COMMUNITY-BASED ENVIRONMENTAL MONITORING (CBEM) FOR MEANINGFUL INCORPORATION OF INDIGENOUS AND LOCAL KNOWLEDGE WITHIN THE CONTEXT OF THE CANADIAN NORTHERN CORRIDOR PROGRAM

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EXECUTIVE SUMMARY

The Canadian Northern Corridor (CNC) concept is proposed to go over several provinces in the Canadian North and near-North and would cross the territories mainly categorized as treaty land (historical and modern), on which the rights, needs and concerns of Indigenous and local communities affected by the CNC must be respected and exercised. In Canada, the *Constitution Act* (1982) identifies three groups of Indigenous Peoples: First Nations, Inuit and Métis. In Canada, early colonizers established agreements with Indigenous Peoples that listed rights and obligations of all parties involved to maintain a peaceful co-existence. However, for a long time, the treaty rights of Indigenous Peoples have been violated, eroding the principles of the agreements. Section 35 of the *Constitution Act* (1982) and the United Nations Declaration on the Rights of Indigenous Peoples (UNDRIP) recognize and affirm the responsibility to respect and exercise treaty rights and Indigenous rights, and Canadian governments have committed to do so.

Indigenous and local knowledge (ILK) is a foundation for the co-evolution of sustainable approaches for planning and developing infrastructure across middle and northern Canada. In the process of implementation and monitoring of infrastructure development and operation within the CNC concept, the knowledge co-production process must be accomplished with consideration of the rights, expectations and priorities of the impacted Indigenous and local communities. The meaningful incorporation of ILK into the large-scale northern infrastructure development can enhance sustainability practices as knowledge co-production extends the conceptual understanding of nature and brings more opportunities for actions to advance sustainable development goals. Indigenous epistemologies develop from the interconnections between the human world, the spirit and inanimate entities. A relational world view is connected to the idea of a strong emphasis on people and entities coming together to help and support one another

in their relationship. ILK systems are knowledge-action-belief complexes and entail different conceptualizations of human-nature connectedness where humans learn from plants and animals by observing what happens in nature, and they treat nature as their teacher.

So-called knowledge integration was unsuccessful in addressing the role of unequal power dynamics, continuing colonial trends and a long history of broken agreements in environmental negotiations. Ensuring only Indigenous participation and inclusion is not enough to address colonialism. Although Indigenous participation is often viewed as a success, Western scientists should investigate their own scientific views and methods. ILK should be treated as expertise, not culture. In many cases, studies on ILK lead to a lack of Indigenous control over the research process or results. Knowledge integration is only one of the steps towards meaningful knowledge co-production, as simply integrating ILK could lead to appropriation or tokenism. Thus, the incorporation of ILK into environmental policy and science needs to take steps beyond knowledge integration.

Community-based environmental monitoring (CBEM) could become a successful approach to incorporate ILK in a meaningful way within the CNC concept. CBEM provides an opportunity for communities to meaningfully participate in recognizing existing and potential impacts of infrastructure development. CBEM includes gathering and overseeing of environmental, cultural, linguistic and social impacts. In the most successful cases, CBEM is led and directed by Indigenous and local community members with or without external agencies such as researchers and government agencies. As part of its contribution to the CNC goal to support economic and social development, CBEM could enhance community engagement and improve the recognition and identification of potential and existing negative impacts of proposed infrastructure projects before, during and after implementation.

This paper reviews the basis of CBEM and its implementation as a tool to meaningfully incorporate ILK in the CNC by evaluating scientific and grey literature and providing the discussion of the benefits and limitations of CBEM. The study recognized the codes and subcodes that are then incorporated into a framework for evaluating successes and challenges in potential projects looking to implement CBEM. The CBEM-implementation framework (CBEM-IF) is applied to three case studies in Canada to illustrate potential challenges and opportunities for CBEM implementation, and recommendations are generated for the CNC.

This study used manual open coding, breaking down, examining, comparing, conceptualizing and categorizing information. The pattern recognition process, which is an element of open manual coding, was used to identify common themes that emerged in the academic literature. This study analyzed 27 articles that presented the case studies of the ILK incorporation into CBEM from various geographical locations across the world without any specific regional focus. The study categorized the data to identify the concepts that seemed to pertain to the same phenomena, and then each category was given a code name.

The CBEM-IF framework was tested with real-life case studies conducted in provinces across middle and northern Canada relevant to the CNC: berry pollution monitoring (AB), water quality monitoring (AB, BC, NWT, NT, SK and YT) and caribou monitoring (QC and NL). The study selected case studies based on the following criteria: a) the geographical location of CBEM studies in Canada's North and near-North relevant to the CNC concept; b) relevance to the CNC large-scale infrastructure development concept (multimodal — road, rail, pipeline, electrical transmission and communication) transportation right-of-way through Canada's North and near-North; and c) the intent to incorporate ILK into CBEM. The framework implementation consisted in identifying elements of success and challenges observed during the implementation of each case study and discussed as lessons learned. Each case study provided data about the practical experience of adopting and implementing CBEM in the Canadian North and near-North.

The evaluation of CBEM literature and case studies indicated that success in CBEM implementation within the CNC concept will require the consideration of key elements, such as Indigenous leadership, appropriate technology integration, an equal partnership of proponents with Indigenous and local communities and the availability and co-development of institutional and project guidelines that state clear rules and objectives for participants. In addition, technical, organizational, financial and environmental issues were recognized as potential challenges to meeting the goals and objectives of CBEM within the CNC concept.

The analysis of Canadian case studies using the CBEM-IF framework indicated that CBEM supports the development of climate change adaptation programs that incorporate ILK. CBEM also offers improved community relationships with the government and the private sector. In addition, CBEM brings an opportunity to enhance action plans by incorporating non-quantitative elements of ILK, such as holistic and spiritual components, often neglected by scientists. Case studies experiences also indicated the common challenges related to the lack of adequate administrative and legal structure at the provincial, territorial and federal levels, high reliance on volunteers, lack of standardized methods, focus on specific types of the landscape and general issues with ILK incorporation into science and policy issues due to the incommensurability of Western science and the ILK epistemologies. CBEM implementation in the CNC should include mitigation strategies for these challenges to reduce implementation obstacles and negative impacts from CBEM deployment.

Indigenous-led CBEM projects could contribute to reconciliation between Canada and Indigenous Peoples as they provide genuine representations of environmental monitoring, which are deeply embedded in ILK and language, traditional values, legal traditions and practices of environmental management associated with the meaningful exercise of Section 35 rights. This study also recognized the other elements that are essential for the meaningful knowledge co-production in CBEM programs, such as the presence of sufficient short- and long-term funding opportunities for CBEM, partnership with bridging organizations, the recognition of ILK as intellectual property and developing special legal acts for CBEM in national and provincial/territorial

legislation. The use of technologies (e.g., mapping, GIS and earth observations) improves detection rates and generates more accurate data. Inviting professional consultants might also increase technical legitimacy of data for decision-makers. The training of community members by technical specialists and environmental scientists contributes to the capacity-building level of Indigenous communities.

The study's results suggest that potential policy responses for the design of CBEM could include collaboration with Indigenous governments to provide Indigenous leadership of CBEM programs; creation of funding opportunities for CBEM by public and private stakeholders; co-operation with bridging organizations; recognition of ILK incorporated into CBEM as intellectual property; building a legal space for diverse types of CBEM; and providing guidance for ILK incorporation into national and provincial/territorial legislation in Canada. Additional studies are required to design the specific CBEM programs that could be adjusted to particular geographical locations and infrastructure projects related to the CNC.