Adapting Rural Climate Cultures

The Role of Culture in Rural Canada's Climate Adaptation

Final Report, December 2024

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A full report with all literature review results is available at https://esrguwinnipeg.ca/adapting-rural-climate-cultures/

This project is funded by the Social Sciences and Humanities Research Council in partnership with Canadian Heritage. Ce projet est financé par le Conseil de recherches en sciences humaines en partenariat avec Patrimoine canadienne.

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Executive Summary

Background

Rural Canada's diverse landscape is experiencing rising pressures from climate change. To adjust to these changes, communities and governance bodies have increased their focus on climate adaptation. Culture – our worldviews, beliefs, languages, ceremonies, stories, values and other symbols of meaning, shape the tools that are available to communities and governance bodies for climate adaptation. It is critical to understand culture's impact on adaptation decisions to ensure communities are well supported. This research aimed to develop understandings of the relationship between climate adaptation and culture and identify key implications for supporting the adaptation of rural communities.

We locate this work in the historical and current cultural, socio-political and economic context of rural Canada, which exists today as a result of Indigenous communities residing here since time immemorial, European settler colonialism on these lands since the 15th century, and a globalized, profit-driven economy that demands the extraction and displacement of resources and people. We understand anthropogenic climate change as existing as a result of this history and these structures.

Objectives

1. Systematically compile existing knowledge on how climate change and adaptation interact with culture to identify evolving research methodologies and knowledge gaps.
2. Synthesize current understandings about climate adaptation and rural culture in Canada.
3. Gather existing resources to support rural communities in climate adaptation and compare them to findings from objectives 1 and 2.
4. Identify climate adaptation actions and opportunities for evolving rural climate cultures.
5. Develop recommendations to integrate findings into adaptation programs and practices.

Results

Culture and Adaptation Tools

- Culture impacts the types of adaptation tools that are available in communities' cultural 'toolkits'. It influences which tools are viewed as valid and how adaptation actions are funded and prioritized.
- Social, economic, and political resources facilitate and restrain which cultural adaptation tools communities have access to, and consequently, which actions are taken for adaptation.
- Adaptation tools emerging from European settler cultures focus on preserving natural resource economies and livelihoods, and preserving private properties, both of which are tied to settler livelihoods. These adaptation tools risk perpetuating colonialism and climate change through a climate adaptation narrative. Social capital is also present as a cultural tool.
- Adaptation actions coming from Indigenous cultures are predominantly focused on traditional knowledges, land-based activities, and health and well-being.
- Communities are more involved in adaptation plans and strategies that are culturally relevant.

Culture in Adaptation Research and Policy

- Culture is generally mentioned in adaptation research and policy by, with and for Indigenous communities. However, culture is rarely engaged with in adaptation research in settler contexts, resulting in limited awareness of the role of settler cultures in shaping adaptation strategies.
- Federal adaptation funding has prioritized physical infrastructure and emergency preparedness and mitigation ($4.1 billion and $700 million since 2016), while smaller pools of funding have been allocated to health and regional knowledge capacity ($65 million and $73.5 million since 2016, respectively).
- Theoretical approaches to adaptation have been predominantly individualistic, resulting in individualized adaptation recommendations. These approaches overlook how structural factors (e.g., financial resources) facilitate or restrain access to cultural adaptation tools.

Key Messages

- **Center Indigenous peoples and calls to action in adaptation:** To ensure adaptation does not perpetuate colonialism and climate change, Indigenous peoples and calls to action need to be centered in adaptation strategies and actions. This includes recognizing Indigenous sovereignty and governance over lands.
- **Acknowledge the presence and influence of settler cultures in adaptation:** To bring awareness to how settler cultures shape adaptation decisions in Canada, adaptation work must explicitly acknowledge its presence and influence. This active awareness is needed to ensure that climate adaptation decisions do not further perpetuate climate change and colonialism.
- **Settler communities must ensure adaptation does not further exacerbate climate change and colonialism:** Adaptation provides an opportunity for settler communities to understand their positioning in Canada's colonial history, and identify existing and potential adaptation actions that do not further exacerbate ongoing harms.
- **More structural approaches are needed:** Researchers, policy makers, and funders of adaptation must ensure structural theories and considerations are integrated into adaptation approaches and policies. This ensures adaptation is not falsely posited onto the individual alone, when in reality, structural contexts significantly impact adaptation capacities.

Methodology

We conducted two scoping reviews of peer-reviewed and grey literature: The first, a systematic scoping review, focused on understanding the relationship between adaptation and culture, and took a meta-study approach to qualitatively examine the underlying assumptions of the theories and methods chosen by researchers that inform research findings. The second literature review followed an exploratory scoping protocol to map the literature and summarize the key concepts, definitions, types of evidence, relevant factors available pertaining to adaptation and culture in rural Canada. We also completed a scan of federal adaptation programs and budgets and analyzed funding amounts distributed to support community adaptation.

Key Definitions

Rural Canada: In this report, rural refers to rural and small towns, including remote, and northern communities across the country. It encompasses populations residing outside of main commuting zones of large urban centers of 10,000 people or more (Statistics Canada, 2021).

Climate Adaptation: The "process of adjustment to actual or expected climate and its effects in order to moderate harm or exploit beneficial opportunities" (IPCC, 2022, p. 43)

Adaptive Capacity: The preconditions (e.g., cultural capital) needed to take adaptation action, and the ability to mobilize these resources (Adger et al., 2011).

Maladaptation: Unintended negative consequences caused by climate adaptation actions and strategies (e.g., increased emissions; displacement of Indigenous peoples)

Capitalism: The dominant economic system in Canada and globally, where private actors own and control resources (including land) according to their own personal interest. An inherent feature of capitalism is the motive to make profit; consequently, resources are generally controlled in a way to make profit.

Settler Colonialism: Settler colonialism is a form of colonization where settlers come to a new territory and displace Indigenous communities to establish new society. It is a continuous, land-centered project and process that coordinates a range of agencies for Indigenous elimination and settler replacement (Wolfe, 2006).

Colonial Capitalism: When forms of colonialism, including settler-colonialism in what is now Canada, is a means through which to acquire resources for the capitalist economy (e.g., land).

Culture: Worldviews, beliefs, art, ceremonies, language, stories, rituals, and other symbols of meanings that inform strategies of actions (Swidler, 1986).

Cultural Components and Toolkits: Swidler (1986) defines culture as a collection of cultural components, or toolkit, of "symbols, stories, rituals and worldviews that people have access to, to solve different problems" (p. 273). With these toolkits, people have access to certain habits, skills, and styles from which they can construct strategies of action, including action for adaptation. Access to these strategies of action is also impacted by structural forces (e.g., colonialism) and resources (e.g., financial resources), which shape and constrain actions.

Indigenous Cultures: A term in this report used to refer to the multiple Indigenous cultures and ways of knowing, being, and doing across what is referred to as Canada. This term is limiting and does not accurately depict the multiplicities of cultures present on these lands.

Settler Cultures: We employ this term to bring attention to the norms, values, knowledge systems, etc. that shape the ways of life of European settlers in Canada. This term is also limiting – it does not accurately depict the nuances present in these ways of life. It is used as a general term to make visible the fact that being 'settler' in Canada is also shaped by culture.

Background

Rural Canada is a diverse and continuously changing space that is home to Indigenous peoples, settlers, and recent and temporary immigrants (CRRF, 2021). Approximately 17.8% of Canada's population, about 6.6 million people, live in areas with less than 1,000 inhabitants (Statistics Canada, 2022). In this geographic space exists multiple 'rural realities' based on differences in location, economic structures, physical landscape, and demographics (Hall & Vinodrai, 2013). Culture is composed of worldviews, beliefs, art, ceremonies, language, stories, rituals, and other symbols of meanings that inform strategies of actions (Swidler, 1986). Present in the rural Canadian landscape is a mosaic of non-homogenous Indigenous, Settler, and immigrant cultures, each resulting in both unique and similar worldviews, beliefs and practices that inform day to day life in rural Canada.

This cultural 'mosaic' has been shaped by socio-political history. The colonization of Turtle Island[1] brought about French and British settler colonies, dispossessed Indigenous peoples of their lands (Harris, 2004) and aimed to eliminate traditional ways of life. While some actions are underway to redress past harms, settler colonialism is ongoing, and continues to shape rural experiences. Throughout colonization, European settlements have been geographically positioned for natural resource extraction from lands of what is now called Canada. The movement of rural populations continues to be shaped by changing resource demands and corporate consolidations, requiring communities to shift and adapt alongside market demands (Parkins & Reed, 2013).

Rural communities are currently facing several challenges including outmigration (particularly youth), boom-bust economies, lack of services and programs, unemployment and limited economic opportunities, and now challenges from climate change. The year 2023 brought about a record-breaking wildfire season, high summer temperatures, and continued changes in precipitation patterns across Canada (Agriculture and Agri-Food Canada, 2023; Natural Resources Canada, 2023). Increased ice and snow losses and coastal erosion from rising sea levels are impacting communities by disrupting traditional ways of existing on the land (Ford et al., 2018; Middleton et al., 2020). Climate adaptation is urgently needed to reduce the climate risks and vulnerabilities experienced by communities. As climate change progresses, rural cultures and climates are co-adapting and evolving.

Culture frames the way that people understand, experience, and respond to climate change (Roncoli et al., 2009). Climate change is impacting culture by threatening existing values and cultural expressions (Adger et al., 2013). On the other hand, chosen adaptation actions and their success are heavily influenced by culture, which can mediate adaptation, be a barrier to adaptation, or generate new ideas for adaptation (Pisor et al., 2023). As rural communities experience, recover from, and prepare for ongoing climatic change, understanding culture's role in shaping adaptation decisions is crucial to inform strategic adaptation actions taking place, and to ensure the wellbeing of communities in rural Canada.

[1] Turtle Island is a name for North Ameria used by multiple Indigenous peoples. It refers to North America without the geo-political boundaries of Canada to reflect the land before colonization, before nation boundaries were imposed by European settlers (Whose Land, n.d.).

To increase our understanding of the relationship between climate adaptation and culture in rural Canada, we synthesized existing literature through two scoping reviews. This report provides an overview of our findings, and recommendations for how to implement these findings into policy and practice.

Objectives

This project's objectives were to:

1) Systematically compile a database of existing knowledge on how climate change and adaptation interact with culture and conduct a meta-study to identify evolving research methodologies and knowledge gaps.
2) Conduct an exploratory scoping literature review and narrative synthesis to understand what is known about climate adaptation and rural culture in Canada.
3) Gather existing resources to support rural communities in climate adaptation and compare them to findings from objectives 1 and 2.
4) Identify climate adaptation actions and opportunities for evolving rural climate cultures.
5) Develop practical recommendations for integrating findings on rural cultures in adaptation programs and practices in rural Canada.

Methods

Positionality

Our team was composed of five people. Bryanne Lamoureux is an early career researcher in the Environment and Society Co-Lab, where she has worked as a Research Associate for 2.5 years. She is a settler with French, Scottish and Irish ancestry and guest on Treaty 1, where she grew up in a small French town near Winnipeg. Sara Sawatsky is a white-settler with Mennonite heritage born in Winnipeg, Manitoba. She is a recent graduate from the University of Winnipeg, where she received her Bachelor of Arts (Hons) in Sociology. Shirlyn Kunaratnam is an international student from Sri Lanka living in Brandon, Manitoba. She recently graduated from Brandon University with a Master of Arts in Rural Development and is currently working as a researcher at the Rural Development Institute. Ryan Bullock is Canada Research Chair and Professor in Environmental Studies and Sciences at UWinnipeg. His North American family roots are in Quebec and Vermont, with links to England and Scotland. Wayne Kelly is the Director of the Rural Development Institute at Brandon University, focusing on rural research, policy and issues in Manitoba and beyond. He is a first-generation white Canadian settler with European roots, and grew up in northern and rural Manitoba, splitting his childhood between Thompson and a small farm near Portage la Prairie.

Research Approaches

There is increasing concern that climate adaptation research, policy, and planning can fail to address and even perpetuate ongoing inequities and structural vulnerabilities (Byskov & Hyams, 2022; Parsons et al., 2024). To address these concerns and prevent the perpetuation of ongoing inequities, we applied a decolonial and intersectional approach to this work.

Decolonial Approach: Decolonizing research entails decentering Western research paradigms, and centering other forms of knowledge, particularly Indigenous ways of knowing, in research outcomes and processes (Johnson et al., 2022). A decolonial approach to climate adaptation favours equity and sovereignty through active awareness of power relations in climate adaptation research and practice (Johnson et al., 2022). Some of the decolonial practices we applied were:

- Reversing the gaze (Potts and Brown, 2015), where we directed our criticism towards the groups and institutions that hold power in the climate crisis; and
- Taking a cyclical and dialogic approach to deepen our understanding of the material (Chambers et al., 2018) by meeting regularly to have meaningful dialogue.

Intersectional Approach: Intersectionality considers how layers of identity are associated with power and impact individuals' experiences of privilege and oppression as they move through societal structures (Hankivsky, 2014). In this research, an intersectional approach supported us to consider how the structures of colonialism and capitalism[2] are at play in shaping knowledge being created about adaptation and culture in rural Canada. Practices we took include:

- Acknowledging and understanding that the production of research, policies and programs is not separate from the social structures and power relations within which we exist; and
- Purposefully seeking out research by and for diverse groups in rural Canada, which meant also including grey literature.

Research Design

Literature Reviews

Using the framework developed by Arksey and O'Mally (2005) and furthered by Levac et al. (2010), we conducted two scoping reviews on climate change and adaptation. Literature Review 1, a systematic scoping review, meets objective 1. This review took a meta-study approach to qualitatively examine the underlying assumptions of the theories and methods chosen by researchers that inform research findings, recommendations and real-world policies (Paterson et al., 2001; Zhao, 1991). Literature Review 2 followed an exploratory scoping review protocol to map the literature and summarize the key concepts, definitions, types of evidence, relevant factors available pertaining to adaptation and culture in rural Canada.

Federal Climate Adaptation Programs and Budgets

As a final piece of data collection, we reviewed and analyzed:

1. Climate adaptation programs available to communities since 2016. Program descriptions, eligibility, and funding amounts were charted in Microsoft Excel.
2. Federal budgets since 2016. Funding amounts to support adaptation were charted in Microsoft Excel and categorized into themes based on the adaptation action they support.
3. The National Adaptation Strategy, which was published in 2023.

[2] An intersectional approach should also consider how structures of white supremacy and patriarchy impact culture and adaptation. This report does not sufficiently consider the impacts of these structures – further research is needed.

Figure 1: Literature Review Protocols

	LITERATURE REVIEW 1	LITERATURE REVIEW 2
Research Questions	How are interactions between climate change adaptation and culture conceptualized in the literature?	How are climate change and adaptation interacting with and evolving rural culture in Canada?
Databases	ProQuest; JSTOR; EBSCOHOST; Web of Science; Google Scholar	ProQuest; JSTOR; EBSCOHOST; Science Direct; PubMed; Elsevier; Google Scholar
Search Terms	**Adaptation** • Climate change • Climate adaptation • Adaptive capacity • etc. **Culture** • Cultur* • Worldviews • Cultural value* • etc. E.g. "Climate adaptation strateg*" AND "cultur*"	**Culture** • Cultur* • Worldviews • Value* • etc. **Adaptation** • Climate change • Climate adaptation • etc. **Geography** • Rural • Remote • Prairie* • etc. E.g. Rural AND "Climate Adaptation" AND Culture AND Canada
Selection Criteria	**Inclusion**: Studies in English and French that discuss interactions between culture and adaptation **Exclusion**: Literature specific to rural Canada	**Inclusion**: Studies in English and French that discuss rural Canada, culture, and climate adaptation **Exclusion**: Literature on urban centers in Canada and about rural culture in other countries
Final Selection	63 peer-reviewed 3 grey literature	64 peer-reviewed 13 grey literature

Coding Strategy	• Descriptive Details (e.g., field of study)
	• Definitions of Adaptation
	• Definitions of Culture
	• Components of Culture
	• Directionality of Relationship Between Culture and Adaptation
	• Recommendations and Knowledge Gaps
	• Meta-Analysis Approach
	  ◦ Theoretical Approaches
	  ◦ Methodological Approaches
	  ◦ Data Collection and Analysis
	  ◦ Evaluation and Comparison
		• Descriptive Details (e.g., field of study)
		• Definitions of Adaptation
		• Definitions of Culture
		• Components of Culture
		• Directionality of Relationship Between Culture and Adaptation
		• Recommendations and Knowledge Gaps
		• Type of Rural Context
		• Types of Knowledges Informing Study
		• Emergent Findings on Rural Culture and Adaptation

Collating Approach	Meta-analysis codes: Iterative and Reflexive Others: Narrative Synthesis	Narrative Synthesis Organized in Thematic Codes and Supported by Text and Visuals

Results

Descriptive Overview

Literature Review 1: Culture and Adaptation

The initial search for Lit Review 1 produced 128 results. After reading all abstracts and articles, 65 articles were eliminated based on inclusion/exclusion criteria. 63 peer-reviewed articles and three grey literature documents were included in the final analysis. The grey literature articles were not included in the meta-analysis as they did not conduct primary research. However, their results were included in the definitions, cultural components, and recommendations sections.

Figure 2: Articles by Academic Discipline

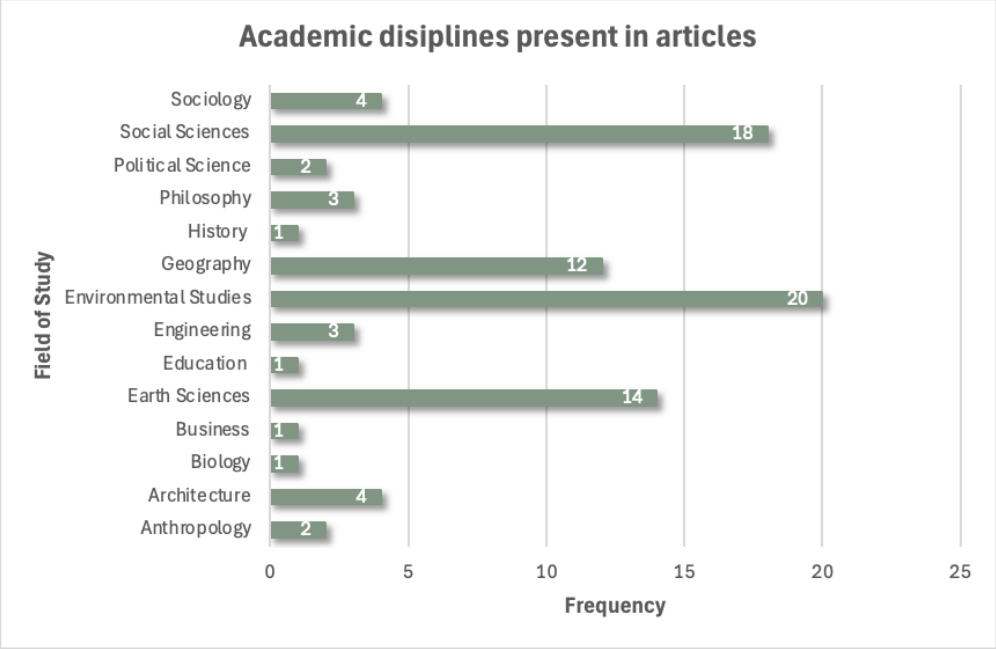
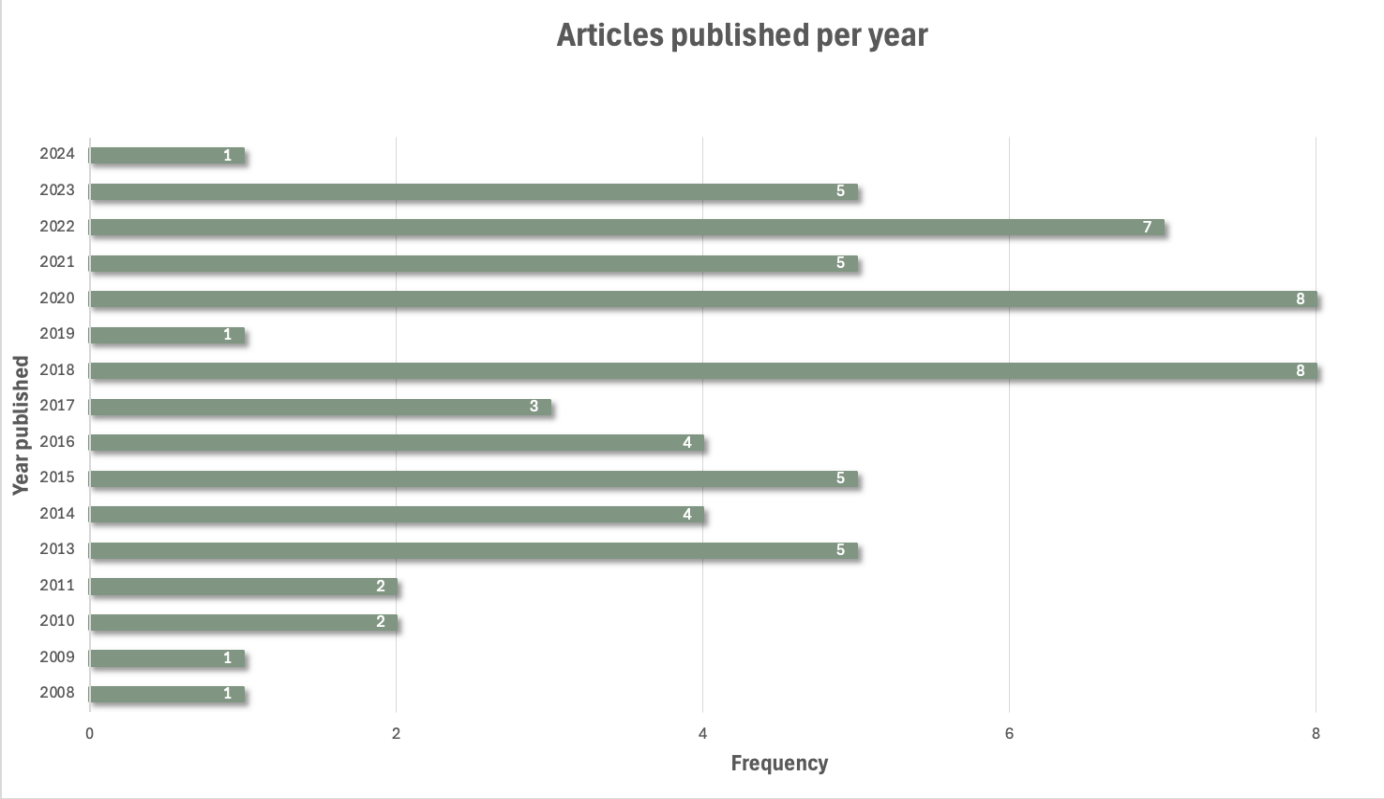


Figure 3: Articles by Year Published



Literature Review 2: Culture and Adaptation in Rural Canada

The initial search for this exploratory scoping review identified 87 journal articles (71 in English, 16 in French) and 25 sources of gray literature. After review, 64 journal articles (59 in English, five in French) and 13 gray literature sources were included in the final analysis; 33 journal articles and 12 gray literature sources were excluded because they did not explicitly discuss cultural components related to climate adaptation in rural Canada.

Figure 4: Articles by Academic Discipline

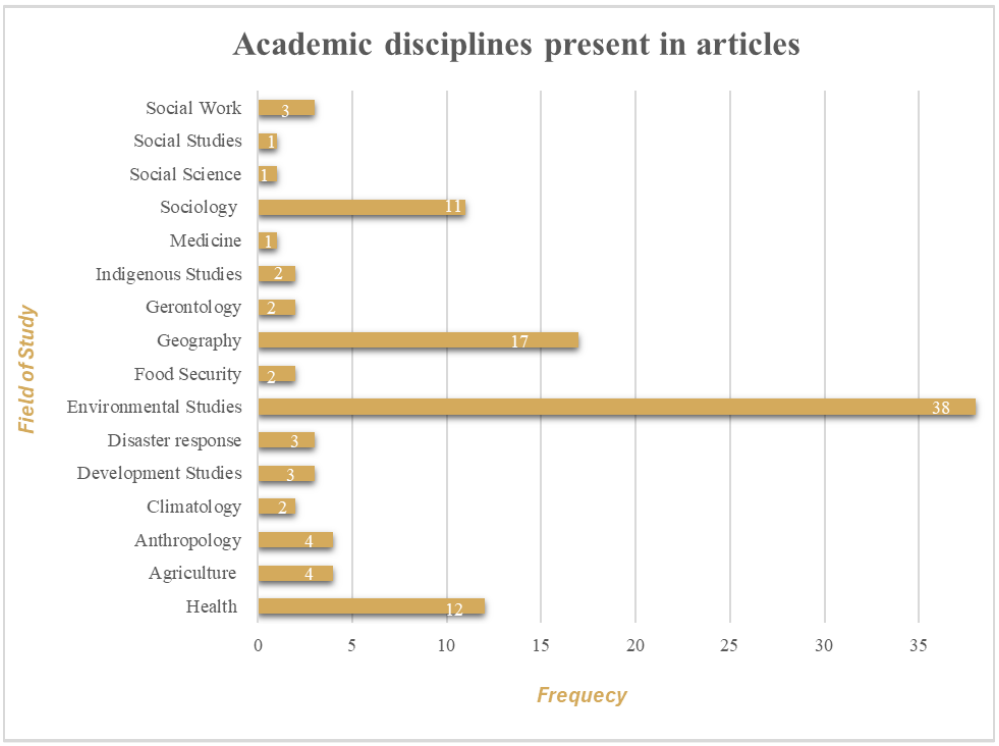
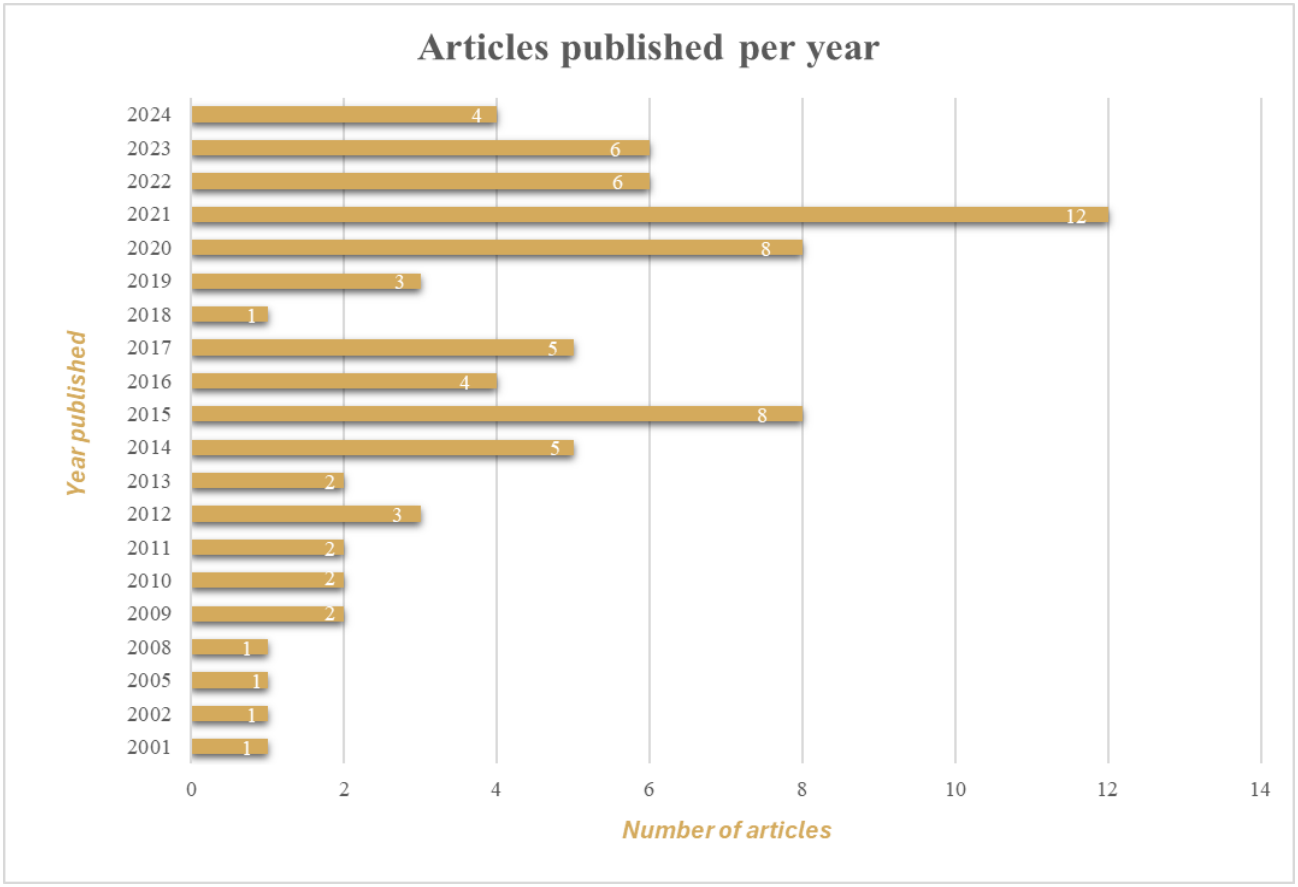


Figure 5: Articles by Year Published



Definitions of Culture

For Literature Review 1, 12 peer-reviewed articles provided clear definitions of culture. No definitions were provided in the articles from Literature Review 2.

Culture was most frequently conceptualized as the customs, values, attitudes, norms and beliefs that give meaning to everyday life and guide actions (e.g., Landauer et al., 2014; Leck, 2017). Four articles included material products of art, clothing, and heritage sites, and immaterial phenomena such as social relations and political ideologies in their definitions (e.g., Järvelä, 2023; Murphy et al., 2016). In some articles, the definition of culture included "shared knowledge" between individuals and groups passed on from generation to generation and modified across time and space (e.g., Miller Hesed et al., 2022). As a function of culture, the shared knowledge, attitudes, values and beliefs were believed to impact the adaptive behaviours people choose to enact (e.g., Heimann & Mallick, 2016; Walshe & Argumedo, 2016). From this interpretation of the literature, culture is socially constructed and plays a significant role in mediating actions taken for climate adaptation.

Crona et al. (2013) used a Cultural Consensus Analysis (CCA) approach that views culture as "in the mind, not in artifacts or enacted behaviour" (p. 521). Similarly, using CCA, Miller Hesed et al. (2022) emphasized that culture is reproduced through shared cognitive framings. For these scholars, culture exists where cultural consensus (i.e., shared knowledge) exists (Crona et al., 2013; Miller Hesed et al., 2022). This interpretation of culture suggests that "cultural competence" is measured by how much people have shared understandings of climate change.

Several scholars suggested people choose adaptive behaviours that align with their cultural beliefs, values, worldviews and perceptions (e.g., Kairimi & Ataei, 2022; Price et al., 2014). Leck (2017) stated that culture works in more complex and contradictory ways; drawing on foundational cultural theorists Swidler and Heyd, Leck proposed that culture provides people with a 'toolkit' of habits, skills and styles that influence action for adaptation, and that it is not a unified system that leads to action in a consistent, linear path. Additional scholars suggested that culture provides diverse and contradictory strategies of action, which people select according to the adaptive tools and habits they have access to (e.g., Bremer & Schneider, 2024). This more complex understanding of culture's role in adaptation recognizes that people draw on diverse and sometimes contradictory tools to adapt to climate change.

These articles clearly demonstrated that culture plays a significant role in determining climate adaptation beliefs and practices. The presence of culture at many levels of society carries important significance for studying climate adaptation and creating criteria for "success" (McNeely & Lazrus, 2014). The absence of a definition of culture in the majority of the literature under review emphasizes how even when it is a central concept for a study, it is often poorly conceptualized. This absence limits the number and range of developed understandings of how culture may influence climate adaptation. Poor conceptualizations of culture may also lead to inaccurate and inappropriate conclusions about the interactions between climate change adaptation and culture.

Cultural Components in the Literature

Each article in the review focused on at least one component of culture in relation to climate adaptation. By cultural component, we mean the 'tools' that are currently being used for climate adaptation by study authors and communities. Figure 6 provides an overview of the cultural components identified in each review. These are discussed further throughout the report.

Figure 6: Cultural components identified in Literature Reviews 1 and 2

Research on Culture and Adaptation: Meta-Study Results

Theory

From 63 articles, 19 included a clearly defined theoretical framework that informed their research. Studies took two distinct approaches for explaining how climate adaptation beliefs and practices relate to culture – individualist (11 studies) and structural (nine studies).

Studies that adopted an individualistic theoretical approach to explaining adaptation (Table 1) tended to use individual values as the unit of analysis for explaining adaptive beliefs and behaviour. They suggested that adaptive beliefs and behaviour can be explained by variation in individual values, attitudes and worldviews. As individualist theoretical frameworks operate from the assumption that individuals choose adaptive behaviours that best align with their cultural values and beliefs, theories such as Cultural Theory of Risk, Knowledge Cultures, Cultural Cognitive Sociology and Theory of Normative Conduct suggest that adaptive capacity is mediated by individual levels of motivation and individual cognitive systems. By choosing theoretical frameworks with individualist approaches, these studies used individual values, attitudes and worldviews to explain the adaptive pathways people choose to enact.

Table 1: Overview of Theoretical Frameworks

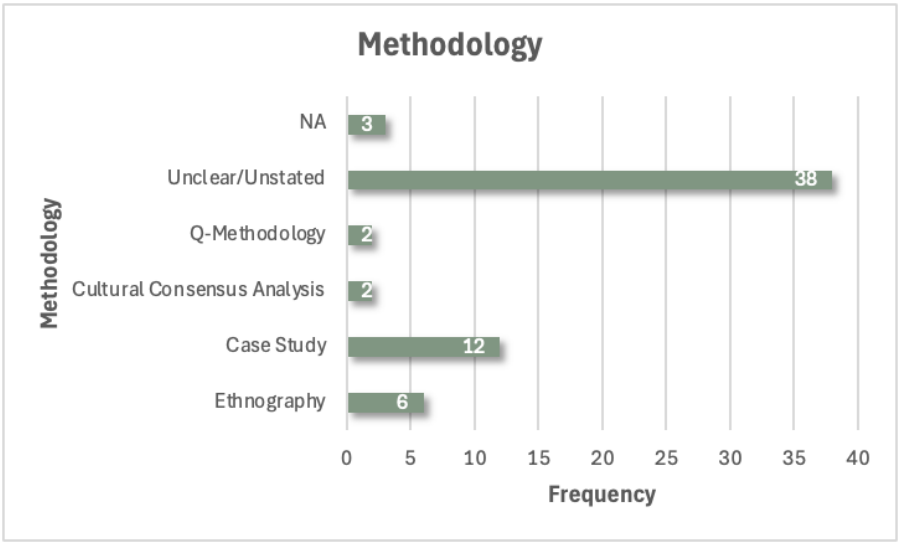
	Theory/Framework	Citation
Individualist	Knowledge Cultures	Bohensky et al. (2016)
	Cultural Consensus Analysis (CCA)	Miller Hesed et al. (2022); Crona et al. (2013)
	Theory of Normative Conduct	Etana et al. (2021)
	Cultural Cognitive Sociology	Skelton (2020)
	Structured Decision Making (SDM)	Fatorić & Seekamp (2017)
	Values-Based Approach	Nursey-Bray & Palmer (2018)
	Cultural Theory	Karimi & Ataei (2022); Price et al. (2014); Shi et al. (2015)
	Cultural Theory of Risk	McNeely & Lazrus (2014)
	Model of Private Proactive Adaptation to Climate Change	Kuruppu & Liverman (2011)
Combined	Values-Beliefs-Identifies Model & State-and-Transition Model	Heimann & Mallick (2016)
Structural	Sustainable Livelihoods Framework (SLF)	Kuruppu (2009)
	Seasonal Cultures	Bremer & Schneider (2024)
	Socio-Ecological Systems Framework	Dastgerdi et al. (2022)
	Afrocentricity	Mugambiwa 2018
	Cultural Toolkit Theory	Leck (2017)
	Cultural Politics Perspective	Kurian et al. (2021)
	Capital Theory Perspective	Van Praag (2023)
	Cultural Ecosystem Services (CES)	Maharja et al. (2023)
	Institutional and socio-cultural framework (ISA-framework)	Van der Brugge & Roosjen (2015)

Studies that applied a structural approach (Table 1) focused on how power, politics and access to resources influence people's adaptation pathways. Theories like the SES framework and the Cultural Politics Perspective, Cultural Toolkit Theory and Afrocentricity emphasized that adaptive pathways are situated in political-economic structures bound to complex power relations. Structural perspectives suggest that adaption beliefs and practices are mediated by the economic, social and cultural resources that people can access. This assumption is clearly referenced in Seasonal Cultures and Capital Theory Perspective, whereby factors such as access to knowledge and capital become the unit of analysis used for explaining the cultural elements of adaptation. Adaptive strategies of action are thus enabled and restrained by varied access to resources and institutional, political, and economic forces.

One study took a hybrid theoretical approach by combining the Values-Beliefs-Identities framework (VBI) and the State-and-Transition model (Heimann and Mallick, 2016). The VBI framework adopts an individualistic explanation of climate change related behavior by focusing on the values, beliefs and identities of individuals, while the state-and-transition model focuses on the impact that social capital and networks have on climate change adaptation behavior. Heimann and Mallick (2016) combined these frameworks to create an enhanced explanatory framework of "climate adaptation cultures".

Methodology

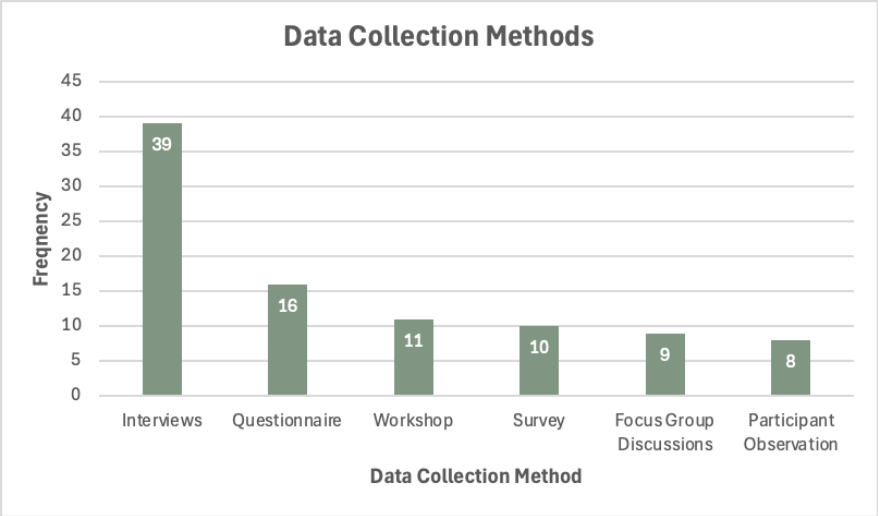
Figure 7: Methodologies identified in the meta-analysis



The methodologies utilized in these studies on climate adaptation and culture were i) case study; ii) ethnography, iii) Q-methodology and iv) cultural consensus analysis. Only 22 of 63 articles included a discussion on methodology. A case study approach, used to provide in-depth examinations of a specific phenomenon in its real-world context, was applied in 12 papers (e.g., Tindan et al., 2023; Van der Brugge & Roosjen, 2015). Ethnography, a qualitative approach used for studying human interactions in their cultural contexts, was used in six papers (e.g., Bremer & Schneider, 2024; Nielsen & Reenberg, 2010). Two papers employed Q-methodology, which is a quantitative tool for measuring and comparing subjective opinions and experiences (Jooste et al., 2018; Terblanche-Greeff et al., 2018). The remaining two papers used cultural consensus analysis (CCA), a quantitative approach used to measure variability in cultural competence (Crona et al., 2013; Miller Hesed et al., 2022).

Data Collection Methods

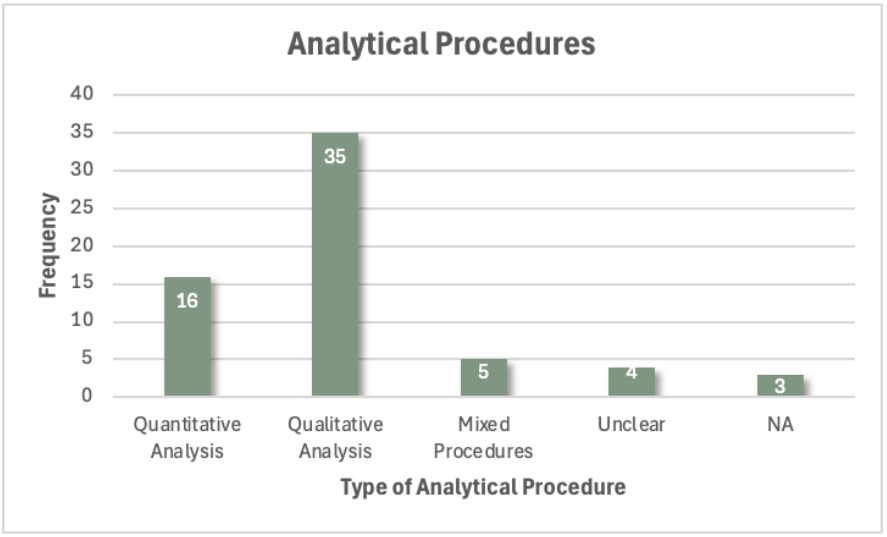
Figure 8: Data collection methods identified in meta-analysis



As shown in Figure 8, interviews were the most common data collection method (e.g., Adaawen, 2021; Sowah et al., 2021). Almost all studies utilized multiple data collection methods. For example, seven studies conducted semi-structured interviews and questionnaires (e.g., Bayrak et al., 2020; Gautam et al., 2013). Five studies combined interviews and focus groups to capture rich qualitative data on participants' diverse experiences with climate adaptation (e.g., Granderson, 2017; Tindan et al., 2023).

Data Analysis

Figure 9: Analytical procedures identified in meta-analysis



While most of the data collection methods employed by researchers collected qualitative data, there was more variation in analytical procedures; 35 studies performed exclusively qualitative analyses of data such as thematic analyses of interviews (e.g., Hosen et al., 2020), and 15 studies conducted exclusively quantitative analytical procedures of qualitative and quantitative data. Statistical analyses were conducted on data from surveys, questionnaires, interviews, and workshops (e.g., Abdelzaher & Martynov, 2023). Five studies used a combination of qualitative and quantitative analytical procedures to interpret data collected from interviews, focus group discussions, surveys and questionnaires (e.g., Bayrak et al., 2020).

Meta-Analysis and Global Cultural Components

This section represents the cultural components, or 'tools' applied in studies to understand adaptation in the reviewed literature. We then relate these cultural components to the results that to theoretical, methodological, and analytical procedures chosen by researchers, and how this impacts scholars' conclusions about culture and climate adaptation.

Table 2: Cultural Components and their concurrent findings from the meta-analysis

Cultural Component	Description
1.1. Values, Beliefs and Worldviews	24 papers discussed how values, beliefs, and worldviews influence climate change adaptation beliefs and behavior (e.g., Shi et al., 2015; Tindan et al., 2023)
1.2. Cognition & Mental Structures	Seven articles looked at cognitive and mental structures as the cultural component that impacts climate change risk perception and willingness to adapt (e.g., Adaawen, 2021; Jooste et al 2018). Cultural beliefs and attitudes are thought to lie and be identifiable in the cognitive systems of individuals and to shape climate change risk perception and response (Jooste et al., 2018; Price et al., 2014).
Cultural Values Impact Beliefs About Climate Change and Adaptation Behaviour: Several papers (22) concluded that individual's cultural values, attitudes, perceptions, worldviews and beliefs significantly impacted climate adaptation beliefs and behaviour. For example, Bayrak et al. (2020) found that Tayal people's cultural perception that climate-related disasters are a normal part of life means they see themselves as recovering from climate-related disasters more quickly than non-Tayal peoples. Studies with clearly stated theoretical frameworks drew from individualist theoretical frameworks (e.g., Cultural Theory adopted by Karimi & Ataei, 2022). Many of these conclusions were made using statistical analyses of questionnaire, survey and interview data (12 studies), while others (four studies) performed qualitative analyses of interview and workshop data.	
Cultural Beliefs Influence Climate Change Risk Perception: Five studies found that cultural beliefs and socioeconomic factors influence climate change risk perception. For example, applying individualist theoretical perspectives to examine risk perception, McNeely and Lazarus (2014) and Etana et al. (2021) foundthat the way people perceive climate change risk is informed by cultural worldviews and access to information. These findings were produced from semi-structured interviews, questionnaires, focus groups, and participant observations.	
1.3. Social & Cultural Norms	Social and cultural norms were viewed as shaping and restraining adaptive capacity at the individual and institutional levels (e.g., Abdelzaher & Martynov, 2023; Etana et al., 2021). Social norms are the perceived social pressure to subscribe to certain beliefs and behaviors (Etana et al., 2021; Karimi & Ataei 2022). Cultural norms are cultural expectations of behavior (e.g., land-use arrangements) that influence adaptive behavior (Kuehne, 2014; Sowah et al., 2021).
1.4. Power, Politics & Capital	These papers discussed how structural components of culture like power, politics and capital (social, cultural and economic capital) influence the production and practice of climate change adaptation strategies (e.g., Leck, 2017; Van Praag, 2023). The unequal distribution of power and forms of capital were determined as significant predictors of climate change impacts and access to adaptation pathways.
Adaptive Capacity is Determined by Social, Economic, and Political Resources and Barriers: Findings from 11 studies identified that access to social, financial, institutional, and political capital had a significant impact on the (in)accessibility of adaptive pathways (e.g., Gautam et al., 2013; Van Praag, 2023). Structural theoretical perspectives were applied in three of these studies (e.g., Leck, 2017). Cultural barriers to adaptation (institutional, financial, and political) were highlighted through the quantitative analysis of interview and survey data (three papers) (e.g., Jooste et al., 2018) and the qualitative analysis of interviews, workshops, participant observation, and questionnaires (seven papers) (e.g., Daly et al., 2022). Seven papers found that lack of economic resources and financial support considerably impact adaptive capacity.	

Diverse Cultural 'Toolkits' Lead People to Draw on Diverse Strategies of Action: Using structural approaches, seven studies found that culture leads people to draw on diverse, at times conflicting, components of their cultural 'toolkit' to inform adaptation strategies (e.g., Bremer & Schneider, 2024; Leck, 2017). With the understanding that adaptation strategies are enabled and constrained by varying levels of social capital (e.g., social networks), cultural capital (e.g., education), and economic capital (e.g., money), semi-structured interview data revealed that groups intentionally and skillfully create strategies that best align with the material and immaterial resources they have access to and know how to use (e.g., Bremer & Schneider, 2024; Leck, 2017).	
1.5. Religion	These papers determined that religion impacts beliefs about climate change and adaptation (e.g., Inaotombi & Mahanta, 2019; Murphy et al., 2016). Religion refers to beliefs and practices maintained by groups and individuals based on spirituality, mysticism and faith in divinity (Jellason et al., 2023; Murphy et al., 2016).
Religious Beliefs Influence Adaptation 'Toolkits': Five studies found that religious beliefs are another cultural tool that inform adaptive practices and resulting actions or inactions (e.g., Inaotombi & Murphy et al., 2016; Leck, 2017). These findings are informed by semi-structured interviews.	
1.6. Cultural Heritage & Landscapes	Cultural heritage and landscapes were found to impact local adaptation (e.g., Fatorić & Biesbroek, 2020). Cultural heritage was generally defined as i) the tangible features such as buildings, ancient monuments and natural landscapes, and ii) intangible qualities such as folklore, knowledge, and traditions (Dastgerdi et al., 2022; Fatorić & Biesbroek, 2020; Granberg et al., 2022).
Climate Change Threatens Cultural Heritage: Four studies demonstrated that communities encounter significant barriers to effectively protecting cultural heritage against climate change effects. Barriers included a lack of political, financial, educational and managerial support (e.g., Daly et al., 2022; Granberg et al., 2022). Mixed method analyses of interviews, questionnaires, workshops and focus groups concluded that more of these resources and increased communication between sectors (academic institutions, government, and local management) are needed to protect cultural heritage (Daly et al., 2022; Granberg et al., 2022).	
1.7. Indigenous & Traditional Ecological Knowledge	Indigenous knowledge systems and TEK were identified as a cultural resource for climate change adaptation (e.g., Chrisholm Hatfield et al., 2018; McIntyre-Tamwoy et al., 2013). Indigenous knowledge systems are an important component of culture in climate adaptation literature; the knowledge, practices and beliefs of Indigenous peoples across the world serve as a critical resource for adaptive capacity.
Indigenous and Traditional knowledges are needed for adaptation: All 14 papers that studied the adaptation beliefs and practices of Indigenous communities concluded that traditional strategies of adaptation offer effective tools for adapting to climate change (e.g., Gautam et al., 2013; Hill et al., 2020; Hosen et al., 2020). Indigenous knowledge systems from around the world provide tools, traditions, beliefs and cooperative management techniques needed for effective local adaptation to climate change (e.g., Chisholm Hatfield et al., 2018; Garai et al., 2022). These diverse material and immaterial tools included the values of respect and mutual support, strong leadership, and localized knowledges (Granderson, 2017; Reid et al., 2014).	

Climate Adaptation and Culture in Rural Canada: A Narrative Overview

Climate change is impacting communities in rural Canada in diverse rural geographies. Those in northern regions are experiencing drastic changes from accelerated sea ice melt, unpredictable weather patterns, and rising temperatures that are impacting infrastructure and putting livelihoods at risk (Ford et al., 2016; 2020; Ross & Mason., 2020). For remote communities, climate impacts and adaptations are very costly; they disrupt transportation routes and migration patterns of wildlife needed for food security, causing increased reliance on costly forms of transportation and imported food (Buss et al., 2021; Vogel and Bullock, 2021). On the coasts, rising sea levels, erosion, and increasingly frequent storms are impacting traditional food harvesting and settler agricultural activities (Guillemard & Lapointe, 2020; Reid et al., 2014). They are also leading to loss of land, infrastructure, and cultural heritage (Vasseur et al., 2017). On the prairies, warming temperatures are causing more frequent droughts, flooding, and extreme weather events, which threaten crop yields and agricultural livelihoods (Hurlbert et al., 2024). The Blood Tribe and James Smith First Nations report that climate shifts disrupt access to culturally significant plants like medicinal herbs and berries (Cameron et al., 2021).

Social factors compound climate change's social and health impacts. Frequent storms and flooding contribute to stress, depression, and social conflict, and low median incomes, scarce housing, and rising food costs exacerbate residents' social vulnerabilities (Kennedy et al., 2024; Vasseur et al., 2017). Impacts on land are putting the cultural practices of Inuit, First Nation, and Métis at risk; In the Gitga'at Nation located on the west coast, shifting weather patterns and rising sea levels threaten access to traditional foods, and intensify economic and cultural strain (Reid et al., 2014). Despite these challenges, Indigenous communities are leading climate adaptation initiatives grounded in Traditional Ecological Knowledge. This section reviews key findings identified in the literature focused on rural Canada, including how impacts from colonialism continue to exist in adaptation, the types of knowledges being applied in adaptation, and the broader cultural implications of adaptation.

Colonialism and Adaptation

The literature emphasized how Canada's colonial history shapes climate vulnerabilities. Colonialism is a historical driver of environmental degradation and influences Indigenous communities' adaptive capacities today (Cameron et al., 2021). Cameron et al. (2021) noted that the displacement of Indigenous peoples due to climate change is a continuation of colonial removal, both geographic and psycho-cultural. Kennedy et al. (2024) highlighted that the responsibility of addressing climate change mitigation and adaptation should not be handed over to researchers because of the inequities inherent in data collection, integration, and analysis systems. They argued that these systems are embedded in colonial and capitalist structures that perpetuate and deepen the climate crisis, and therefore, it is essential to challenge the dominance of these epistemologies and ensure Indigenous and local knowledge systems are the foundation of a more inclusive and just approach to climate adaptation.

Colonialism has also directly impacted Canada's rural landscape, making it less adaptive to climatic changes. For example, the historical shift in the Prairie ecozone from Indigenous stewardship to export-oriented agriculture due to settler and government colonialism has increased the ecological vulnerability of the Prairies as climate change introduces heightened risks (Thiessen, 2022). Thiessen (2022) concluded that ecosystem restoration in the prairies will require settler farmers and others to adapt their worldviews to their local socio-ecological systems and require a significant change to the existing food production system.

Types of Knowledges applied in Climate Adaptation in Canada

The types of knowledge informing climate adaptation in rural Canad include Indigenous knowledges, traditional ecological knowledges (TEK), local knowledges, and Western scientific knowledges, each offering unique perspectives and insights. A total of 33 peer-reviewed articles and five grey literature pieces discussed the implications of different types of knowledges and considerations for adaptation.

Indigenous Knowledges and Traditional Ecological Knowledges

Indigenous Knowledges (IK) and Traditional Ecological Knowledges (TEK) describe the deep, place-based understandings and practices developed by Indigenous peoples over generations. TEK is often viewed as a subset of IK, explicitly focusing on ecological and environmental knowledge, including sustainable resource management and adaptive strategies to environmental changes. While the two names are sometimes used interchangeably, IK encompasses a broader spectrum, including cultural, spiritual, and social dimensions (Cameron et al., 2021). In contrast, TEK is more narrowly centered on ecological relationships and practices (Ford et al., 2017). A central element of IK in climate adaptation is its place-based and culturally rooted understanding of environmental changes. Willox et al. (2012) and Reid et al. (2014) emphasized that IK, with its holistic and culturally grounded approach, provides insights to implement effective climate adaptation strategies that aligns with the Indigenous communities. For example, Akearok et al. (2019) highlighted how Inuit concepts such as Piliriqatigiinniq (working together for the common good) and Unikkaaqatigiinniq (the philosophy of storytelling) guide climate adaptation efforts by embedding traditional values and communal cooperation into decision-making. Berkes & Jolly (2002) described how Indigenous communities use traditional knowledge to adjust seasonal hunting patterns and diversify resource use in response to environmental changes, embedding climate adaptation within culturally ingrained practices.

Local Knowledges and Climate Adaptation

Local knowledge encompasses the lived experiences, observations, and practices, of Indigenous and non-Indigenous communities. Incorporating local values into climate planning processes improves the identification of priorities for adaptation, and support successful implementation (Reid et al., 2014). Reid et al. (2014) highlighted that in marginalized or resource-limited communities in particular, local knowledge is indispensable for adaptation planning, as it compensates for limited access to external expertise and technology. Reid et al (2014), Champalle et al, (2015), MacDonald et al. (2013), and Ford et al, (2017), stated that including local knowledge in climate adaptation supports strategies that are context-specific, practical, and responsive to each community's unique environmental and social conditions. The intimate connection between local residents and their environment allows for adaptation plans to be rooted in practical, real-world knowledge that enhances their effectiveness.

Western Scientific Knowledge

Western knowledge's role in climate adaptation was discussed only in articles that also discussed Indigenous Knowledges and/or Traditional Ecological Knowledges. Golden et al. (2015) stated "in western science, there still exists a mindset that it is superior to TEK in that knowledge that includes 'feelings and spirit' or 'anecdotal' information cannot be measured or quantified and is therefore not scientific" (p.403). Norris (2020) described how Western Science differs from TEK because "there is a time-limited observation process, science usually requires a quantitative validation, and it is often believed and considered valid once written down into textbooks, whereas oral tradition is the knowledge that is embedded within Indigenous ways of knowing" (p.21). Ford et al. (2016) discussed how Western knowledge is often met with mistrust in northern communities due to the damaging

effects of past research practices and ongoing colonial legacies. Hancock et al. (2022) stated that relying solely on a Western science perspective is unlikely to result in sustainable solutions for northern communities, as it follows a linear cause-and-effect approach in contrast to a holistic one.

Integrating Indigenous Knowledges into Climate Adaption Policies

Despite growing recognition of Indigenous knowledge in climate adaptation, integration into policy remains limited and superficial rather than substantive. Champalle et al. (2015) emphasized that few adaptation tools genuinely incorporate Indigenous knowledge to inform policy actions. Labbé et al. (2017) observed that while Inuit Qaujimajatuqangit (IQ) is often acknowledged, its influence is rarely monitored in practice, reducing its potential to shape culturally relevant policies. In these processes, Indigenous peoples are often restricted to the title of "stakeholders" rather than being recognized as autonomous nations (Wale, 2023). According to Ford et al. (2017), these approaches perpetuate colonial governance by maintaining decision-making authority within government agencies, which undermines Indigenous perspectives and limits their impact on policies affecting their lands. The legacy of colonialism continues to impact Indigenous exclusion from environmental governance, with the Intergovernmental Panel of Climate Change identifying colonialism as a factor driving climate vulnerability (Reed et al., 2024). Datta et al. (2024) advocated for centering Indigenous knowledge systems in governance to address these historical injustices. Wale (2023) insisted governments should actively engage Indigenous experts, promoting those with specialized Indigenous knowledge into leadership roles to ensure climate policies respect Indigenous values, protocols, and cultures.

Prioritizing Indigenous Knowledges while integrating Western Knowledges

Certain scholars suggested that integrating Indigenous Knowledges alongside the Western scientific approaches that inform most adaptation planning in rural Canada can enrich understandings of long-term, place-based observations often missing in Western models (Berkes and Jolly, 2002; Labbé et al., 2017; Willox et al., 2012). Valuing and incorporating Indigenous knowledge leads to a more comprehensive understanding than relying solely on Western scientific. There have been successful collaborative initiatives that combine Western science with Indigenous knowledge to build climate adaptation that aligns with community worldviews, cultures, and values, such as the Indigenous Clean Energy (ICE) Network (Wale, 2023). However, currently, the dominance of Western governance structures that guide adaptation perpetuate extractive, top-down approaches, which disregard Indigenous peoples' rights and sovereignty over their lands (Datta et al., 2024). While Indigenous communities rely on long-held practices and values for resilience, especially in the face of unprecedented climate impacts, these forms of knowledge are often overlooked or undervalued within Western frameworks.

Intergenerational Knowledge and Adaptation of Cultural Practices

Transferring knowledge from generation to generation is important for adaptation. Berkes and Jolly (2002) noted that younger generations in northern communities still engage in traditional food preservation techniques; however, there is often an incomplete transmission of skills due to disruptions caused by external influences like colonial policies. Reid et al. (2014) documented how traditional practices, such as sun-drying seaweed, have been adapted to climate change, with individuals finding alternative methods to preserve their cultural practices. Thiessen (2022) reflected on how settler descendants in Saskatchewan will face changes to sense of place, as their connection to managed farm landscapes contrasts with pre-settlement ecosystems that need to be restored for climate resilience. Adaptation efforts must consider the evolving cultural landscapes of Indigenous and non-Indigenous communities, and how this impacts how culture is transferred from generation to generation.

Cultural Components: The Canadian Context

This table showcases the cultural components, or cultural 'tools' that are applied in rural communities to adapt to climate change.

Table 3: Cultural components in rural Canada

Cultural Component	Description
2.1. Indigenous and Traditional Ecological Knowledge	Indigenous Knowledges and Traditional Ecological Knowledge (TEK) are significant cultural components for resilience and adaptation for Indigenous communities. These place-based and culturally rooted understandings of environmental change inform adaptation practices. However, the rapid pace of climate change erodes this knowledge by disrupting the ecosystems that form its foundation and impact communities' cultural and environmental resilience (Manrique et al., 2018; Ross & Mason, 2020).
2.2. Land-based Practices	Land-based practices are a cultural component repeatedly present in climate adaptation literature, particularly for Indigenous communities. Cameron et al. (2021) exemplified this by quoting Melina Laboucan-Massimo (Lubicon Cree from Northern Alberta): "we are the land and the land is us, there is no separation" (p. 374). In addition to informing adaptation, land-based practices serve as healing rituals (Cameron et al., 2021; Datta et al., 2024) and to reassert cultural values like collectiveness (Reid et al., 2014). Traditional food practices such as hunting, fishing and gathering are also part of this cultural component. These practices among Indigenous groups like the Gitga'at and Nuxalk nations, reinforce self-sufficiency and environmental stewardship (Reid et al., 2014; Wolf et al., 2013). Land-based activities by non-Indigenous communities like farming are also rooted in culture and rural integrity (Guyadeen & Henstra, 2023). This settler land-based relationship intertwines with natural resource economies often present in rural communities.
2.3 Natural Resources Economies	Many rural communities in Canada depend on natural resource extraction to 'make a living', and cultural identities have been built around these ways of life (Guyadeen & Henstra, 2023). This includes natural resource economies based on mineral, fossil fuels, forestry, animal husbandry, agriculture, fisheries, and more recently tourism. For example, in Saskatchewan, the extraction of minerals is both vital for economic survival and deeply tied to cultural identity (Campbell-Gale et al., 2023). Because of this relationship to the natural environment, communities rely heavily on natural resources to sustain their culture identity and way of living. Climate adaptation in these contexts is thus often seen as figuring out how these economies can continue to exist by adapting them to predicted changes.
2.4 Social Capital	Social capital includes the relationships, networks, and social ties within a community, and is present in the literature as crucial component of resilience to climate change in rural communities. Social capital is a functional and cultural asset, reinforcing values like trust, reciprocity, and solidarity (Fletcher et al., 2020). It is passed down through generations, serving as a cultural resource that helps communities respond effectively to uncertainties (Vasseur et al., 2022). In agricultural communities, social capital is closely linked to the collective management of resources (Thiessen, 2022). In Acadian coastal communities, local organizations and collectives that connect community members are credited as playing a key role in creating belonging and integrating residents into local community adaptation (Noblet et al., 2016; Rabeniaina et al., 2014). Changes in demographics, like the arrival of new residents to established towns, can impact cohesion and increase vulnerability to climate change

	(Weissenburger et al., 2016). While not referred to as social capital, Munro et al. (2021) talked about the Blackfoot concept of *ispommitaa* (help out, assist) and how it fosters connection, cooperation, and a sense of belonging, serving as the foundation for culturally safe community care during flood recovery efforts in Siksika land.
2.5 Cultural Rights	Cultural rights is a cultural component present in the grey literature. With fishing, hunting, gathering, social and cultural ceremonies being constitutional rights, Teegee (2020) argued that climate change undermines Indigenous cultural rights by eroding the ecosystems essential for their traditional practices and thereby making it impossible to exercise these rights meaningfully. Human Rights Watch (2020) stated that Indigenous peoples have the right not only to practice but to protect and control their ancestral lands and resources. To protect these cultural rights, Human Right Watch (2020) suggested taking measures to recognize Indigenous land rights, prevent resource degradation, respect Indigenous autonomy, and return lands.
2.6 Private Land and Infrastructure	Protecting private land emerged as a key cultural component, particularly in coastal settler communities. In Noblet et al. (2016), residents in coastal communities used collective action to convince the government to provide financial and technical support to protect housing. The development of private land was also identified as crucial tax revenue income for municipal government. This discourages adaptation actions from fear of scaring away future residents, and favours private development interests (Noblet et al., 2016; Weissenburger et al., 2016).
2.7 Governance Systems	In eastern coastal communities, provincial and regional governments impact adaptative capacity (Noblet et al., 2016; Rabeniaina et al., 2014). Noblet et al. (2016) found that communities with a municipal government were more likely to reach a level of social capital that is economically and politically effective for adaptation, while communities with limited local governance (e.g., districts) have more difficulty reaching that effectiveness, even if levels of collective action are similar across communities. Guillemard and Lapointe (2020) found that even with funding, the municipal government of Rivière-de-Loup lacks tools for adaptation.
2.8 Health and wellbeing	This cultural component was present for Indigenous communities. It intersected with other components above, particularly land-based practices. Land-based practices and the health of the land are crucial for the well-being and identity of Indigenous communities, and for effective climate adaptation (Akearok et al., 2019). For example, hunting and fishing reinforce physical and mental health, and increase resilience to climate change (Willox et al., 2012). This cultural component should be viewed not from the Western perspective of health, but from health as understood from Indigenous knowledge systems. Concerns about health were also present in non-Indigenous communities, however these focused on the impacts climate change on health (e.g., Eyzaguirre et al., 2022) rather than health being applied as a tool for adaptation.

Challenges of Ignoring Cultural Dimensions

Drolet (2012) warned that adaptation strategies that neglect socio-cultural dimensions risk marginalizing or losing critical cultural practices. Policies that fail to incorporate cultural values and traditions often struggle to align with community needs and motivations (Ford et al., 2016; Whitney et al., 2020). Whitney et al. (2020) emphasized that Indigenous values, such as spiritual connections to the land, are crucial for enhancing the cultural alignment and overall effectiveness of adaptation efforts. By failing to consider socio-cultural dimensions, adaptation strategies risk undermining the very communities they aim to support (Drolet, 2012). These findings collectively underscore the importance of integrating cultural dimensions into climate adaptation policies and practices.

Directionality of Relationship Between Adaptation and Culture

Culture has an impact on Climate Adaptation (Culture → Adaptation)

Global Context (35 papers)	Canadian Context (30 papers)
The components of culture of 1.1 worldviews, values, and beliefs; 1.2 cognition and mental structures; 1.3 religious beliefs; 1.4 social and cultural norms; and 1.5 power, politics and capital can have significant impacts on adaptive capacity, adaptive beliefs, and strategies for adaptation.	Culture shapes adaptation strategies in rural Canada. Adaptation strategies must be culturally relevant to succeed in communities (Labbé et al., 2017; Udas et al., 2021). Policies incorporating Indigenous values, such as harmony with nature and respect for traditions, are more likely to strengthen community-driven actions, while neglecting these cultural dimensions often leads to policy failures (Buss et al., 2021; Drolet, 2012; Ford et al., 2016).

Climate Adaptation has an impact on culture (Adaptation → Culture)

Global Context (six papers)	Canadian Context (12 papers)
Six papers examined the influence of climate change adaptation on culture, five of which studied the impact on cultural heritage in particular (e.g., Granberg et al., 2022). These papers found that climate change adaptation has a significant impact on cultural heritage and landscapes across the world (e.g., Maharaja et al., 2023).	Pearce et al. (2015) and Prno et al. (2011) argued that TEK exemplifies a bidirectional dynamic between adaptation and culture, as culture evolves alongside environmental shifts. They demonstrated that adaptation strategies themselves can reshape cultural practices. For instance, Prno et al. (2011) documented how innovations like snowmobiles and global positioning systems (GPS) have been integrated into traditional Inuit hunting methods, reflecting the evolving nature of cultural practices in response to environmental changes.

Bidirectional relationships between adaptation and culture (Culture ←→ Adaptation)

Global Context (21 papers)	Canadian Context (26 papers)
These papers found that culture impacts climate adaptation, and is impacted by climate adaptation. 15 of these papers discussed Indigenous culture, including Indigenous knowledge and TEK. The bidirectional relationship between culture and climate change adaptation is particularly highlighted, as traditional and Indigenous knowledge systems determine perceptions about climate change and adaptive capacity, and climatic changes inform cultural practices. For example, studying the role of culture in climate adaptation in South Africa, Leck (2017) suggests that culture shapes climate change adaptation beliefs actions while culture is simultaneously influenced by climate change.	Cultural values and practices significantly influence how communities perceive and respond to climate change (Whitney et al., 2020), while adaptation processes reshape cultural practices (Drolet, 2012). TEK exemplifies this bidirectional dynamic as it evolves alongside environmental shifts (Pearce et al., 2015; Prno et al., 2011). Culturally relevant adaptation strategies can embody this bi-directional relationship when they reinforce cultural identities through preserving and revitalizing cultural traditions. For example, adapting agricultural fairs in the township of Edwardsburgh/Cardinal to continue to be relevant is seen as key to addressing environmental vulnerabilities, as they support a strong sense of cultural heritage (Sander-Regier et al., 2009).

Information Box: Current Adaptation Funding and Programs for Rural Canada

Since 2016, the federal government has allocated approximately $7 billion in funding towards adaptation programs (Table 4). A portion of these funds have been made available to communities through programs like:

- The Climate Change and Health Adaptation Program for First Nations and Inuit communities - $6 million available annually, allocated by Indigenous Services Canada;
- The Climate Resilient Coastal Communities Program - $41 million over 5 years, allocated by Natural Resources Canada;
- The Climate Change Preparedness in the North Program - $8.8 million available annually, allocated by Crown-Indigenous Relations and Northern Affairs Canada (CIRNAC);
- The First Nation Adapt (FNA) program - $9.5 million available annually for communities south of the 60th parallel, allocated by CIRNAC;
- Disaster Mitigation and Adaptation Fund - $3.375 billion available over 12 years, allocated by Housing, Infrastructure, and Communities Canada

Table 4: Adaptation Funding per Budget Year

Budget Year	Amount
2016	$388,500,000.00
2017	$2,417,300,000.00
2018	$119,900,000.00
2019	$495,230,000.00
2020	*No Budget*
2021	$1,647,200,000.00
2022	$300,000,000.00
2023	$1,600,000,000.00
2024	$166,100,000.00
Total	**$7,134,230,000.00**

Sources: Government of Canada Federal Budgets, 2016-2024

Certain funds are dedicated to specific groups people (e.g., First Nations and Inuit) and specific types of rural geographies (e.g., northern communities). Most general funds require that a minimum percentage go towards Indigenous peoples and communities. No other equity considerations are explicitly stated in program considerations.

The Federation of Canadian Municipalities (FCM) plays a significant role in disbursing the Green Municipal Fund, a fund of approximately $2.4 billion from the federal government. Specific to adaptation, these funds support feasibility studies for adaptation, implementing adaptation actions, and the creation of adaptation plans. Funding disbursed through FCM has some built-in equity measures, including offering higher funding coverage for rural, remote, and small communities; Indigenous communities/community partnerships; projects that meaningfully address anti-racism, equity and/or reconciliation, and; projects that emphasize nature-positive adaptation (i.e. do not negatively impact the environment).

As seen in Table 5 below, over half of adaptation-specific funding (58%) is dedicated to infrastructure. Emergency preparedness is the second largest allocation of adaptation funding. Four of the cultural components identified in the previous section (Table 3) are explicitly represented in this funding disbursement, including health and wellbeing, natural resource economies (agriculture), and Indigenous and traditional knowledge (combined themes).

Table 5: Funding per theme 2016-2024. Highlighted categories are represented in cultural components identified in Literature Review 2.

Funding Theme	**Description**	**Amount**
Infrastructure	These funds are focused on adapting physical infrastructure for climate change and infrastructure recovery. This total includes the $2 billion Disaster Mitigation and Adaptation Fund (Budget 2017), and the $1.4 billion top up from Budget 2021.	$4,110,900,000.00
Agriculture	In Budget 2022, $150 million was allocated to a resilient agriculture landscape program. Other funds have been dedicated to adaptation in agriculture, but these were not explicitly stated in the budgets.	$150,000,000.00
Combined Themes	This section includes dedicating a portion $83.8 million for Indigenous and Northern Affairs Canada to integrate traditional Indigenous knowledge to build a better understanding of climate change and guide adaptation measures, and enhance northern community resilience.	$105,400,000.00
Health	For health research and health adaptation for First Nations and Inuit communities (Budget 2017).	$65,000,000.00
Emergency Preparedness	These funds are dedicated towards preparing communities for fires, flooding, and other crises through emergency planning, mapping, mitigation activities, and equipment (e.g., fire detectors).	$692,730,000.00
Risk Management	This includes $75 million allocated to FCM (budget 2016) for mitigation, climate risk assessment and asset management.	$103,700,000.00
Data and Information	For establishing a Canadian Centre for Climate Services for climate data (Budget 2017).	$73,500,000.00
Asset Management	For developing community capacity for asset management best practices (Budget 2016).	$50,000,000.00
Sustainable Management Strategy	For Western Economic Diversification Canada to develop a sustainable management strategy for land and water across the Prairies.	$1,000,000.00
Unclear Disbursement	This includes $1.6 billion to implement the National Adaptation Strategy (Budget 2023), and $25 million for regional adaptation in the Yukon (Budget 2021).	$1,782,000,000.00
	Total	**$7,134,230,000.00**

Sources: Government of Canada Federal Budgets, 2016-2024.

Research Strengths and Gaps

Strengths

Our team collected and synthesized a significant amount of literature on the evolving understandings of the relationship between culture and adaptation in an international research context, and creating a greater understanding of adaptation and culture in the context of rural Canada. Contrasting the findings from this literature to federal adaptation funding programs provides important new insights and awareness into how culture is currently shaping adaptation in rural Canada. We have also positioned this collection of literature in rural Canada's historical, social, and economic context. This information provides opportunity for governance bodies and communities across rural Canada to more consciously choose adaptation pathways.

Gaps

This knowledge synthesis was limited to peer-reviewed and grey literature. Additional knowledge from discussions, from interactions with communities, and from various media sources were not considered and may contain findings other than those shared in this report. One consequence of this has been a very limited adaptation literature focused on non-Indigenous and non-settler communities and adaptation. This includes Canadians whose ancestors were forcibly displaced to the Americas as a result of chattel slavery, immigrants, newcomers, refugees, and temporary foreign workers, all of whom are also present in rural Canada. We acknowledge that in the process of synthesizing literature, the intersectional nuances present in any community is at times lost, if those nuances are present at all.

We note the absence of corporate organizations in this review – which also play a significant role in shaping Canada's rural landscape. Corporate organizations are not necessarily what first comes to mind in discussions on communities and cultures, however in Canada's rural landscape, corporate extractive entities have a significant impact on community locations and culture, and governing bodies. Acknowledging and understanding their presence and influence in the rural landscape is needed when working towards climate adaptation and mitigation.

While we have focused on the structures of capitalism and colonialism in continuing to shape adaptation in rural Canada, this report does not explicitly consider structures of patriarchy, white supremacy, class, and other structural considerations that would provide a full intersectional analysis of these results. As stated by Fellows & Razack (1998), "Attempts to change one system while leaving the others intact leaves in place the structure of domination that is made up of interlocking hierarchies" (p. 336). Consequently, all structures of oppression should be considered in the creation and implementation of adaptation if we are to change the course of climate change and prevent the reproduction of current systemic inequalities.

Implications and Recommendations

Our findings challenge some of the fundamental assumptions that continue to guide research on climate change adaptation. Adaptation to climate change is not uniform - cultural components significantly influence climate adaptation practices (Adger et al., 2013). Acknowledging and understanding different components of culture such as forms of knowledge, norms and beliefs, and social capital in climate adaptation research enables more nuanced understandings of the factors that influence the selection of adaptation actions and adaptive capacity (Eriksen et al., 2015; Van Praag, 2023). Awareness of cultural dimensions of adaptation is essential for:

1. The effectiveness of local adaptation. A lack of conceptualization of culture's role in adaptation may negatively influence climate change adaptation research, policy, and practice, resulting in a failed moderation of harms caused by climate change.
2. Preventing maladaptive research, policy, and practice that may perpetuate climate change, colonialism, and other forms of oppression through adaptation, and identifying new pathways forward – particularly in a settler-colonial state like Canada.

The results focused on rural Canada highlight the necessity of understanding that cultural connections to place influence adaptive capacity and resilience. While some adaptation programs are shaped to meet cultural needs of Indigenous communities, there is still a lack of meaningful acknowledgement and understanding of the ongoing colonialism in Canada's landscape. Consequently, Western forms of knowledges and colonial interests continue to shape adaptation programs. To ensure the current and future wellbeing of rural communities, adaptation policies, programs and practices must prioritize ways of knowing that are supportive of the wellbeing of all communities in rural Canada, and this requires addressing ongoing harms still taking place in the rural landscape.

Many adaptation actions and strategies across Canada have been predominantly informed by European settler governance and Western knowledge systems. However, these decisions are rarely acknowledged as related to 'culture'. In the reviewed literature, discussions on culture are present in studies on adaptation with Indigenous peoples and communities, but it is much less engaged with in research with predominantly settler communities. The same is to be said with acknowledging different forms of knowledges – Western knowledge is only acknowledged and discussed in studies with Indigenous communities, while it is absent from studies on predominantly settler communities and governance structures, where Western knowledges are most present. Western knowledge is rarely discussed in research without this "other" to compare to. We believe this is because of the tendency of the dominant culture[3] – culture upheld by a prevailing social group – to be invisible because it is seen as the 'norm'. The dominant culture in Canada is a culture that requires more careful consideration in its shaping of adaptation policies and practices. To do this, it first needs to be made visible, particularly to those who operate within the dominant system and as a result, may not be aware of its existence.

Being aware of dominant cultures is crucial for understanding how prevalent adaptation actions are in fact shaped by these cultures. Dominant cultures in Canada have been shaped by European settler colonialism. One way this emerges in this research is in the different cultural components for

[3] The concept of cultural hegemony, originally coined by Antonio Gramsci, is helpful to understand this phenomenon. A useful overview of the concept can be found at Pilat and Krastev, 2020.

adaptation and what they reveal about relationships to land. For settler communities, adaptation focuses more on shaping land to maintain natural resource economies and owned property – both of which are viewed as important for livelihoods (Thiessen., 2022). In contrast, cultural components stemming mostly from Indigenous communities see the health of the land as integral to human health. Since both settler and Indigenous communities interact with land to obtain food, looking at differences in how communities obtain food provides useful insight into how cultural knowledge shapes land relationships. Secwepemc food sovereignty leader and activist Morrison (2011) describes these broad differences in land relations as the following:

> "The Indigenous eco-philosophy that underlies the ability of Indigenous peoples to maintain dignified relationships to the land... is in sharp contrast to the Eurocentric belief, inherent in the worldview proposed by European philosopher Rene Descartes, that humans are to dominate and control nature, and therefor seek to 'manage' the land that provides us with our food. Indigenous eco-philosophy reinforces the belief that humans do not manage the land, but instead can only manage our behaviours in relation to it. (p. 99)

In this literature review, we see this application of difference knowledge systems emerge in the form of differing adaptation actions as they relate to land. Settler communities focused predominantly on utilizing adaptation tools in the cultural toolkit to 'manage the land' to ensure natural resource economies can continue. Indigenous communities engaged with Indigenous knowledges to adapt land-based practices, which includes grieving land-based activities that may no longer be possible with a changing climate.

The dominant culture in Canada continues to be shaped by its predominant economic system, of which its most recent form, neoliberalism, encourages individual responsibility and consumerism, while downplaying solidarity and community (Taylor-Gooby and Leruth, 2018; Thompson, 2021). This also has implications for adaptation. A key finding in Literature Review 1 is that individualist approaches to adaptation, often emphasized through individual beliefs and values, are often not accompanied by structural considerations of adaptation. This may be as a result of the presence of individualism, who's presence is supported by the dominant economic structures in Canada's landscape. Another way colonial capitalism makes an appearance is through the presence of private land ownership and other forms of privatized infrastructure as a cultural component important for adaptation in predominantly settler communities. The privatization and commodification of land is a key land use feature of the dominant culture. It is also a land use strategy that has and continues to result in the displacement of Indigenous peoples. This has significant implications to consider in the adaptation context.

While settler individuals and communities who have grown up in predominantly western knowledge systems are not necessarily unanimous with settler colonial-capitalism, they do overlap; colonialism and capitalism are embedded in European settler culture here in Canada (Harris, 2004). The dominant governing bodies that exist today continue to enact laws and policies that fail to recognize Indigenous self-determination, resulting on ongoing colonial harm. These governing bodies are a part of settler culture. This makes adaptation actions informed by settler knowledge systems and governance structures more likely to perpetuate colonial-capitalism, and consequently, climate change (Sultana, 2022). As stated by Janna Wale, a member of Gitanmaax First Nation and adaptation associate with the Canadian Climate Institute:

> "...when decisions related to climate policy are made by the same people using the same knowledge systems and predisposition towards extraction that has fueled the climate crisis in the first place, how can we expect different outcomes?" (Wale, 2023, p. 4).

A current example of this concern is the application of Natural Climate Solutions (NCS) – a mitigation and adaptation approach that is receiving significant resources in the country. When this solution is implemented without centering Indigenous self-determination, it can further dispossess Indigenous peoples from land and use climate change as a justification to do so – something called climate colonialism (Reed et al., 2022; Townsend et al., 2020). Currently, in the federal government there is still a "clear unwillingness to recognize Indigenous jurisdictions and Indigenous understandings of land as systems of reciprocal relations" (Reed et al., 2022). Climate adaptation needs to center Indigenous peoples in order to not be maladaptive. In their article *Decolonization is not a metaphor,* Tuck and Yang (2012) remind us that decolonization is not just about improving education and other societal structures, that it requires the rematriation of Indigenous lands. The importance of Indigenous sovereignty in addressing the climate crisis has been recognized and advocated for, for some time, and continues to be advocated for here in Turtle Island by both Indigenous and settler groups and individuals (e.g., Decolonial Futures, 2023; Yellowhead Institute, 2019). Climate adaptation requires decolonization of land ownership systems (e.g., changes to private land tenure regimes) and the return of lands to Indigenous peoples[4].

Tuck and Yang (2012) state: "In the process of settler colonialism, land is remade into property and human relationships to land are restricted to the relationship of the owner to his property" (p. 5). In this adaptation report, we've seen how settler relations to land result in adaptation actions that can prioritize the protection of private land, infrastructure, and natural resource economies, even if this compromises adaptation to a changing climate (e.g., Weissenburger et al., 2016). While these adaptation approaches may reduce short-term economic harms, they may not be sufficient for meaningful climate adaptation that reduces physical and environmental harms, as they demand the ongoing changes to land that fail to address colonialism and further perpetuate climate change. Scholars and writers have brought attention to the fact that the reshaping of relationships caused by settler colonialism and capitalism have caused disconnection that have harmed Indigenous and non-Indigenous peoples (e.g., Pinnington, 2014; Ulrich, 2019). Working towards effective adaptation requires that settler communities come to terms with Canada's colonial history, how it has impacted their cultural values, beliefs, worldviews and structures, and identify other possibilities to relate to Canada's rural landscape that do not perpetuate the structures that contribute to climate change.

The cultural component of social capital, which was present in Indigenous and non-Indigenous communities in the form of relationships as a tool for adaptation, provides a potential starting point from where to start identifying these possibilities. Climate adaptation could provide a lens through which to identify ways forward that are place-based, aim to repair colonial harms, and form new ways of relating that do not perpetuate structures of harm. The results from this report reveal how a continued failure to address the impacts of colonial-capitalism and its impact on the dominant culture in Canada, is compromising life-supporting adaptation in a settler-colonial state. This is a significant challenge that goes beyond this report. We suggest the following actions as a starting point to address the outlined implications.

[4] We acknowledge that the simplicity of this statement is not reflective of the diverse, context-specific processes of restoring Indigenous land governance. Our purpose with this statement is to make clear to readers that the decolonization of lands in Canada is needed for effective climate adaptation.

General Actions for Adaptation in Rural Canada

- **Understand that colonialism is an ongoing process and integrate this knowledge in adaptation decision-making:** Equitable adaptation requires addressing the roots of injustices. This begins with acknowledging that settler colonialism is ongoing in Canada and is thus shaping adaptation actions. In addition to understanding, action is needed to ensure adaptation policies move beyond tokenistic recognition of Indigenous knowledge.
- **Center Indigenous peoples and calls to action, including restoring Indigenous sovereignty over lands:** Addressing colonialism requires the decolonization of land governance and ownership. This includes recognizing nation-to-nation sovereignty, and honouring the Treaties. This also includes meaningfully working towards meeting calls to action that have already been created and shared by Indigenous peoples, such as the Truth and Reconciliation Commissions' 94 Calls to Action. Adaptation decision-making in all sectors should support these actions.
- **Acknowledge the presence of dominant cultures in adaptation:** Adaptation decision-making must explicitly acknowledge the dominant knowledge systems and influential structures that shape adaptation decision-making in Canada. This active awareness is needed to: i) ensure that climate adaptation decisions do not further perpetuate climate change; and ii) ensure that climate adaptation decisions do not further perpetuate colonialism.
- **Consider intersectionalities:** Climate adaptation needs to account for how climate impacts intersect with social, cultural, and economic factors in specific populations based on age, gender, class, and degree of rurality. Taking an intersectional approach helps identify and address unique vulnerabilities created by climate change, and enable effective strategies.

Implications for Rural Communities

Resources like adaptation funding from federal government are important for supporting rural communities in adapting to climate change. However, certain adaptation actions are accessible to communities regardless of federal support. Adaptation tools are being created at the community level to empower communities to have access to adaptation options. For example, the National Association for the Advancement of Colored People (NAACP)'s *Advancing Resistance and Resilience in Climate Change Adaptation Action Toolkit* includes tools on building social cohesion, communication, governance, housing, and other aspects of daily life that are not always seen as 'adaptation actions' in mainstream practice (Kennedy et al., 2019).

In the present context, there is an opportunity and responsibility here for settler communities in particular to reflect on their community's positioning in Canada's historical context. Community members have an opportunity to identify their current adaptation toolkits, and to identify which tools are culturally available to bring forward for adaptation that do not worsen climate change, and that can exist in as part of a process of decolonization and reconciliation. One potential tool for this is the cultural component of social capital, or rather relationships; both redressing colonial harms and adaptation require context-specific considerations, and building relationships within and amongst communities provides a concrete location where this important work can occur.

Actions for Rural Communities

- **Understand community's relationship to Canada's settler-colonial history**: Particularly for those who embody settler cultures and Western knowledge systems, communities must gain awareness of their positioning in Canada's colonial history to ensure adaptation actions do not further perpetuate colonialism.
- **Identify adaptation tools that meaningfully address climate change and do not perpetuate colonialism**: This action item is directed towards settler cultural communities in particular; toolkits may already contain culturally relevant adaptation actions that meaningfully address climate change and do not further perpetuate colonialism. Identifying whether these possibilities exist.
- **Identify potential new adaptation tools**: As a follow-up to the previous point; consider your community's current values, beliefs, and knowledge systems. Are there possible adaptation tools not currently in the community's toolkit that align with community members' values and beliefs? What would be needed (education, skill learning, etc.) to add these options to the cultural toolkit?
- **Build Relationships**: Collective action and community organizing are key for adaptation. Communities must actively counter individualism by building opportunities for social connections and collective actions. These should be available in community's cultural toolkits as a tool for intracommunity social organizing as well as inter-community relationships.
- **Learn from others through cross-cultural learning**: Through social connections, get to know adaptation tools that may not be prominent in community members' toolkits. A way to do this is to learn from others stemming from different cultural positions. This should be done in relationship with individuals and/or other communities.
- **Build cross-cultural solidarity with surrounding communities:** Seek collaboration with surrounding communities to work towards adaptation. In that process, center Indigenous peoples and consider the intersectionalities to identify people who may be uniquely impacted by climate change. If the goal of adaptation is truly to prepare for climate risks, we know that: i) cross-community solidarity is needed; and ii) settler relationships to land, which currently can perpetuate risks, require new forms of relationships. Working collectively while considering Canada's socio-economic history can support intersectional, community-centered adaptation.
- **Incorporate local knowledge into adaptation strategies:** Incorporating local knowledge and experiences into climate adaptation strategies is crucial for creating contextually relevant, resource-appropriate plans. Integrating local knowledge can significantly enhance the community's engagement with adaptation plans, foster a sense of ownership, and increase implementation.
- **Commit to creating new relationships that center Indigenous peoples' calls to action:** For settler communities in particular, there is a responsibility to consciously and collaboratively develop new ways forward in relationship structures that are different than what currently dominates the rural landscape. Reconciliation and decolonization can and should be part of adaptation processes.

Implications: Government Officials, Policy-Makers and Funders

In addition to federal adaptation funding, philanthropy is playing an increasingly influential role in funding climate change related projects (e.g., the McConnell Foundation) (Yirenkyi & Vodden, 2024). This section addresses government officials, policymakers, and private funders financially supporting climate adaptation.

Actions for Government Officials, Policy-Makers and Funders

- **Center Indigenous peoples in all adaptation strategies and actions in policy:** Incorporating Indigenous peoples into policy and decision-making remains inconsistent (Native Women's Association of Canada, 2023). Indigenous knowledges and calls to action for reconciliation and decolonizing should be centered in adaptation efforts. To achieve this, Wale (2023) suggests a government-to-government approach with each Indigenous Nation in Canada, which could take place with regional engagement sessions or an annual province-wide Conference of the Parties.
- **Fulfill the Truth and Reconciliation Commission's Calls to Action and Recognize Indigenous sovereignty:** Indigenous self-determination and sovereignty is central to supporting effective climate action (Reed et al., 2024). Indigenous peoples across Turtle Island have already outlined ways that this can be done (e.g., Truth and Reconciliation Commission of Canada, 2015). Fulfilling these calls to action, such as TRC Action 45[5], supports this process.
- **Ensure funding programs and policies do not perpetuate colonialism nor climate change:** Unless actively prevented, settler-colonialism will continue to be facilitated justified through a variety of methods (Wolfe, 2006), and adaptation practices and policies are not immune to this. Elected officials, funders, and policy-makers have a responsibility to ensure adaptation does not perpetuate colonial-capitalism. Once course of action is to build these conditions into funding requirements. However, to be truly effective, parameters to actively counter the perpetuation of colonialism and climate change should be built into funding and governance structures themselves.
- **Engage local communities and knowledges:** Ensure local communities are actively involved in the adaptation planning process. Develop adaptable climate adaptation frameworks that allow community to tailor policies to their unique cultural and contextual needs. This flexibility ensures that adaptation strategies remain relevant, practical, and sustainable.
- **Place-based funding**: Instead of allocating funding based on pre-determined adaptation actions, allocate place-based funding with flexibility for the adaptation actions that the funds support.
- **Support Social Capital:** Governance and funding structures must recognize and support the building of social capital to enhance rural adaptation efforts.
- **Consider these findings in the disbursement of $1.6 billion for the adaptation strategy:** In 2023, the federal government announced $1.6 billion to support Canada's adaptation strategy over five years. The disbursement of these funds must consider the findings of this study.

[5] TRC Call to Action 45: "Reconcile Aboriginal and Crown constitutional and legal orders to ensure that Aboriginal peoples are full partners in Confederation, including the recognition and integration of Indigenous laws and legal traditions in negotiation and implementation processes involving Treaties, land claims, and other constructive agreements."

Implications: Researchers and Research Practices

Research Design

The selection of appropriate data collection methods and analytical procedures have significant impacts on the perceived validity, reliability and generalizability of research findings. Similarly, the theoretical frameworks that researchers choose for their studies provide a system of concepts, assumptions and beliefs that guide the research question, data collection, and analysis (Miles & Huberman, 1994; Omodan, 2022). While these theoretical and methodological decisions reflect the cultural beliefs of the researcher and/or of their discipline (Grant & Osanloo, 2014), they also have significant impacts on research findings and popular beliefs about culture and adaptation.

For example, the popularity of individualist perspectives in adaptation research highlights the extent to which the responsibility to adapt to climate change is believed to lie with individuals, oftentimes suggesting individuals change their values in order to make better adaptation choices (Shove, 2010). This individualist take means researchers will locate culture in individual attitudes, behaviors and choices. This risks oversimplifying culture's causal role in shaping behavior (Leck, 2017; Shove, 2010), resulting in potentially unhelpful conclusions about adaptation. By focusing on individual values as the unit of analysis that influences climate adaptation beliefs and practices, questions of power, structure and inequality are often dismissed (Brulle & Norgaard 2019). Failing to consider the role of societal structures in perpetuating climate change means that findings in adaptation research will not provide effective recommendations.

It is important to recognize power and structure as cultural factors that not only influence climate change adaptation, but also the production of adaptation research. The political nature of knowledge production highlights the need for researchers to critically reflect on how positionality and ideology shape their theoretical and methodological decisions (Brown & Strega, 2015). The practice of reflexivity, whereby researchers examine how their values and identities influence study design and research findings, is essential for producing useful adaptation research (Preston et al., 2015).

Research Topic

Currently, a majority of research on adaptation in rural Canada is focused on Indigenous communities. This work is of course important for capacity building and to understand the important role of Indigenous knowledges in adaptation. However, there is a lack of research focused on settler communities and on challenging oppressive institutions like profit-making enterprises. Enterprises that extract oil, minerals, and other products for profit-making have a profound impact on rural landscapes and communities. There is a blatant lack of research on understanding how their cultural toolkits relate to climate change and adaptation.

<u>Actions:</u>

- **Fully Conceptualize the Concept of Culture:** The inclusion of clear definitions of culture in published literature is critical to the accuracy and relevance of study findings on the interactions between climate change adaptation and culture. Researchers using "culture" as a main concept should define the term and draw on the vast amount of research and theory on what culture is and how it works.

- **Prioritize Structural Approaches:** Researchers must prioritize structural approaches to understanding climate adaptation: Climate change is not an individual concept, and neither is culture. Researchers interested in studying culture and climate change draw on the vast range of structural perspectives and social theory that move beyond only the individualist approach to understanding culture. To prevent falsely positing responsibilities for adaptation onto individuals alone, researchers must also take structural approaches to climate adaptation work. If this is not possible, researchers should be very explicit about the theoretical limitations.
- **Self-Reflect on Cultural Assumptions:** Researchers should reflect on their own epistemological beliefs when choosing a theoretical framework for studying the interactions between climate change adaptation and culture. This means being aware of their own culture, and how this culture may perpetuate or mediate climate change.
- **Explicitly State Theoretical Framework and Methodological Approaches**: The selection of an appropriate theoretical framework will ultimately determine what is included or excluded from the analysis (Omodan, 2022). Research methods should also be carefully selected based on their chosen units of analysis, theoretical assumptions, and epistemological paradigms.
- **Assume Non-Objectivity:** Researchers should not assume objectivity of resoults, even if statistical forms of data collection and analysis are being used.
- **Practice Reflexivity:** Researchers should reflect on how their personal values and beliefs influence research processes and outcomes.
- **Adopt a Critical Lens:** Consumers of research should adopt a critical lens to interpreting methods sections and resulting findings.
- **Reverse the Gaze:** There is a disproportionately high number of studies focused specifically on Indigenous communities and people. We need more critical research on institutions with cultural toolkits that perpetuate colonial capitalism, and in turn perpetuate climate change. This is particularly important as funding for adaptation increasingly stems from the private sector.

Research Reflections

Shirlyn: Being part of this research has deepened my understanding and appreciation of the extensive work being done globally to mitigate and adapt to climate change. At the same time, it has made me anxious to realize how many people remain unaware of the changing conditions because they have not yet been directly affected or have not witnessed the severe impacts of climate change, as experienced by rural, remote, coastal, and northern Canadian communities. The research also helped me understand that adaptation practices become unsuccessful when culturally appropriate adaptations are not practiced or when communities related to the context are not involved. Studies among Indigenous communities across Canada vividly illustrate how climate change profoundly impacts their entire way of life, as their existence is intricately linked with nature. This includes their values, culture, heritage, identity, travel, traditional knowledge, health, food systems, and livelihoods. These communities struggle immensely to protect their natural environment, showcasing a deep understanding of and respect for nature often lacking in other communities. I also observed a significant gap in comparative studies and cross-context learning to inform adaptation practices. There is a pressing need for space,

capacity, and resources to support place-based adaptations tailored to specific contexts. Such approaches could ensure more sustainable and effective responses to climate change.

Sara: As a young university graduate with a background in sociology, my participation in this research has highlighted the need for more critical social science perspectives in climate adaptation research. Given that climate change is caused by capitalist systems and structures, it concerns me how frequently the responsibility to adapt to climate change is located in individuals–their values, attitudes, and levels of motivation. I have come to believe that the disproportionate emphasis on individual units of analysis (e.g., individual beliefs, worldviews, attitudes, etc.) in climate change adaptation research is an effective way to diverge attention from critical issues of capitalism and inequality which cause climate change in the first place. Despite the cultural incentive to sometimes avoid critical perspectives on climate change, I hope that future research is encouraged to ask critical questions when producing and consuming environmental research.

Bryanne*:* Being part of this research project has truly expanded my perspective of adaptation work taking place across the country, particularly in the field of Environmental Studies. There is often an over-emphasis in the field on the individual choices of people, while structural facts are not considered in the creation of recommendations for action. Research results also often identify that our economic structures are not reflective of community beliefs and values, but these studies do not always provide further analysis on why that is the case. This project has deepened my understanding of structural influences on adaptation in this country. It has also made me more critical of what we assume to be valid adaptation actions in our communities, and has encouraged me to think about other types of adaptation actions that could be available to my community. Coming from a settler background, I do not think that the knowledge systems I grew up with are the best ones to inform adaptation strategies in Canada's rural landscape, and I see adaptation as a process through which we can tangibly work towards repairing the harms cause by colonialism. While climate change is terrifying, it also provides an opportunity to participate in new ways of relating to each other, and in this I find hope.

Wayne: As one of the co-leads, this project has been a great opportunity to learn and guide around rural and climate change. The collaborative nature of this project, which brought together researchers from the University of Winnipeg's Environmental Studies Research Group and Brandon University's Rural Development Institute, provided complimentary yet distinctive critical perspectives and experiences that have created a rich approach to the issue of rural culture and climate change. It has also benefited the RDI team to collaborate on training and managing the project, building additional capacity and understanding through shared approaches. The topic of rural culture and climate change is one that is under-researched, and this project has provided the opportunity to explore and understand the topic from multiple perspectives, shedding light on both the exclusion of key ideas as well as the presumption of others. The findings and recommendations from this project reaffirm the importance of place-based rural development, highlighting that culture, in addition to geography and demographics, needs to be prominent in both the analysis and planning for rural communities. Regarding climate change in rural spaces, it also clarified how essential it is that adaptation strategies and activities are place-based and sensitive to cultural and other local contexts. Moving forward, we need to learn from and build on findings in this project to ensure that we better understand the different culture and climate change contexts amongst rural neighbours, in addition to the predominant urban-rural focus.

Ryan: Co-leading this research with early career scholars, staff and students has provided many opportunities for reflection on my own role in climate adaptation knowledge generation. I have always taken a critical approach to understanding power relations in complex socio-ecological problems domains. However, there is a richness in taking an intersectional approach that furnishes new insights and can redress power asymmetries that may otherwise be reproduced through conventional research methodologies. This opportunity for collaboration has also affirmed the benefits of creating empowering learning environments. This team has shared leadership in research conceptualization and conduct, which has provided a stronger analysis and better training opportunities, as well as exposure to "new" concepts and approaches that have enhanced my own perspectives on climate change and rural Canada. My hope is that future critiques of culture in the context of climate change will provide much more nuanced portrayals of Western cultures (than the ones we found) so that new pathways for making real change can be found and initiated; given the seemingly immutable presence of colonial and capitalist systems, we clearly need deeper and more incisive analyses if we are to affect positive change.

Conclusion

Further Research

While the results from these reviews are specific to adaptation, this research approach may also apply to climate mitigation. Like adaptation, mitigation actions that are prioritized and funded will be impacted by cultural dimensions. Researchers should consider conducting analyses on the role of culture in determining mitigation actions that are valid/receive most funding, and how this could be perpetuating climate change rather than mitigating it.

We note the absence of research in rural Canada outside of this settler and Indigenous binary. More research is needed to fill this gap and understand how the cultural toolkit of forcibly displaced communities, immigrants, newcomers, temporary residents, and other human beings in Canada's rural landscape interact with adaptation in rural Canada.

Settler cultures and communities remain under-researched when it comes to adaptation and culture. More research is needed on the impact of settler colonialism in shaping adaptation actions and strategies, and the possible consequences of failing to address this. It would be useful to know whether the prioritization of infrastructure in adaptation funding (58% of known distribution) is effectively reducing harm and supporting the wellbeing of rural communities, or whether it is in itself a cultural consequence that will perpetuate the structural problems we are currently experiencing.

More in-depth research is needed on the allocation and distribution of funds for climate adaptation from a cultural lens. This research should consider how funds from philanthropic organizations are being distributed from this lens of culture.

Final Comments

This report has showcased that for adaptation strategies to be successful, they need to be culturally relevant to the communities who are implementing these strategies. It is clear that Indigenous knowledges and TEK are crucial for successful adaptation in these lands, and that true decolonization

and recognition of nation to nation sovereignty is required for adaptation to be possible without perpetuating colonialism. These results also showcase that because of relationships with land present in settler cultures, the types of adaptation tools available in settler tool boxes may lead to maladaptive actions that could further perpetuate climate change.

There is a contradiction in these statements - adaptation strategies need to be culturally relevant to be effective, yet culturally relevant strategies for settler communities may perpetuate the very challenge we are trying to adapt to. This report does not provide a clear pathway for how to address this contradiction. However, these results demonstrate that adaptation can itself be pathways through which to work towards 'something else' in rural Canada. This begins with awareness of how culture and societal structures that shape and constrain cultural expression are influencing adaptation actions. And, it continues with people in communities, in governance bodies, in research and in funding positions making the very significant and conscious changes needed to choose adaptation actions that meaningfully address the worsening climate crisis, and ensures the wellbeing of those living in rural spaces on Turtle Island.

We acknowledge that our own cultural locations and self-awareness have shaped this report. These are the results that emerge from our own understandings of the reviewed literature. This is an open document, and we would like to continue to improve understandings, implications and recommendations stemming from this work. If you would like to provide input, please reach out to us at the contact information provided on the title page.

Knowledge mobilization activities

All knowledge mobilization products resulting from these activities will be made available on the Environment and Society Co-Lab website (esrg.uwinnipeg.ca), and the Rural Development Institute website (brandonu.ca/rdi/).

Public Society

1. **Plain Language Summary**: This report will be adapted to create a plain language summary specifically for communities and adaptation practitioners. It will be made available in both French and English.
2. **Media Article(s):** One to two news articles will be created and published with the Canadian Broadcasting Corporation.
3. **Virtual Panel Discussion**: The Rural Development Institute will host a virtual panel discussion in February or 2024, where the public will gather with the research team to discuss pertinent results from the report and how to apply these results into community practice.

Research

1. **Manuscripts**: We will publish two manuscripts outlining the results of this work.
2. **Conference:** The results from this report will be presented at a future conference.

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