



Understanding Natural Climate
Solutions as Pathways to
Resilience in Rural and Indigenous
Communities Across Canada



Table Of Contents

- Introduction 1
- Literature Review Summary 2
 - Purpose 2
 - Methodology 2
 - Working Definitions..... 3
 - Key Findings..... 4
- Community Questionnaire..... 6
 - Purpose 6
 - Key Findings 7
- What We Heard 14
- Conclusion 14





Introduction

Across Canada, rural and Indigenous communities are already experiencing the impacts of climate change through increasing wildfire risk, flooding, erosion, changing seasons, drought, food insecurity, ecosystem degradation, and more. At the same time, these communities hold deep knowledge, stewardship practices, and place-based relationships with the land that are essential to building long-term resilience.

Nature-based Solutions (NbS) are gaining significant attention from governments, funders, researchers, and organizations as approaches that can help communities adapt to climate change while also supporting biodiversity, ecosystem health, and community wellbeing. However, despite growing interest, these concepts are often poorly understood outside of academic or policy circles and are not always framed in ways that reflect local realities, Indigenous knowledge systems, or community priorities.

This project was developed by The Resilience Institute (TRI) to better understand how Nature-based Solutions and related concepts can support resilience in rural and Indigenous communities across Canada. Through a literature review and community questionnaire, the project aimed to bridge the gap between external NbS frameworks and community-based realities.

Our team explored three key concepts:

- 1 | **Nature-based Solutions (NbS)**
- 2 | **Ecosystem-based Adaptation (EbA)**
- 3 | **Natural Capital**

The goal was to better define and understand these terms, as well as learn directly from communities about the strategies, relationships, and land-based practices that already contribute to resilience and adaptation.

This work is grounded in participatory and relationship-based approaches that value Indigenous leadership, local knowledge, and community-driven pathways forward. Effective climate adaptation cannot rely solely on top-down approaches, but must instead be informed by the lived experiences, priorities, and stewardship practices of the communities most affected by climate change.

Literature Review Summary

Purpose of the Literature Review

A scoping literature review was conducted between January and April 2026 by six students enrolled in Climate Change Projects, a senior-level experiential learning course in the Department of Geography and Environmental Management at the University of Waterloo. The course partners student teams with organizations and community groups to undertake applied research projects that contribute to real-world climate change solutions.

Working closely with staff from The Resilience Institute, the six students were mentored throughout the project and tasked with examining how NbS, EbA, and Natural Capital are currently defined, applied, and critiqued across academic, policy, and practitioner literature. The review focused on rural and Indigenous contexts, with an emphasis on Canada, and was designed to help inform TRI's ongoing work supporting climate resilience in communities across the country.

Methodology

The review followed a structured screening process using three academic databases: Google Scholar, Scopus, and Web of Science. Studies were assessed based on their relevance to the project objectives, geographic focus, and applicability to rural and Indigenous contexts. Following screening and review, 59 peer-reviewed studies were included in the final analysis.

The selected literature was analyzed to identify:

- Common definitions and interpretations of key concepts
- Examples of nature-based approaches in practice
- Benefits and opportunities for climate resilience
- Challenges and barriers to implementation
- Research gaps relevant to rural and Indigenous communities

The findings were used to develop working definitions, inform the project questionnaire, and support discussions on pathways for implementing Nature-based Solutions in rural and Indigenous communities across Canada.

Working Definitions

A primary objectives of the literature review was to develop practical working definitions that could support community discussions about nature-based approaches to climate resilience. The following definitions were developed based on the findings of the review and are intended to provide a common foundation for future work at The Resilience Institute.

1 | Nature-based Solutions (NbS)

Nature-based Solutions are actions that protect, sustainably manage, and restore ecosystems while also addressing societal concerns such as climate change, biodiversity loss, disaster risk reduction, human health, and wellbeing. NbS offers a multi-functional holistic approach to addressing societal challenges while enhancing both human and environmental resilience. Examples include afforestation to rebuild forests and water quality, and traditional fire management to prevent catastrophic wildfires.

2 | Ecosystem-based Adaptation (EbA)

Ecosystem-based Adaptation is an approach to addressing climate change through strengthening the provisioning, regulating, and supporting services that ecosystems provide, which in turn contributes to building resilience and addressing societal challenges. It includes the conservation, restoration, and sustainable management of ecosystems through practices such as restoring wetlands for flood defense and the conservation of native species for biodiversity.

3 | Natural Capital

Natural Capital refers to the stock of natural resources whose monetary value is expressed through the ecosystem services they generate. 'Capital' in this sense refers to a stock that yields a flow of services, such as forests providing timber and carbon storage, wetlands providing flood control and water filtration, or lakes providing freshwater supply and food sources.

Key Findings

Across the literature review, NbS was presented as a widely used but also broadly defined concept. NbS functions as an umbrella term that includes Ecosystem-based Adaptation, but this widespread use has also contributed to the term having inconsistencies in definition and application. Instead, the review concluded that EbA is more specifically focused on strengthening ecosystem services with the goal of supporting climate adaptation. However, it is frequently used interchangeably with similar terms such as “ecosystem-based management” or “ecosystem-based solutions”. Natural Capital was found to be less frequently applied to more recent literature, and is largely discussed at macroeconomic scales, which limits its applicability to Indigenous and rural communities. While Natural Capital was identified as having strong potential for sustainability planning and policy integration, the literature suggested it remains less influential in broader non-environmental policy areas.

A key finding of this review is the significant gap in research focused specifically on rural and Indigenous communities within Canada. The majority of existing literature demonstrated that there is a strong urban bias, as many of the studies focused on green infrastructure, urban heat mitigation, and stormwater management. In addition, there is a lack of meaningful inclusion of Indigenous perspectives, with few studies mentioning or incorporating Indigenous-led methodologies or Traditional Ecological Knowledge (TEK) in a substantial way.

Despite these gaps, the literature highlights that Indigenous Knowledge Systems and cultural land practices inherently reflect the principles of NbS and EbA. In comparison, Indigenous approaches typically emphasize an understanding of humans as one with nature, centred on care, responsibility, long-term sustainability and well-being. These types of perspectives are able to offer crucial insights for developing more effective and context-specific climate adaptation strategies. However, despite this, current frameworks found in the literature review often failed to fully integrate these types of knowledge systems. Instead, they often relied heavily on Western approaches that view ecosystems primarily as assets or services.

The review also identifies several major barriers that prevent the implementation of NbS and EbA in practice. These barriers include inconsistent terminology, limited evidence on long-term outcomes, a lack of frameworks for evaluating effectiveness, and a persistent gap between theory and practice when it comes to implementation. These challenges can be amplified for Indigenous communities when governance does not recognize or include them during decision-making processes.



When reviewing Natural Capital, the literature was comparatively limited and heavily focused on broad economic frameworks rather than place-based or community-level applications. Research connecting natural capital to rural or Indigenous communities was especially scarce. Additionally, the term “ecosystem services” appeared much more frequently than “natural capital,” suggesting that the concept may be discussed under alternative terminology in non-economic or community-focused research

Nature-based approaches have the potential to enhance climate resilience in rural and Indigenous communities across Canada. However, it is necessary to address the key gaps presented in the research, improve conceptual understandings and definitions of terms, and ensure that Indigenous rights, knowledge, and leadership are central in the development and implementation of these strategies.

Community Questionnaire

Purpose

While the literature review provided valuable insights into how nature-based approaches are understood and discussed in academic and policy settings, The Resilience Institute also wanted to understand how these concepts are perceived and applied within communities across Canada.

To complement the literature review, TRI developed and distributed a questionnaire focused on understanding awareness, perceptions, and experiences related to nature-based approaches in rural, remote, and Indigenous communities. The questionnaire was designed to:

- Assess baseline awareness and understanding of Nature-based Solutions and related concepts
- Identify perceived climate risks and existing nature-based practices within communities and sectors
- Explore which types of Nature-based Solutions are viewed as relevant, feasible, and culturally appropriate
- Identify gaps in knowledge, capacity, or support related to implementing Nature-based Solutions

The questionnaire was distributed through The Resilience Institute’s network of community, organizational, and industry partners. Participants were invited based on existing relationships and connections developed through TRI’s programs and partnerships across Canada. The target audience included individuals involved in land management, community planning, climate adaptation, emergency management, natural resource management, and community leadership. Participants included representatives from rural, remote, Indigenous, municipal, non-profit, and industry sectors.

The questionnaire received 18 responses from individuals working across rural, remote, Indigenous, northern, mountain, and small-town communities in Canada. Respondents represented a range of sectors including community administration, land-use planning, emergency management, environmental management, research, Indigenous governance, and community engagement.

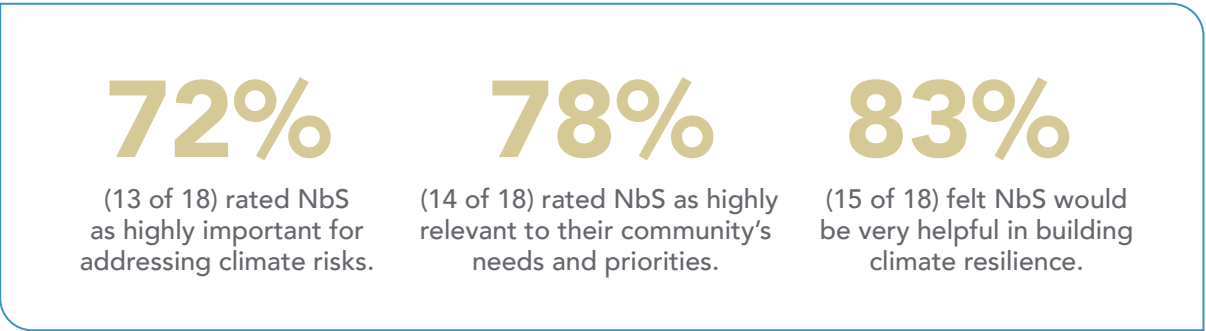
Importantly, 72% of respondents (13 of 18) indicated they are directly or indirectly involved in decision-making related to land, environment, or community planning, providing valuable perspectives from individuals actively shaping community resilience efforts.

While the sample size is not intended to be statistically representative, the responses provide valuable insights into current awareness, opportunities, challenges, and priorities related to Nature-based Solutions from practitioners and decision-makers working in communities across Canada.

Key Findings

1 | Nature-based Solutions are Viewed as Important and Relevant

Despite varying levels of familiarity with Nature-based Solutions (NbS), respondents overwhelmingly recognized their value for addressing climate-related challenges.



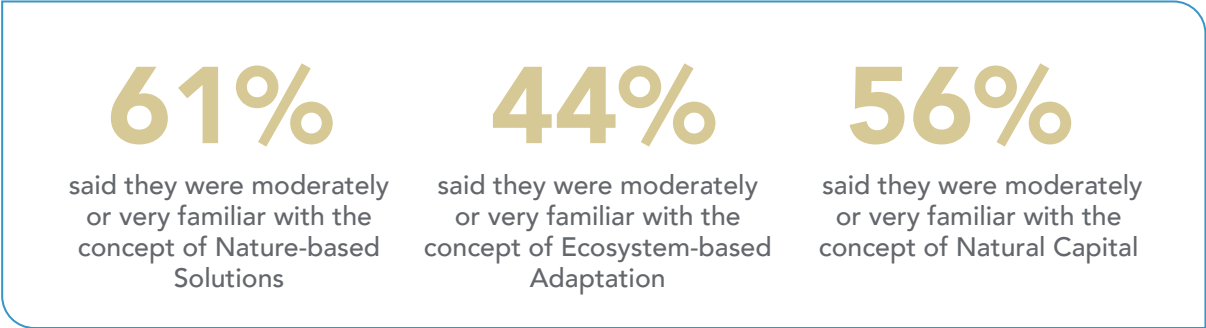
This suggests strong support for nature-based approaches, even among those who may not be familiar with the terminology.

- *Key takeaway* -

Communities see nature-based approaches as relevant and beneficial. Regardless of whether they formally use the term “Nature-based Solutions”.

2 | Familiarity with NbS is Higher than Related Concepts

Respondents reported moderate familiarity with Nature-based Solutions, but substantially lower familiarity with related concepts such as Ecosystem-based Adaptation and Natural Capital.



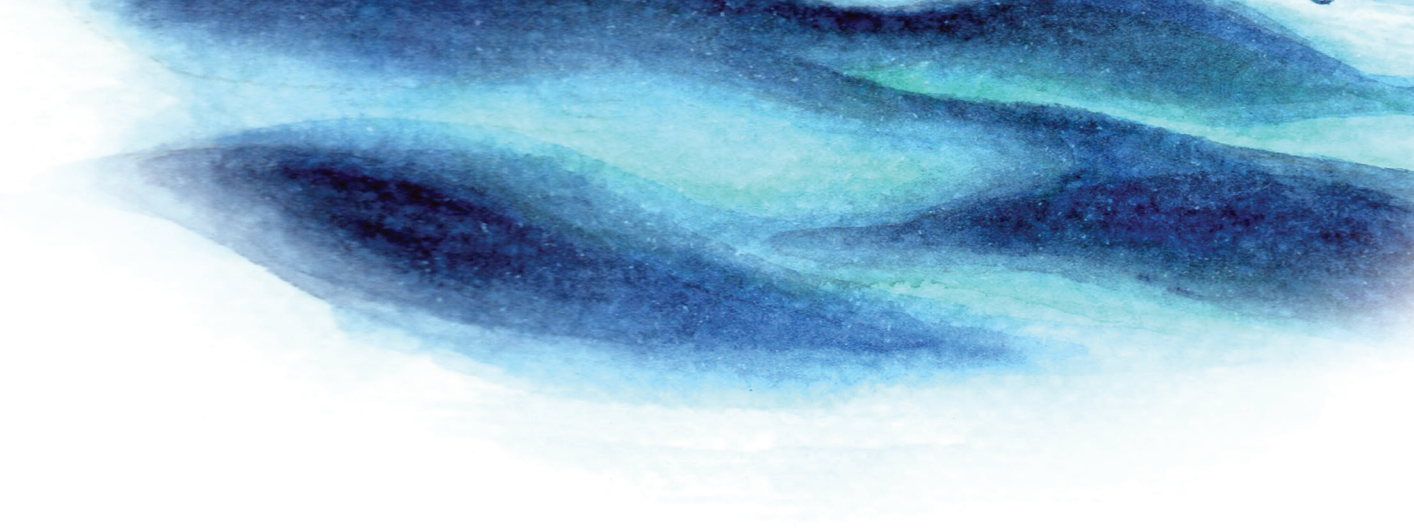
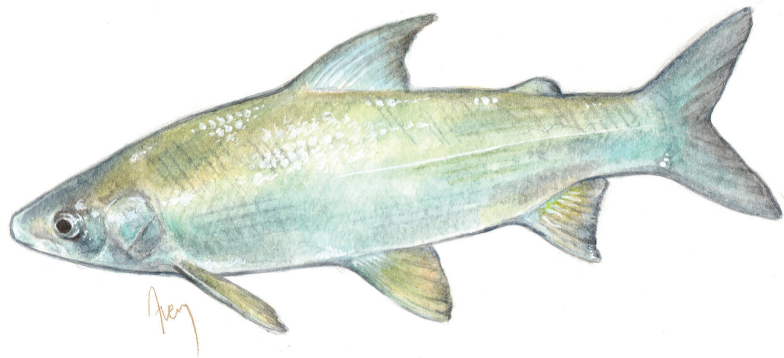
Many respondents noted that multiple terms can create confusion and make it more difficult to communicate with community members and decision-makers.

Common comments included:

- “Too many concepts, paradigms, and frameworks get thrown around.”
- “Nature-based solutions is a more accessible and intuitive term.”
- “These terms need to come down to the average person’s understanding.”

- Key takeaway -

The language used matters. Clear, accessible terminology may be just as important as the technical concepts themselves.



3 | Communities Are Already Implementing Nature-Based Solutions

Many respondents identified examples of NbS already occurring in their communities, often without being explicitly labeled as such.

Examples included:

- FireSmart vegetation management
- Traditional and cultural burning practices
- Wetland conservation and restoration
- Riparian restoration
- Stormwater retention and infiltration projects
- Urban forest management
- Watershed protection initiatives
- Naturalization of parks and public spaces

This suggests that many communities are already undertaking activities aligned with NbS principles, even if they do not use the terminology.

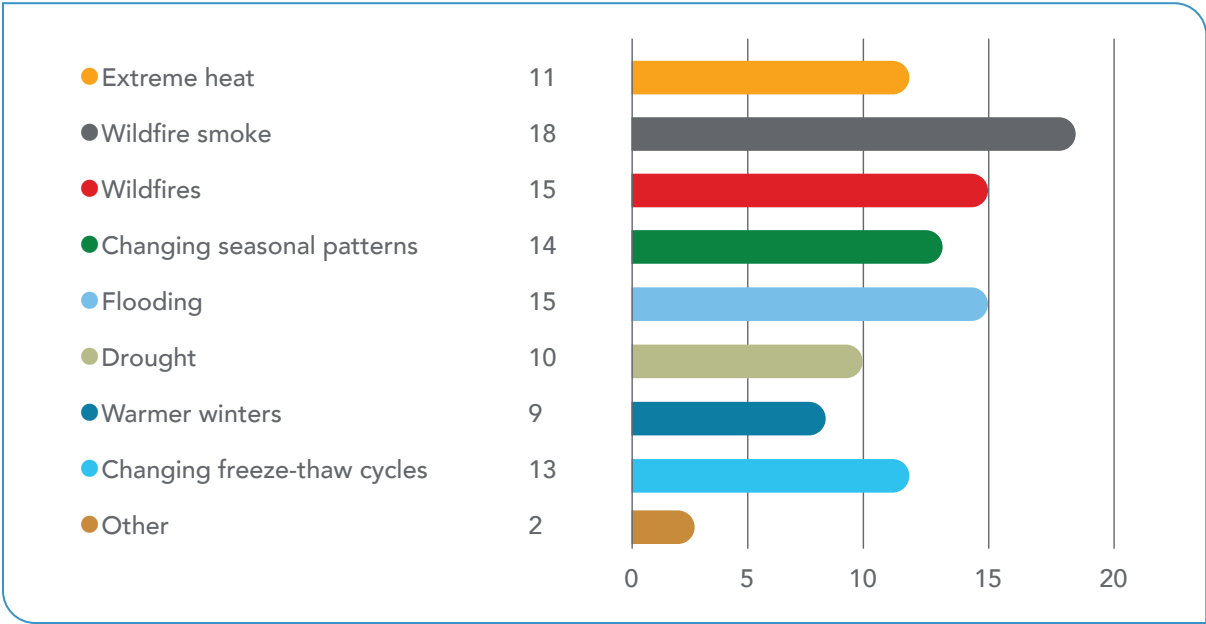
- Key takeaway -

Communities may be “doing NbS” without calling it NbS.

4 | Wildfire, Flooding, and Changing Seasons are Top Climate Concerns

Respondents identified a wide range of climate impacts affecting their communities.

Most frequently cited impacts included:



The prevalence of wildfire-related concerns likely reflects the significant representation of mountain, rural, and western Canadian communities in the survey.

- Key takeaway -

Respondents see NbS primarily as a tool for addressing increasing climate hazards, particularly wildfire and flooding.



5 | Climate Risk Reduction is the Most Valued Benefit

When asked about the benefits of nature-based solutions, respondents consistently prioritized reducing climate risks.

The most commonly identified benefits were:

- Reducing climate risks (18 respondents)
- Supporting biodiversity and ecosystem health (17 respondents)
- Improving community health and well-being (17 respondents)
- Supporting local livelihoods and economies (15 respondents)
- Protecting cultural practices and ways of life (14 respondents)
- Strengthening community connections (14 respondents)

Many respondents emphasized that while climate risk reduction is the primary driver, the broader social, cultural, and ecological co-benefits are also highly valuable.

- Key takeaway -

Respondents view NbS as providing multiple benefits simultaneously, with climate resilience as the primary motivation.



6 | Funding, Policy, and Capacity Remain Major Barriers

Respondents identified several recurring barriers to implementing NbS.

The most commonly identified supports needed were:

- Stronger policies and governance (17 respondents)
- More funding (16 respondents)
- Training and education (15 respondents)
- Partnerships with other organizations (14 respondents)
- Leadership support (13 respondents)

Open-ended responses further highlighted:

- Short-term funding cycles
- Capacity limitations
- Lack of public awareness
- Regulatory challenges
- Competing land-use priorities
- Limited industry participation
- Insufficient Indigenous representation in decision-making

One particularly consistent theme was that nature-based approaches require long-term investment, while many funding opportunities remain short-term and project-based.

- Key takeaway -

Communities generally support NbS, but implementation is constrained by funding, governance, capacity, and long-term support.



7 | Respondents Want Practical Guidance, Not More Theory

When asked what resources would help respondents better understand nature-based approaches and how to implement them, respondents consistently requested:

- Real-world case studies
- Success stories from similar communities
- Practical implementation guidance
- Step-by-step toolkits
- Examples of projects that have worked elsewhere
- Access to technical expertise

- Key takeaway -

Communities are looking for practical examples, peer learning opportunities, and implementation support rather than additional conceptual information.

What We Heard

Overall, respondents expressed strong support for nature-based approaches as tools for addressing climate risks and strengthening community resilience. While familiarity with specific terms such as Nature-based Solutions, Ecosystem-based Adaptation, and Natural Capital varied, there was broad recognition of the important role that healthy ecosystems play in supporting communities. Respondents identified wildfire, flooding, changing seasonal conditions, and ecosystem degradation as key concerns, and highlighted the need for practical guidance, funding, partnerships, and policy support to advance nature-based approaches locally.

Conclusion

The literature review and community questionnaire revealed a consistent message: nature-based approaches have significant potential to strengthen climate resilience in rural and Indigenous communities across Canada, but their successful implementation requires approaches that are community-driven, locally relevant, and supported through long-term investment and partnerships.

The literature highlighted the growing recognition of Nature-based Solutions and Ecosystem-based Adaptation as effective strategies for addressing climate change while generating social, cultural, environmental, and economic co-benefits. At the same time, it identified important gaps in research and implementation, particularly in rural and Indigenous contexts where local realities, knowledge systems, and stewardship practices are often underrepresented.

The questionnaire findings reinforced many of these observations. Participants expressed strong support for nature-based approaches and identified numerous examples already being implemented within their communities. However, respondents also highlighted challenges related to funding, policy support, capacity, and the complexity of terminology and frameworks used to describe nature-based approaches.

Together, these findings suggest that future efforts should focus not only on promoting nature-based approaches, but also on creating the conditions that enable communities to lead, adapt, and sustain these approaches over the long term. This includes supporting Indigenous leadership and knowledge systems, strengthening local capacity, improving access to funding and technical expertise, and sharing practical examples that demonstrate how nature-based approaches can address community priorities.

Ultimately, the findings from this project suggest that many communities are already applying the principles of Nature-based Solutions through stewardship, restoration, conservation, and land-based practices. The opportunity moving forward is to build on this existing knowledge and experience, fostering pathways that strengthen both ecosystem health and community resilience in the face of a changing climate.



