interconnected with all living things). This needs to include cultural contexts, protocols, spirituality, space, time, and scale. The fractures reflected in colonial governance structures have been, to date, reflected in how we approach risk assessments. Effective risk narratives need to be holistic and told with an understanding of our responsibility to the big picture while still considering the smaller working pieces around us.

### 3) Risk narratives need to be contextually relevant and place-based

Different understandings of risk are often rooted in specific cultural, social, and ecological contexts. By integrating these diverse perspectives, climate risk narratives become more contextually relevant and responsive to the needs, values, and priorities of affected communities and ecosystems. "Since scientific knowledge of climate change tends to be generalized, local knowledge is more effective in identifying particular risks, exposure, and vulnerability to climate change" (Rosales and Chapman 2015). Further, to quote Aboriginal Housing Management Association (AHMA) "one size does NOT fit all: policies, programs, emergency planning [and risk narratives] should not be done in silos, ignoring the distinct strengths, vulnerabilities, and needs of [differing] communities (2023). Risk narratives should include place-based knowledge and experience, targeting the specific needs, values, and priorities of each community.

### 4) Risk assessment processes need to be dynamic and reflexive

Risk, community values, and community resilience to climate change all shift over time.

**Because of the dynamic relationships within our communities and with the Land itself, risk narratives need to be living, dynamic stories about how communities are seeing, experiencing, and adapting to climate change rather than static snapshots**.

Risk narratives can be adjusted, added to, and updated. For example, the National Risk Profiles (NRP) report states, "As such, this represents a first attempt to integrate these considerations, and as the NRP evolves, further efforts to incorporate more detailed findings on these experiences will be added" (Government of Canada 2023). Time will tell if the efforts will match the energy.

In addition, more energy and effort must be focused on addressing the underlying causes of risks: historic injustices, exclusion, poverty, and inequality (United Nations 2015). Indigenous peoples have shown incredible resilience to complex systemic barriers that continue to impact communities today. These challenges and barriers are interconnected and require a holistic view of how community life, values, and ecosystems intersect (AHMA 2023). In other words, as scientists, practitioners, and people living in a relationship with the earth, we need to do a much better job of telling and listening to the whole story.

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