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Community-Based Participatory Research and Indigenous Knowledge: A Pathway to Climate-Resilient and Transformative Water Governance

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ABSTRACT: This critical reflection explores how community-based participatory research (CBPR) can serve as both a methodological and political foundation for transforming water and climate governance. Beginning with an overview of CBPR, the paper emphasises its capacity to centre community needs, redistribute power, and foster resilience through participatory governance. Rather than viewing CBPR solely through the lens of research ethics or engagement, we argue that it enables deeper structural transformation by challenging exclusionary governance systems and amplifying community-defined priorities. We examine how CBPR contributes to water and climate governance by integrating relational place-based knowledge and enabling more adaptive and equitable policy responses. Central to this approach is the recognition of Indigenous Knowledges (IK) not as supplementary to effective governance, but as foundational. By unsettling dominant epistemologies and exposing power asymmetries, CBPR facilitates the inclusion of IK and other marginalised knowledge systems in governance reform. The paper further engages with Indigenous research approaches and decolonial methodologies that inform CBPR, highlighting their role in cultivating relational accountability and shared authority. Situating CBPR within broader debates on knowledge justice and decolonial governance, we also address tensions such as institutional resistance, issues of scale, and the risk of co-optation. Ultimately, we present CBPR as a critical research approach and governance practice that supports climate-resilient, justice-oriented, and community-led policy transformation.

KEYWORDS: Community-based participatory research, Indigenous Knowledge, policy, water, climate, justice

INTRODUCTION

Climate change is compounding serious water-related challenges that have far-reaching impacts on communities, such as flooding, drought and pollution (IPCC, 2022). Scholars from various fields including critical policy studies emphasise the equity dimensions of water governance and climate change (Freudenberg and Tsui, 2014; Klepp and Chavez-Rodriguez, 2018). In Canada, Indigenous, Black and newcomer communities face heightened risks of, and heavier impacts from, climate-exacerbated water

crises; they are also more likely to be excluded from water- and climate-related decision-making (Waldron, 2018). Grassy Narrows First Nation in northwestern Ontario, for example, has experienced more than 60 years of mercury contamination from industrial discharges into the English-Wabigoon River system; this has resulted in profoundly adverse impacts on health, livelihoods and culture that continue to affect the community today (Rudd et al., 2021). In Ontario, Canada, the Ontario Clean Water Act mandates technical risk assessment but provides few mechanisms for incorporating Indigenous water law or community-defined priorities (McGregor, 2014a).

To address the intersection of climate change and water challenges, scholarship and practice increasingly point to the need for governance frameworks and policy processes that prioritise equity and inclusivity. Following Folke et al. (2010), we define climate-resilient governance as the capacity of governance systems to continually adapt to climate-driven water stress while remaining effective, equitable and responsive to changing social-ecological conditions. Community-level efforts to initiate governance reforms and policy innovations are crucial for building resilience that incorporates equity and social justice. Community-based participatory research (CBPR) directly engages those who are most affected; it provides a means to bridge knowledge gaps, address policy inequities, and co-create sustainable policy solutions. By emphasising the lived experiences and leadership of marginalised communities, CBPR offers a path towards more equitable and inclusive climate and water governance.

This paper examines how CBPR can challenge exclusionary governance and can place community knowledge at the centre of water and climate policy changes that enhance resilience and bring about transformative water governance. Transformative water governance refers to the decision-making processes, institutions and power relations that are needed to foreground environmental justice, equity and care in relation to water (IHE Delft, 2023). The focus is on transformative water governance, a progressive approach to decision-making that addresses the root causes of water inequality and environmental degradation. It shifts the focus from purely technocratic, top-down fixes to profound institutional changes, prioritising environmental justice, equity, and community-centred care. It includes policy and social learning, institutional change (Pahl-Wostl, 2017) and 'reconciliatory water governance' that is based on the important role of collaborative leadership in water governance transformations (Phare et al., 2025). It focuses on the participation, community, equity and diverse knowledge attributes of water resilience that are required for adaptive governance transformations (Saikia and Jiménez, 2023).

We begin by outlining CBPR as a transformative research approach for centring community voices in environmental governance. By fostering genuine collaboration and shared decision-making, CBPR supports more equitable, adaptive and resilient policy and governance outcomes. The paper then situates CBPR within broader conversations on participatory governance and resilience, drawing on both theoretical and empirical research to underline the urgent need to democratise policy processes and include a broad range of interested parties to improve implementation and outcomes (Cleaver and Whaley, 2018). We then turn to the role of CBPR in the context of water and climate governance, where it serves as a means to confront entrenched policy inequities and amplify community-defined priorities. We critically examine the limitations of current governance processes, particularly the marginalisation of Indigenous Knowledges and community expertise. Building on this, we examine why Indigenous Knowledge systems are crucial in policy and governance transformations, particularly in efforts to address structural inequities and colonial legacies in water and climate decision-making. Finally, the paper engages with Indigenous research approaches that inform CBPR practice, highlighting how relational and decolonial methodologies can generate new knowledge, redistribute power, and foster more just and resilient governance frameworks. Among the many Indigenous Knowledge systems, for example, Haudenosaunee teachings emphasise responsibility to future generations through the Seventh Generation Principle, offering a model of long-term stewardship that is essential for climate resilience (Johansen and Mann, 2000; King, 2007; Porter, 2008). Haudenosaunee governance frameworks are rooted in consensus, relational accountability, and the sacredness of water; they thus provide valuable insights for reimagining current policy structures (Johansen and Mann, 2000; King, 2007).

By bridging CBPR, climate and water governance, and Indigenous research approaches, this paper offers a framework that rethinks how community-led knowledge can meaningfully inform policy transformation. In doing so, we contribute to the literature by positioning CBPR not only as a method of engagement but as a critical governance strategy that is grounded in relational accountability and epistemic justice. Specifically, the paper explores two interrelated questions: 1) How can CBPR serve as a methodological and political approach to challenging exclusionary water and climate governance?; and 2) In what ways does CBPR facilitate the meaningful integration of Indigenous Knowledge systems into governance and policy processes to support equitable climate resilience? This paper offers a critical and forward-looking reflection on CBPR's potential for challenging structural inequities, disrupting knowledge hierarchies, and inspiring more inclusive governance. While the paper engages with theoretical and conceptual frameworks from international scholarship, the methodological focus is grounded in case studies and examples within the Canadian context. This approach allows for a localised analysis of governance practices while drawing on broader global insights.

The authors are based at Toronto Metropolitan University in Toronto, Ontario, and at Brock University in St. Catharines, Ontario. Toronto Metropolitan University is situated on the traditional territories of the Anishinaabeg, Haudenosaunee and Huron-Wendat Peoples, and on lands governed by the Dish With One Spoon Wampum Belt Covenant; Brock University is situated on the traditional territories of the Haudenosaunee and Anishinaabe Peoples. The authors bring interdisciplinary expertise in political science, public policy, sustainability science, ecology and Indigenous governance. The team includes a member of the Eagle Clan of the Heiltsuk Nation in British Columbia and a Haudenosaunee researcher from Six Nations of the Grand River, Ontario. The lived experiences, community relationships and scholarship of the Indigenous researchers have been integral to this work, alongside the expertise and experiences of the non-Indigenous researchers who recognise the ongoing impacts of colonialism and strive to conduct research that recognises this reality. The lead author and the other non-Indigenous co-authors are committed to respectful, relational engagement with Indigenous Knowledge systems, recognising the distinct knowledge, perspectives and responsibilities that each of the Indigenous and non-Indigenous researchers brings forward.

COMMUNITY-BASED PARTICIPATORY RESEARCH (CBPR)

As both a research philosophy and approach, CBPR promotes collaboration throughout all stages, from project design to data sharing (Israel et al., 1998; Wallerstein and Duran, 2006). This often involves early relationship-building, creating advisory groups, defining roles, and developing ethical standards (Castleden et al., 2012). By centring community knowledge and experiences and amplifying marginalised voices, CBPR nurtures a deeper understanding of climate change and water governance challenges; for instance, Haudenosaunee wampum belts such as the Two Row Wampum (Kaswentha) embody principles of mutual respect and non-interference that can guide ethical participatory research. CBPR can draw on such traditions to build protocols for collaboration that respect Indigenous sovereignty and epistemologies (Coleman et al., 2025; Dolan, 2016).

We use CBPR to refer broadly to community-engaged research approaches, including community-based research (CBR), participatory research (PR) and critical participatory action research (CPAR); at the same time, we recognise important distinctions within these bodies of work in different disciplines (Kemmis et al., 2015). We draw on interdisciplinary literature that includes critical policy studies, social-ecological systems and Indigenous research, which emphasise equity and inclusiveness in policy research and the interconnectedness of social and environmental factors in addressing complex issues (Berkes et al., 2001; Cleaver and Whaley, 2018; Smith, 2021). The paper contributes to the growing body of work showing that Indigenous and community-based governance fosters more inclusive and participatory policy processes and can serve as a foundation for transformational change (Armitage et al., 2011; Hill et al., 2020; Smith, 2012; Whyte, 2018).

Over the past two decades, scholars from various disciplines have emphasised the value of CBPR approaches in addressing governance, policy and community action challenges. Political scientists have increasingly focused on the democratisation of governing processes, as reflected in the substantial scholarship on governance (Bevir, 2011). Critical policy studies scholars have been focusing on the need for inclusive knowledge and research approaches to understanding a wide range of policy topics (Orsini and Smith, 2007; Fischer, 2003). Public policy and environmental policy scholars have focused on the power relations embedded in policy processes and institutional arrangements and have increasingly recognised the significance of public and community engagement in policy change and transformation (Ostrom, 2009; Mees et al., 2015; Scholz et al., 2014; Shankland, 2024). Socio-ecological systems scholars have highlighted the need to include a focus on both social and ecosystems in studying governance (Folke et al., 2005; Pahl-Wostl et al., 2007; Armitage et al., 2011; McGinnis and Ostrom, 2014). CBPR has evolved from various fields relevant to climate change and water governance research.

The growing recognition of the value of community-based research has shifted academic paradigms, particularly in fields such as environmental justice. Stoecker (2005) challenges traditional research models by asserting that grassroots, community-driven research holds significant legitimacy and can be as impactful as, if not more impactful than, research conducted by academics alone. Case studies range from environmental activism in Kentucky to neighbourhood planning in Minneapolis; they demonstrate how non-academic researchers, despite lacking formal training, engage in sophisticated, goal-oriented research that directly benefits their communities (Stoecker, 2005). Scholars from various disciplines, including public policy, public administration and planning, reveal gaps between academic research and applied, community-based research, thus underscoring the need for participatory approaches that empower local communities. This gap is especially pertinent in environmental justice movements where community-led research can challenge dominant state or corporate narratives about 'natural resource' management.

Peter Reason's *Choice and Quality in Action Research Practice* (Reason, 2006) highlights the value of CBPR by showing how researchers' choices shape the quality and purpose of inquiry. Focused on ecological and participatory action research, Reason identifies four dimensions as being essential to effective research; these are: practical purpose, democracy, diverse knowledges, and emergent development. He argues that the quality of action research depends not on fixed standards, but on reflexive and ethical engagement with communities. His work reinforces CBPR's core commitments to power-sharing, responsiveness to local contexts, and integrating diverse ways of knowing. These relational practices are crucial for addressing complex issues such as water governance and climate adaptation, where collaborative and adaptive approaches are essential.

Similarly, Kemmis et al. (2015) expand on the evolution of CBPR frameworks by emphasising the role of critical theory in critical participatory action research (CPAR). The authors argue that both critical theory and CPAR share the overarching aim of addressing social injustices and transforming societal practices. This approach emphasises that the 'self' in CPAR is inherently social – shaped through cultural, economic and political interactions. CPAR highlights the crucial importance of intersubjectivity for the success of participatory research, that is, a shared understanding and common language. CPAR thus serves not only as a tool for individual transformation but also as a means of achieving broader collective social change.

The evolution of community-based research (CBR) in Canada, as traced by Ochocka and Janzen (2014), is grounded in participatory action research and Indigenous Knowledge. Ochocka and Janzen highlight CBR's role in fostering social innovation, co-designing policy, and promoting knowledge democracy. Their framework centres on the three principles of community relevance, equitable participation, and action-oriented change; it further specifies the three functions of knowledge production, mobilisation, and community activation. Through case studies, they emphasise the relational and iterative nature of CBR. Their insights provide a valuable model for water and climate governance, where local knowledge and inclusive collaboration are essential to achieving sustainable solutions.

In the past decade, scholars have increasingly recognised the value of CBR in relation to policy change (Minkler and Freudenberg, 2010; Dushkova and Ivlieva, 2024). Public policy and public administration scholars have also focused on the critical knowledge that CBR brings to the policy process and the way it addresses a range of complex policy challenges (Kapucu, 2016). A growing body of scholarship on policy co-design demonstrates how a diversity of participants in the policy-making process democratises and enhances policy outcomes (Blomkamp, 2018; Mintrom et al., 2024; Avila-Garzon and Bacca-Acosta, 2024). Some scholars have highlighted that co-design and co-creation related to environmental sustainability require alternative approaches that include Indigenous Knowledge (Castelli et al., 2025; Parsons et al., 2016; Zurba and Papadopoulos, 2023).

Together, these studies underscore the critical role of participatory and collaborative research approaches in addressing complex social, health and environmental issues. By bridging the gap between academic and community knowledge, they offer compelling arguments for the need to involve communities as active participants in the research process, ensuring that research outcomes are both relevant and actionable.

Despite its advantages, CBPR is not without challenges. While it promotes shared authorship and acknowledgement, these practices are not always consistently applied (Drawson et al., 2017); furthermore, power imbalances, differing epistemologies, and institutional constraints can impede effective collaboration (Minkler, 2010; Kapucu, 2016). These barriers can be mitigated, however, by employing best practices such as culturally responsive methodologies and by fostering long-term relationships (Cargo and Mercer, 2008; Parsons et al., 2016). Ethical considerations are paramount in CBPR, especially in contexts involving historically marginalised communities. Researchers should work towards equitable participation, shared benefits, and a process that does not perpetuate existing inequalities. Adhering to ethical guidelines established in Indigenous Knowledge systems and research methodologies strengthens the credibility and impact of CBPR (Kovach, 2009; Parsons et al., 2016).

The literature underscores that CBPR not only provides methodological tools for community-engaged research but also reinforces ethical commitments that are crucial for addressing the relational, political and ecological dimensions of climate and water governance. Through power-sharing, equity in participation, and the integration of Indigenous and local knowledge, CBPR-based models can foster transformative change, particularly in addressing the urgent challenges posed by climate and water crises. Scholars focused on governance and transformative policy processes are increasingly documenting policy spaces in which different actors recognise the significance of these characteristics for democratising policy processes and improving outcomes (Bussu et al., 2022; Gaventa, 2006; Hendriks and Colvin, 2026; Hendriks and Dzur, 2022; Jensen et al., 2020; Pera and Bussu, 2024).

PARTICIPATORY GOVERNANCE AND RESILIENCE

There is a growing recognition in environmental scholarship and policy practice that engaging communities in governance and decision-making processes fosters more adaptable and sustainable solutions (Armitage et al., 2011; Hafferty et al., 2025; Kiss et al., 2022; Reed, 2008; Shankland, 2024). Participatory approaches are essential for both social and ecological resilience, particularly in the face of climate change, water crises and other environmental challenges (Berkes and Ross, 2013; Ellermann et al., 2026; Folke et al., 2005; Jensen et al., 2020; Pahl-Wostl, 2009, 2017; Pahl-Wostl and Gorris, 2026; Syam et al., 2025). By prioritising local knowledge and community-driven processes, solutions are better aligned with the real on-the-ground needs of those most affected by environmental change (Shankland, 2024). Involving communities not only empowers them but also ensures that policies are contextually relevant and rooted in lived experiences (Meadow et al., 2015).

The process of involving communities, however, is often impeded by dominant power structures that favour certain types of knowledge – usually those grounded in Western scientific and technical frameworks – while marginalising alternative perspectives (Smith, 2012). Public policy scholars across

many policy areas including water policy document how new approaches may also be hindered by vested interests, exclusive institutionalised policy communities, and value systems that exclude local and Indigenous knowledge (Johns, 2021). This is especially true when it comes to integrating traditional and Indigenous Knowledge systems, which are frequently underfunded and sidelined in mainstream policy and academic arenas (Angheloiu and Tennant, 2024). Despite their high relevance, these systems are often seen as incompatible with standardised frameworks of knowledge production and closed policy systems (McGregor 2018, Phare et.al. 2025). This disregard for local expertise ultimately weakens resilience strategies and leads to missed opportunities for more inclusive and effective solutions. A more holistic approach is needed, one that values diverse ways of knowing, particularly those grounded in community relationships, cultural traditions and long histories of environmental stewardship.

The integration of community knowledge and participatory governance plays a central role in building both social and ecological resilience. Social resilience refers to a community's capacity to adapt to challenges such as economic shocks, climate disruptions or health crises. Ecological resilience, by contrast, concerns the ability of ecosystems to recover from disturbances while maintaining their essential functions and biodiversity (Folke et al., 2010). These two forms of resilience are closely linked in that strong, cohesive communities are more capable of stewarding local ecosystems, while healthy ecosystems sustain community well-being.

A foundational principle of participatory governance is that communities possess detailed, place-based knowledge that is critical to understanding and responding to environmental and social challenges. This idea is central to institutional design and collective action research (Ostrom, 2009), and it is further developed through social-ecological systems frameworks (SEFS) (McGinnis and Ostrom, 2014). Indigenous communities, in particular, offer long-standing models of governance that emphasise interdependence, reciprocity and ecological balance (Berkes, 2017). These principles are especially vital in contexts where climate change exacerbates existing vulnerabilities. Participatory governance enables the co-creation of solutions that are flexible and evolve over time and are grounded in ongoing feedback from the communities they serve.

Haudenosaunee traditions exemplify these principles by embedding environmental governance within relational, ethical and ceremonial frameworks. Storytelling is not merely a cultural artifact; it is a living practice that embodies ecological knowledge, social responsibility, and protocols for interacting with the natural world. Stories are shared in specific seasons by designated knowledge holders and are part of broader systems of accountability (Daigle et al., 2019; Lilomaiaava-Doktor, 2020; Sheridan and Longboat, 2006). Oral histories about the creation of rivers or lakes, for instance, often emphasise the sacredness of water and the consequences of environmental imbalance. Stories about animals, such as the turtle's foundational relationship to the earth, reveal ecological insights that are shaped by centuries of observation and experience. These narratives convey an understanding of humans as part of a larger web of life that requires humility, gratitude and restraint in their interactions with water, land and other beings (King, 2007; Coleman et al., 2025; Dolan, 2016).

This mode of storytelling is not merely illustrative; it is a form of governance that reinforces intergenerational responsibility and guides community behaviour. CBPR aligns with these practices by creating space for storytelling that is led by community members and grounded in ceremonial, seasonal and linguistic contexts. Participatory tools such as digital storytelling, mapping and video can support the respectful integration of these teachings while preserving their integrity (Corwin, 2016; Butet-Roch, 2016; Caquard et al., 2009). Community mapping projects, for example, can include both physical features such as wetlands and flood zones, as well as story-based layers that identify sacred sites, seasonal knowledge, and/or ancestral water relationships. When designed collaboratively and guided by cultural protocols, such methods enable policy development that is not only scientifically informed but is also spiritually and culturally grounded (Wilcox et al., 2013; Tzou et al., 2020).

By centring Haudenosaunee storytelling within participatory research and governance, for example, a deeper model of resilience emerges, one that is relational, adaptive and rooted in place. These practices challenge top-down governance models by demonstrating how Indigenous legal orders and knowledge systems offer alternative approaches to environmental management (Steele, 2020; Ransom and Ettenger, 2001; Bowie, 2013; Barnhill, 2009). They also emphasise governance as an ethical practice wherein decision-making is inseparable from responsibilities to the land and the community. In this way, Haudenosaunee knowledge contributes to more inclusive policy as well as to transformative frameworks for living well with water.

Participatory governance also strengthens communities by fostering collective action and shared responsibility. When people are directly involved in decisions that affect their environments, they are more likely to support and sustain those decisions (Newig et al., 2010). This is particularly evident in natural resource management, where co-management and collaborative governance approaches have shown improved outcomes in water, forestry and fisheries sectors (Ostrom, 2009; Berkes, 2009). These participatory models encourage the sharing of power and knowledge, thus creating governance systems that are more responsive, legitimate and effective. This requires processes and policy actors who are open and committed to more equitable and authentic engagement (Arnstein, 1969; Campbell, 2005; King and Cruikshank, 2012; King et al., 1998).

Ultimately, participatory governance marks a shift from hierarchical to polycentric and horizontal forms of decision-making (Ostrom, 2010; Pahl-Wostl, 2009; Huitema et al., 2009). This transformation supports the broader goals of environmental and social justice by enabling more equitable and locally grounded responses. In water and climate governance, Indigenous worldviews such as those of the Haudenosaunee offer deeply rooted insights into sustainable management. Recognising water not as a commodity but as one's relative reframes governance as a relationship rather than a control mechanism. Integrating these perspectives strengthens resilience by improving outcomes and by reshaping the foundations of how communities and ecosystems interact.

As the pressures of climate change and water insecurity intensify, the need for participatory governance becomes increasingly urgent. Without deliberate efforts to integrate diverse knowledge systems – particularly Indigenous and community-based knowledge – resilience strategies will remain incomplete. By positioning community relationships, reciprocity and local agency at the centre, participatory governance offers a path towards more just, adaptive and enduring solutions.

CBPR, WATER AND CLIMATE

We draw on scholarship in CBPR that is related to climate change, water governance and policy transformation, with an emphasis on centring Indigenous Knowledge, fostering intergenerational dialogue, and integrating diverse policy and cross-sectoral perspectives to enhance resilience (Castleden et al., 2012; Ochocka and Janzen, 2014; Berkes, 2017). Governance systems often exclude marginalised voices and fail to incorporate interdisciplinary and practice-based knowledge, resulting in gaps in CBPR approaches. Angheloiu and Tennant (2024) attribute these exclusions to the complexity of integrating different ways of knowing. They advocate for participatory processes that value local and traditional knowledge, but they caution that policy professionals often resist co-construction and that such efforts frequently overlook marginalised and migrant communities.

CBPR includes several important methodological approaches for addressing these challenges. Unlike traditional research approaches, CBPR centres on collaboration, co-learning, and decision-making that is shared between researchers and community stakeholders (Israel et al., 1998). This inclusive framework integrates local knowledge with scientific and technical expertise, providing a powerful tool for policy transformation in the face of climate change and industrial pressures on freshwater resources (Castleden et al., 2012). By fostering participatory democracy and environmental justice, CBPR ensures that affected communities have a meaningful voice in decision-making processes (Schlosberg, 2007).

The concept of 'co-production of knowledge' further highlights the value of CBPR in climate change and water governance research. This approach combines scientific data with traditional ecological knowledge (TEK), recognising that environmental issues are best addressed through a fusion of the two systems (Armitage et al., 2011; Ojha et al., 2025). Many water governance and policy scholars have outlined how participatory research fosters adaptive co-management, resulting in flexible and community-responsive water policies (Ostrom, 1990; Berkes, 2009; Pahl-Wostl, 2009). In Indigenous-led water governance and climate adaptation, CBPR ensures that research processes respect Indigenous sovereignty and self-determination while aligning with the principles of free, prior, and informed consent (FPIC) (Whyte, 2017). Castleden et al. (2012) demonstrate how CBPR strengthens Indigenous water rights through partnerships that prioritise relational accountability and knowledge-sharing.

In the Great Lakes Basin, CBPR initiatives have improved policy outcomes by incorporating diverse perspectives, including those of Indigenous nations, environmental organisations, and government agencies (Norman et al., 2015). This underscores the role of CBPR in decolonising research practices, centring Indigenous Knowledge, and building policy innovation, legitimacy and long-term sustainability. A notable example is the development of the 1972 Great Lakes Water Quality Agreement, under the leadership of the International Joint Commission (IJC), which explicitly incorporated input from CBPR-informed public engagement sessions and Indigenous-led workshops and research (IJC, 2025). The IJC's Water Quality Board adopted Indigenous engagement principles and practices in 2017 and added a focus on Indigenous peoples and knowledge in its 2018, 2021 and 2024 regional polls. Since 2019, two Indigenous Commissioners have been appointed by the Canadian government. In 2020, its Science Advisory Board initiated a project entitled *Bridging Western Science and Traditional Ecological Knowledge*; the organisation is committed to transforming its water governance and institutionalising Indigenous Knowledge and engagement in the Commission's work through its Indigenous Collaboration Team (IJC, 2026).

Expert science alone cannot address complex environmental challenges; these require approaches that integrate local experiences and community values, what Simpson et al. (2015) refer to as 'vernacular' knowledge. This type of knowledge emerges through collaborative processes that blend scientific expertise with local insights and social beliefs, encouraging dialogue and negotiation among diverse and often competing interests. In the context of water governance, such knowledge-sharing is increasingly facilitated through collaborative forums and policy networks that involve state actors, NGOs and local stakeholders. While Simpson et al. (2015) highlight the importance of these spaces for cultivating vernacular knowledge, earlier work on policy networks and collaborative governance has also emphasised the role of inter-organisational linkages in shaping knowledge production and decision-making (see, for example, Bakker and Morinville, 2013; Bäckstrand, 2006).

In Indigenous contexts, CBPR builds respectful partnerships by centring community leadership and ensuring that researchers participate as invited collaborators, with decision-making power remaining in the hands of the community. As climate change intensifies, cities must innovate and adopt inclusive, justice-centred approaches to water governance and policy change. CBPR represents a critical, participatory research approach to co-creating knowledge and advancing climate resilience, sustainability and social justice goals. The integration of CBPR into theoretical and methodological approaches to transformative water governance and policy is critical in an era of accelerating climate and environmental change.

INDIGENOUS KNOWLEDGES IN GOVERNANCE AND POLICY TRANSFORMATIONS

In the settler-colonial contexts of many countries like Canada, where water governance has long marginalised Indigenous voices, a shift toward pluralistic and relational knowledge systems is both a political and ecological necessity. We argue that Indigenous Knowledge systems, far from being supplementary to Western science, constitute distinct and legitimate forms of governance that demand

recognition, reciprocity and structural change in environmental policy. Indigenous Knowledge systems provide critical insights into sustainable water and climate governance that are underpinned by long-established relationships with the land, water and ecosystems. Water is not viewed as a mere resource, but rather as a living entity with profound spiritual and relational significance. Indigenous Knowledge emphasises the ecological, cultural and spiritual aspects of water, particularly in the context of climate change and governance (Whyte, 2018).

Underlying these approaches is a broader debate about the nature of knowledge itself. Haudenosaunee knowledge systems demonstrate that Indigenous law and environmental stewardship are inextricably linked. Governance is not limited to formal institutions; it is enacted through reciprocal relationships with land and water and is maintained via oral traditions, ceremonies and shared responsibilities. The Kaianere'kó: wa (Great Law of Peace) presents a model of relational governance that is based on balance, accountability and consensus-building, where water is viewed as a living relative, not as a resource to be managed (Leonard, 2019; Phillips, 2010). Ceremonial practices such as the Thanksgiving Address (Ohen: ton Karihwaterkwén), which give thanks to the waters, are more than symbolic; they are legal and political expressions of Haudenosaunee jurisdiction and responsibility (Hill, 2020; Porter, 2008; Longboat, 2008; Wemigwans and MacKay, 2023).

These traditions challenge dominant settler-state frameworks by asserting a place-based legal order that both predates, and persists alongside, colonial systems. Instead of seeking inclusion within existing state governance, Haudenosaunee law asserts inherent jurisdiction. The Two Row Wampum (Kaswentá) embodies this ethos, promoting coexistence through mutual respect and non-interference between Indigenous and settler societies (Sultana et al., 2023; Coleman et al., 2025). Integrating Haudenosaunee governance into water and climate policy requires honouring Indigenous laws and recognising their authority as a distinct and legitimate system of governance (Sioui et al., 2022; Dolan, 2016; Castleden et al., 2017).

To respectfully engage with Indigenous Knowledge, research methodologies must undergo significant changes. Banuri and Apffel-Marglin (1993) identify fundamental differences between traditional ecological knowledge (TEK) and Western scientific knowledge. Using a systems-of-knowledge approach, they highlight key differences between the two, emphasising that Indigenous Knowledge is inherently tied to cultural contexts, local environments and community relationships. Unlike Western scientific knowledge, which often separates nature from culture and treats nature as a resource, Indigenous Knowledge fosters a deeper and more reciprocal relationship with the environment (Banuri and Apffel-Marglin, 1993).

Berkes (2017) highlights how Western science emphasises universality, abstraction and instrumentalism, while Indigenous Knowledges are grounded in place, relationships and intergenerational responsibility. Rather than treating these systems as oppositional, Berkes encourages a focus on their complementarities. This argument resonates with Linda Tuhiwai Smith's *Decolonizing Methodologies* (Smith, 2012), which critiques the colonial underpinnings of Western research and calls for Indigenous-led approaches. Smith identifies how traditional research practices have dehumanised Indigenous peoples, and she advocates for methodologies that are grounded in respect, activism and self-determination.

In British Columbia, Canada, von der Porten et al. (2016) analyse the integration of Indigenous Knowledge into collaborative water governance, with a particular focus on Indigenous nations without historic treaties. By examining four case studies, the authors explore the tensions between Indigenous-led water management and colonial governance structures. They argue that Indigenous Knowledge and Western science must be recognised as equally valid and that meaningful participation in water governance requires ongoing dialogue, the recognition of Indigenous governance systems, and decision-making processes that honour Indigenous sovereignty. Similarly, de Loë and Kreutzwiser (2007), writing from a water policy and governance perspective, examine the evolution of Ontario's water governance

system toward more decentralised and participatory models. They suggest that recent structural changes in Ontario's water governance system (the move toward watershed-based management, stakeholder engagement processes, and the devolution of authority to local conservation authorities) have created opportunities for more inclusive decision-making, including the integration of Indigenous voices.

Berkes (2017) also emphasises the mutual scepticism that exists across knowledge systems. Western scientists often question traditional ecological knowledge, but many Indigenous Knowledge holders are equally sceptical of book-based expertise. Berkes discusses a caribou biologist's experience in Baker Lake, Nunavut, where local hunters questioned his expertise in caribou. The hunters stressed that their understanding of caribou, based on first-hand observation and mentorship from Elders, was more legitimate than external knowledge that lacked local grounding. This underscores the importance of local place-based knowledge in validating expertise, and challenges the assumption that Western science, often regarded as universally applicable, is inherently more credible than Indigenous Knowledge (Berkes, 2017).

In Ontario, Deborah McGregor (2018) emphasises that Indigenous Knowledge is not merely an alternative to Western science, but rather is a distinct governance system that is grounded in responsibilities, relationships and ceremony. Meaningful collaboration, she argues, requires that water governance respect Indigenous legal systems and sovereignty rather than fitting Indigenous Knowledge into colonial frameworks. This demands not just dialogue but a fundamental shift in how knowledge and authority are recognised and shared. A compelling example is the partnership between the Six Nations of the Grand River First Nation and McMaster University, where a community-led health survey – co-designed with Indigenous leadership – facilitated dialogue between Indigenous and Western perspectives (Duignan et al., 2020). The collaboration addressed the health impacts of a long-standing water crisis while also exposing structural barriers rooted in colonialism. By centring Six Nations leadership, the study illustrates how CBPR can bridge Indigenous Knowledge and Western science, producing culturally relevant assessments and actions that are grounded in community values. This approach reflects the Two Row Wampum Treaty, which affirms reciprocal and respectful governance, particularly regarding water and health (Duignan et al., 2020).

Sultana et al. (2023) further underscore the value of integrating Indigenous Knowledge with CBPR methodologies in water governance. Their research, guided by Haudenosaunee Kaswenta (Two Row Wampum) treaty principles, explores the impact of water insecurity on maternal health within Six Nations. The study combines CBPR with Indigenous research approaches and methods such as storytelling, to facilitate reciprocal knowledge exchange. Indigenous methodologies challenge traditional anthropological research approaches that often marginalise Indigenous ways of knowing and being. The researchers advocate for frameworks that respect epistemological differences and emphasize Indigenous leadership, knowledge holders and community participation. Their work contributes to decolonising research practices and encourages Indigenous self-determination in health and water governance.

McKibbin (2023) calls for the decolonisation of Canadian water governance, highlighting case studies from Indigenous organisations that expose systemic inequities rooted in colonial control over water. She advocates for integrating Indigenous Knowledge systems through the 'Two-Eyed Seeing' methodology; this is a Mi'kmaw principle introduced by Elder Albert Marshall which promotes the coexistence of Indigenous and Western knowledge systems (Hall et al., 2015). This framework asserts that decolonisation requires Indigenous leadership in decision-making, and governance structures that are grounded in Indigenous values, ethics and spiritual relationships with water (McKibbin, 2023). Reid et al. (2021) apply Two-Eyed Seeing in fisheries research and management, emphasising complementarity rather than assimilation. They pair Indigenous practices such as seasonal salmon harvesting, place-based ecological observations, and oral histories with Western approaches such as population modelling and statistical analysis. Drawing on three Canadian case studies, they show how Two-Eyed Seeing fosters co-developed research questions, shared learning, and culturally grounded governance.

Historically, research involving Indigenous peoples in Canada has often been conducted *about* them rather than in genuine partnership or collaboration *with* them. Researchers' failure to respect Indigenous ways of knowing has led to the perpetuation of harmful practices in the collection, interpretation and application of community knowledge (Drawson et al., 2017). The epistemic gap between Indigenous Knowledge and Western frameworks is further widened by differing perspectives on the relationship between theory and practice. Policymakers and practitioners often hesitate to adopt methods that are based on theories perceived to be untested or weak. Theoretical insights are frequently dismissed as being disconnected from real-world applications, and practitioners resist changing their approaches on the basis of new theoretical understandings (Angheloiu and Tennant, 2024).

Indigenous scholars and leaders have long advocated for the recovery and promotion of Indigenous Knowledge (IK) systems as a critical process for decolonising Indigenous nations and their relationships with settler governments. These strategies serve as acts of cultural resistance and represent efforts to revitalise Indigenous worldviews, philosophies and knowledge systems. Such approaches, driven by the political goal of self-determination, challenge colonial systems and foster the restoration of Indigenous governance, promoting coexistence, peace and justice within Indigenous nationhood (Simpson, 2004). Aimée Craft (2013) builds on this foundation by emphasising the centrality of traditional governance and Indigenous legal traditions – particularly Anishinaabe law – in shaping relationships with water. She argues that Indigenous legal orders are not only legitimate systems of governance but are rooted in reciprocal, place-based responsibilities that offer guidance for environmental stewardship and nation-to-nation relations.

As traditional ecological knowledge has gained wider recognition, a 'TEK industry' has emerged that utilises rapid rural appraisal methods to collect information for official purposes. This approach, however, raises two significant concerns. First, the knowledge collected often loses its cultural context (Nadasdy, 1999). Second, TEK is frequently absorbed into non-Indigenous systems that differ fundamentally from Indigenous worldviews, reducing its effectiveness and relevance (Berkes, 2017). Consequently, just as research must be rethought, so too must the governance of knowledge. OCAP principles (Ownership, Control, Access and Possession) have emerged as a critical framework for asserting First Nations data sovereignty. The emergence of OCAP principles addresses these issues by providing ethical guidelines for research involving Indigenous communities. Developed by and for them, OCAP affirms the authority of First Nations over research involving Indigenous Knowledge; it ensures that communities have control over all stages of research, from design to data ownership and knowledge-sharing. By adhering to these principles, researchers can ensure that their work aligns with community values and standards. Increasingly, Indigenous communities are prioritising these ethical guidelines in all research partnerships (Drawson et al., 2017).

Incorporating Indigenous Knowledge into water governance is not about romanticising these practices but about recognising their intrinsic value. Indigenous perspectives offer a relational worldview where water is not merely a resource to be managed; it is also a respected relative that must be protected. This shift from an anthropocentric approach to one of reciprocity is crucial for sustainable water governance. Indigenous Knowledge has long informed the stewardship of water bodies and ecosystems. Ultimately, supporting Indigenous-led approaches to water governance requires more than institutional inclusion; it demands an epistemic shift. Plurality, relationality and responsibility must replace the extractive hierarchical logics that have long dominated environmental governance and policy systems. As water systems are pushed to their limits in the context of climate change and multiple human uses, the systems of knowledge that guide our collective responses must be revisited.

INDIGENOUS RESEARCH APPROACHES AND CBPR

Water and climate governance require a commitment not just to integrating knowledge systems, but also to aligning methodologies that share core values. Community-based participatory research (CBPR) and

Indigenous research approaches are both grounded in respect, relational accountability, and the co-production of knowledge. Together, they provide an ethical and culturally appropriate framework for addressing climate and water challenges in partnership with Indigenous communities.

One of the fundamental aspects of conducting research with Indigenous communities, particularly in the context of climate change and water governance, is the recognition that Indigenous Knowledge must remain within its cultural context (Nadasdy, 1999; McGregor, 2004). This means resisting the tendency to treat Indigenous Knowledge merely as another data set to be extracted and fitted into pre-existing scientific models. Instead, researchers must engage in the challenging task of integrating both Western scientific and Indigenous Knowledge systems in ways that are respectful, reciprocal and mutually beneficial (Berkes, 2017).

Margaret Kovach, in her book *Indigenous Methodologies: Characteristics, Conversations, and Contexts* (2009), presents a powerful framework for decolonising Indigenous scholarship. Kovach emphasises that Indigenous research methodologies are inherently different from Western approaches as they are rooted in tribal cultural perspectives and place a strong emphasis on storytelling. According to Kovach, storytelling is a profoundly intuitive and introspective form of knowing that bridges the spiritual and material realms, playing a critical role in how Indigenous communities transmit and preserve knowledge. Kovach also cautions, however, that written transcriptions of these stories can lose their full meaning and significance as stories carry layers of cultural context that are not easily captured through conventional academic writing. As such, respecting the cultural context and understanding of these stories is crucial to ensuring their accurate representation (Kovach, 2009). In the context of water governance, this means moving away from simplistic models that extract knowledge for academic or policy-driven purposes, and instead adopting research approaches that are grounded in cultural respect and mutual understanding. It also requires acknowledging the unique ways that Indigenous communities relate to water, both as a resource and as a living relational entity.

Linda Tuhiwai Smith's concept of 'decolonising methodology' is a foundational principle in CBPR, particularly when it comes to working with Indigenous communities. Smith (2012) argues that colonial power structures have intentionally severed Indigenous peoples from their histories, landscapes, languages and ways of knowing. This disconnection has resulted in the marginalisation of Indigenous Knowledge systems, which have often been relegated to the periphery of academic discourse. To counter this, Smith proposes decolonising research practices and restoring and validating Indigenous perspectives. Such practices require researchers to actively work against the historical and ongoing effects of colonisation and to develop research methods that recognise the resilience and importance of Indigenous Knowledge systems (Berkes, 2017).

Storytelling is foundational to Indigenous research methods as it enables a richer and more holistic understanding that is rooted in oral traditions and relational knowledge-sharing about how communities engage with water (McIvor, 2010). Storytelling enables participants to share their lived experiences in ways that honour personal, collective and land-based knowledge. Through storytelling, the non-human world – including animals, plants, and water – can also be represented as active participants in the narrative, acknowledging the deep interconnections between humans and the environment (Wright et al., 2012). Storytelling also offers a powerful tool for translating research findings into formats that are both meaningful and accessible to Indigenous communities (Christensen, 2012).

In North America, particularly within some First Nations communities in Canada, the practice of offering tobacco plays a central role in establishing respectful research relationships. Wilson and Restoule (2010) explain that offering tobacco is often in the form of Tobacco Ties, where tobacco is placed in a piece of cloth along with a person's prayers and intentions and then tied into a small bundle. The Tobacco Tie signals a gesture of respect and relational accountability when seeking knowledge from Elders. The act of offering tobacco is deeply symbolic, with the refusal of tobacco signalling a refusal to participate or consent to the research process. This practice not only supports ethical research relationships but also

helps reclaim tobacco's original sacred meaning, which has been distorted in non-Indigenous contexts (Wilson and Restoule, 2010).

In addition to these broader Indigenous methodologies, Haudenosaunee knowledge systems offer unique philosophical and ceremonial approaches to research and governance that further deepen our understanding of relational ethics and ecological stewardship. Among the Haudenosaunee (People of the Longhouse), research, knowledge-sharing and governance are deeply tied to spiritual, relational and ecological principles. Central to Haudenosaunee knowledge systems is the concept of the Good Mind (Skén: nen), which refers to a way of thinking and being that prioritises peace, respect, balance and harmony within the self, the community and the natural world. This worldview does not separate science from spirituality or community from land; rather, it understands them as inseparable parts of a living whole. As such, research conducted in Haudenosaunee communities must be guided by this relational ethics, where responsibilities to the land, water and ancestors are as important as responsibilities to research participants or institutions (Sultana et al., 2023; Ten Fingers, 2020; Francis, 2019).

The Ganohonyohk, or Thanksgiving Address, is a ceremonial practice that exemplifies Haudenosaunee values and cosmology. It is often recited at the beginning of meetings or gatherings to express gratitude to all aspects of Creation – from the people and animals to the waters, winds and celestial beings. This ceremonial act is not simply symbolic; it reflects a governance model that is rooted in gratitude, relational accountability and ecological awareness. Integrating this into research processes helps reaffirm the sacredness of water and reinforces the understanding that water is not just a resource, it is also a living relative. This worldview is critical in shaping ethical and community-led water governance strategies (Bourque, 2025; Coleman et al., 2025). These ceremonial and governance practices exemplify how CBPR, when guided by Indigenous methodologies, can embody relational ethics and community-defined authority over research.

The Haudenosaunee Confederacy has a long-standing tradition of collective decision-making through consensus, as embodied in the Great Law of Peace (Kayanerenkó: wa). This legal and philosophical foundation provides a model of governance that honours interdependence, sovereignty and long-term thinking – principles that are directly relevant to climate resilience and environmental stewardship. In the context of research, this translates into methodological approaches that value extended dialogue, shared leadership, and the collective shaping of knowledge outcomes. Facilitation methods rooted in Haudenosaunee protocol, for example, often use circle-based dialogues, wampum-inspired memory practices, and ceremonial offerings such as tobacco to establish mutual respect and ensure community consent (Hill, 2020; Potts and Brown, 2015; Wilson and Restoule, 2010).

Incorporating Haudenosaunee perspectives into Indigenous research methodologies enriches the broader field of CBPR by emphasising ceremony, kinship and place-based responsibilities as being core to knowledge creation. These methods resist the fragmentation and objectification that is often found in Western research paradigms, and they centre instead on holistic, intergenerational and community-defined values. When applied to water governance, these approaches foreground the sacredness of water, recognise the rights of non-human beings, and challenge extractive practices that separate knowledge from responsibility. Haudenosaunee-informed methodologies offer not only a culturally grounded approach but also a philosophical framework for rethinking our collective relationship with the natural world (Scott Thomas, 2022; Sioui et al., 2022; Debassige, 2010).

Talking and sharing circles offer a clear point of convergence between Indigenous methodologies and CBPR by fostering co-leadership, respectful knowledge exchange, and safe spaces for collective meaning-making. Talking Circles are guided by respect, cooperation and attentive listening, with participants speaking in turn, often using a talisman or culturally significant object to indicate who has the floor (Tachine et al., 2016; Haozous et al., 2010). Unlike Western focus groups, they emphasise holistic, spiritually grounded sharing, where participants engage with their hearts, minds, bodies and spirits. Lavallée (2009) expands on this approach through Sharing Circles, which prioritise participant control and

the relational dynamics within the circle. She further developed Anishinaabe symbol-based reflection, blending participatory action research with cultural practice. This method invites participants to create symbolic art representing their experiences, which is then shared and discussed collectively. The process supports individual reflection and deepens understanding of relationships among people, places and water.

Other culturally grounded methods, such as Anishinaabe *mino-bimaadiziwin* and *wahkohtowin*, also play an essential role in guiding research with Indigenous communities. Mino-bimaadiziwin, the Anishinaabe principle of living a 'good life', emphasises ethical and spiritual engagement in the research process (Debassige, 2010). Wahkohtowin, a Cree concept of kinship and relationality, is used to guide storytelling and memory work in research relationships; it ensures that all participants are treated with respect and that the interconnectedness of people, place and nature is honoured (O'Reilly-Scanlon et al., 2004). These philosophical principles align with CBPR's emphasis on ethical engagement, long-term partnerships, and accountability to the communities most affected by environmental harms.

While there is no single, universally applicable Indigenous research method, common approaches such as storytelling, Talking Circles and symbolic art are frequently used across communities. Researchers are encouraged to begin their work with self-reflection and engage in relationship-building with community members to co-develop methods that are culturally appropriate and contextually relevant (Drawson et al., 2017). This approach ensures that research is not only ethically conducted but is also deeply respectful of Indigenous Knowledge systems and cultural values.

Notably, Indigenous research methods should be employed throughout the entire research process, from the development of questions to the sharing of results. Unlike Western research methods, which often compartmentalise the process, Indigenous methodologies demand that each phase of research reflect the values, needs and priorities of the Indigenous community involved. Even when using Western methods such as surveys or quantitative approaches, Indigenous methodologies can guide the process to ensure that the research is culturally appropriate and community-driven (Drawson et al., 2017).

Berkes' book, *Sacred Ecology*, provides foundational insight into how Indigenous research methods and CBPR can reframe environmental knowledge. His central question (whether TEK remains relevant amid modern scientific advances) critiques Western science's tendency to marginalise other ways of knowing. Citing Bertrand Russell, Berkes argues that technological progress often comes at the expense of wisdom; he thus suggests that TEK should be reconsidered as a legitimate and vital knowledge system (Berkes, 2017). His intellectual shift from marine biologist to interdisciplinary scholar reflects a broader turn towards participatory and relational methodologies. Influenced by philosophers of science like R.G.H. Siu and Thomas Kuhn, Berkes challenged dominant objectivist epistemologies. Kuhn's model of scientific revolutions marked by paradigm-disrupting anomalies offered a framework for understanding TEK as coherent and empirically grounded rather than anecdotal or inferior (Berkes, 2017). This philosophical shift parallels CBPR's core principles of co-learning and the integration of diverse epistemologies.

This methodological transformation became concrete during Berkes's fieldwork in the 1970s with the Cree of James Bay. Rejecting extractive research models, he adopted a participatory approach that respected Cree knowledge systems. By focusing on lived experience and subsistence practices, Berkes co-produced knowledge that was rooted in community priorities and place-based relationships. His work exemplifies Indigenous research methods that integrate social, ecological and spiritual dimensions of knowing, elements that are frequently excluded from conventional ecological research (Berkes, 2017). Although Western ecological science continues to privilege reductionist approaches, Berkes highlights how Indigenous frameworks offer holistic and relational alternatives. TEK embodies principles of reciprocity, ethics and place-based learning that are central to CBPR and vital for addressing environmental complexity (Berkes, 2017).

The 2024 Confluence gathering at the University of Toronto offered further insight into Indigenous research methods and CBPR. Set on the unceded territories of the Huron-Wendat, Seneca and Mississauga of the Credit, the gathering brought together community leaders, scientists and water protectors to reimagine water governance. Rather than treating Indigenous Knowledge as supplementary, the event emphasised its centrality. CBPR principles were evident in the emphasis on collaboration, respect and relational accountability. Throughout the gathering, participants shared land-based practices and emphasised the spiritual and cultural dimensions of water protection. These contributions reflected Indigenous research approaches that are not limited to data collection, but rather are rooted in relational ethics and lived responsibility. Discussions highlighted, for example, how community knowledge informs daily decisions about water stewardship, how traditional agricultural and water conservation techniques challenge dominant infrastructures, and how embodied experiences such as storytelling, ceremony and place-based learning sustain long-term ecological care.

Environmental justice continues to shape the relevance of CBPR in water governance. Dr. Ingrid Waldron's work on environmental racism documents the disproportionate impacts of pollution on Indigenous, Black, and marginalised communities. Her research highlights how participatory methods can centre on lived experiences and community action in the face of systemic injustice. As an example, Africville, a historic Black community in Halifax, Nova Scotia, endured decades of environmental racism through the siting of polluting industries, waste disposal facilities and inadequate municipal services before the community was forcibly displaced in the 1960s (Waldron, 2025). This case reveals the urgent need for collaborative frameworks that address both ecological harm and social inequity. Sarah Wiebe (2016) similarly highlights how community storytelling and arts-based participatory research can expose the lived realities of toxic exposure in places like Aamjiwnaang First Nation community on the St. Clair River in southwestern Ontario. Her work demonstrates that centring marginalised voices through creative, place-based methods not only informs policy but also fosters healing and collective agency in the face of environmental violence.

Efforts to link water governance with policy reform are also evident in calls for stronger legislative protections, as seen in the passage of the 2024 environmental racism bill in Canada. These calls emphasise the need to dismantle extractive policy processes and replace them with relational, intersectional approaches, ones that consider food, land, water and sovereignty as fundamentally interconnected. These goals are at the heart of CBPR, which prioritises shared power, knowledge co-creation and accountability to the communities most impacted.

Together, these examples reveal the transformative potential of Indigenous research methodologies and CBPR in reshaping water and climate governance. By grounding knowledge in lived experience, reciprocal relationships, and community leadership, they challenge extractive research models and traditional scholarship on climate change and water governance, offering more equitable, ethical and responsive pathways forward. These approaches are not merely alternatives to dominant paradigms; they are necessary correctives that address colonial legacies while building a more just and sustainable future.

CONCLUSION

This critical research reflection affirms the value of collaborative community-centred approaches to building climate change resilience and transforming water governance, particularly through CBPR. We outline how CBPR can play a transformative role in addressing the complex challenges at the intersection of climate change and water policy by fostering equitable, inclusive and culturally grounded processes. By integrating insights from interdisciplinary and Indigenous scholars, we have shown that CBPR effectively supports the integration of Indigenous Knowledge systems alongside scientific approaches, while also revealing the benefits and challenges of this work. We argue that governance and policy

inherently involve unequal knowledge and power relations and that transformative governance and policy innovations require CBPR approaches and methods.

At its core, CBPR promotes meaningful power-sharing between researchers, Indigenous communities, diverse community actors, and actors in colonial structures and systems at all levels of governance. It positions participants as co-creators of knowledge rather than as subjects of study and policy decisions. This paradigm shift is realised through diverse participatory methods including visioning sessions, daily journals, participant observation, intergenerational exchanges between Elders and youth, and dialogue. These methods are designed not only to enable mutual learning but also to respect and elevate the integrity of Indigenous Knowledge systems.

As Berkes (2017) emphasises, there is no universal formula for effective collaboration; instead, a range of flexible relational approaches can support genuine dialogue and knowledge co-production. A key factor in the success of CBPR is the cultivation of long-term relationships between researchers, practitioners and communities. These relationships build trust and continuity; they ensure that research efforts are not extractive, but instead offer lasting benefits and contribute to transformative governance systems and processes. They create a foundation for sustained collaboration and the enduring application of Indigenous Knowledge in governance and policy contexts. Respectful, authentic and long-term engagement allows for deeper mutual understanding and enables communities to shape the research agenda, governance processes, and outcomes.

Participatory tools that bridge Indigenous and scientific knowledge systems, such as mapping, storytelling and sharing oral histories, are instrumental in creating a shared understanding. These tools allow Indigenous ecological knowledge to be communicated in ways that are both culturally respectful and scientifically informative. When designed collaboratively, they help illuminate local experiences of environmental change and contribute to more context-sensitive research and policy solutions.

Positioning Indigenous Knowledge at the centre Of water governance enhances the relevance, effectiveness and legitimacy of the resulting policies (Phare et.al. 2025). Policies that reflect lived realities and cultural values are more likely to resonate with communities, promote environmental stewardship, and support long-term sustainability. By grounding water governance and climate resilience in place-based knowledge and experience, CBPR fosters culturally responsive and environmentally just decision-making. CBPR also strengthens community resilience by fostering a sense of agency, collective ownership and empowerment. Communities that are engaged in shaping their own futures are better positioned to adapt to environmental changes and advocate for their needs. In the face of climate threats to water systems, this adaptive capacity is crucial for ensuring timely and locally appropriate responses. By involving historically marginalised communities (particularly Indigenous, Black and newcomer populations) in decision-making processes, CBPR supports the democratisation of governance. It expands who is heard in policy conversations and encourages inclusive, participatory structures, processes and designs that are better equipped to develop equitable and widely supported solutions.

Despite its promise, scaling CBPR approaches requires significant structural support. There is an urgent need for policy spaces, approaches and frameworks that formally recognise Indigenous Knowledge systems and affirm their legitimacy in governance processes. Critical policy studies and governance scholars outline the need for new and alternative policy spaces (see Gaventa, 2006) to diversify knowledge, actors and discourses, challenge and transform existing water and climate change policy systems, and build more equitable and resilient communities.

A significant barrier to sustained CBPR work is the limited availability of long-term funding from governments and universities. Many research initiatives and governance approaches are short-term and focused on immediate outputs, while the deep relational work required for equitable collaboration demands ongoing investment. Funding models must evolve to support extended timelines, community leadership, and enduring partnerships that can produce long-lasting policy impacts (Castleden, 2017). In addition to structural and financial support, CBPR requires robust training of researchers and

policymakers. Participatory methods demand not only technical expertise but also cultural humility, ethical awareness and relational competence (Ball and Janyst, 2008). Training is essential to address power imbalances, uphold community protocols, and ensure that research is respectful, relevant and co-owned by all participants.

As climate change intensifies, CBPR emerges as a critical methodology for creating more just and responsive governance systems. Water-related impacts of climate change, including flooding, contamination and scarcity, disproportionately affect marginalised communities who are often excluded from formal governance processes (Whyte, 2018). CBPR offers a path forward by facilitating knowledge-sharing, building trust, and enabling communities to shape the governance systems that affect them. It is important, however, to distinguish between power relations within the research process and power relations within broader water governance systems. CBPR directly addresses power imbalances in knowledge production by promoting shared decision-making, consent, co-design and recognition of communities as knowledge holders and co-creators rather than research subjects. Nonetheless, shifting power within research relationships does not, by itself, resolve the broader institutional and political inequalities that shape water governance. This paper instead positions CBPR as one important lever among multiple efforts needed to advance more equitable governance, including recognition of Indigenous sovereignty, institutional change, and more inclusive approaches to decision-making.

The contributions of Indigenous Knowledge holders, particularly water protectors, are increasingly vital in the context of climate change and as environmental degradation accelerates. Their perspectives offer not only ecological insight but also ethical frameworks for safeguarding water as a shared responsibility and a source of life. Embracing these teachings is crucial for ensuring a clean, safe and healthy water supply for future generations (McGregor, 2014). As Schlosberg et al. (2017) argue, democratising policy processes is essential for improving implementation and achieving more sustainable outcomes. CBPR strengthens these processes by building alliances between communities, researchers and policymakers.

We must build on participatory governance, social-ecological systems and public policy literatures that emphasise the interconnectedness of human and ecological systems (Folke et al., 2005). A growing field of research is focused on Indigenous and community-led approaches to climate and water governance, and on identifying strategies for transformative change (Smith, 2021, Phare et.al. 2025). There is also evidence of increasing community engagement in policy spaces. Governance frameworks, however, must continue to evolve to meet the demands of a rapidly changing climate and the related water challenges. Scholarship in this area makes clear that these governance and policy changes are not easy, but they are possible (Arsenault et al., 2018; Caretta and Morgan, 2021; Duncan et al., 2018; Huitema and Meijerink, 2010; Jensen et al., 2020; Moore et al., 2014).

CBPR offers not only a method but also a political and ethical commitment to inclusion, justice and sustainability. Realising the full potential of CBPR will require bold commitments to equity and long-term partnerships, as well as genuine respect for diverse ways of knowing. These principles can guide the development of water governance systems that are resilient, adaptive and just.

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