

# Including Indigenous Knowledge Systems in Environmental Assessments: Restructuring the Process

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## Abstract

Indigenous peoples around the world are concerned about the long-term impacts of industrial activities and natural resource extraction projects on their traditional territories. Environmental impact studies, environmental risk assessments (EAs), and risk management protocols are offered as tools that can address some of these concerns. However, these tools are not universally required in jurisdictions, and this Forum intervention considers whether these technical tools might be reshaped to integrate Indigenous communities' interests, with specific attention to traditional knowledge. Challenges include unrealistic timelines to evaluate proposed projects, community capacity, inadequate understanding of Indigenous communities, and ineffective communication, all of which contribute to pervasive distrust in EAs by many Indigenous communities. Despite efforts to address these problems, substantive inequities persist in the way that EAs are conducted as infringement continues on constitutionally protected Indigenous rights. This article highlights challenges within the EA process and presents pathways for improving collaboration and outcomes with Indigenous communities.

As Indigenous communities are often disproportionately affected by industrial development, meaningful inclusion of Indigenous knowledges into project development processes is an essential step toward more accurately representing Indigenous exposure to risks and harm (Beckford et al. 2010; Metsger et al. 2003). In Canada, environmental assessments (EAs) have been mandated since 1972 through legislation and represent a scientifically driven process that evaluates local environmental impacts of proposed development projects (Darling et al. 2018; First Nations Environmental Assessment Technical Working Group 2010). EAs are tools that may be used to prevent projects from producing harmful outcomes and to mitigate impacts on Indigenous peoples. However, while assessments can lead to changes in project design, rarely do they lead

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to the denial of industrial activity, and the typical outcome with EAs is project approval. In *Place in Research*, Tuck and McKenzie (2015) describe the conditions leading to environmental decline and resource depletion as *neoliberalism*, or the process through which capitalism and colonial objectives on the economy influence governance systems to favor corporations and economic growth over the protection of the natural environment and sustainability. The mandated process for conducting EAs in Canada exemplifies a neoliberal attitude. For instance, studies required for EAs for proposed development projects are generated by project proponents. Project proponents often leverage EAs and other scientific studies to influence public opinion, acquire government support for development, and negate remediation and restoration proposals suggested by Indigenous communities.

Widespread industry control of EAs is exemplified by the harmful impacts of approved projects on Indigenous communities from deforestation, resource depletion, water and air pollution, and declining animal populations (LaDuke 2005). The patterns of inequity in project outcomes reinforce the mistrust held by Indigenous peoples toward the environmental assessment process (McCreary and Milligan 2013). In the Canadian context, Udofia et al. (2017) suggest that effective governance requires that Indigenous participation be “institutionalized in EA systems.” Such institutional innovations will “improve project design, enhance mitigation options, and increase legitimacy of development undertaking” (164). This article presents pathways toward achieving such institutionalization. First, it highlights historical challenges and limitations to Indigenous participation in EAs through a focus on traditional knowledge (TK); second, it discusses best practices toward meaningful, sustainable engagement of Indigenous peoples for a more effective and equitable EA process; and finally, it provides five specific recommendations for improving future assessments in First Nations territories.

## Environmental Assessments and Traditional Knowledge in Canada

Canada has a unique relationship with Indigenous peoples (encompassing First Nations, Inuit, and Métis people) based on Section 35 of the Constitution Act of Canada (1982). This relationship requires provincial and federal governments to consult with and accommodate Indigenous peoples when planning to develop projects, policies, or other initiatives that may impact Indigenous lands (Department of Aboriginal Affairs and Northern Development Canada 2011). Through these consultation processes, Indigenous peoples have a long history of contributing TK to strengthen EAs—with Indigenous communities often functioning as environmental experts who possess information that is not readily available to Western science (Borrows 1997; Nakashima et al. 2012). In a broad sense, TK reflects Indigenous perspectives on the “responsibilities that arise from particular cosmological beliefs about the relationships between living beings and non-living things or humans and the natural world” (Whyte 2013, 5). Yet, as Whyte

(2013) suggests, there are multiple ways of conceptualizing TK, which include ecological, critical, relational, and collaborative orientations (Latulippe 2015). For this article, we consider the role of TK within EA processes. We acknowledge that ecological applications of TK by dominant government agencies often reduce complex Indigenous knowledge to facts, observations, and singular practices, an approach that can be highly extractive (McGregor 2014). At the same time, Indigenous governance embraces a more holistic usage of TK, which sets the appropriate rules for maintaining mutually beneficial responsibilities and relationships between humans and environment over generations (e.g., Craft 2017; Whyte 2018). Collaborative approaches to TK have provided a constructive foundation for procedural innovation that bridges Western and Indigenous ways of knowing and different applications of TK (Latulippe 2015).

Collaborations involving TK also invite critical analysis, such as an evaluation of environmental justice concerns, including procedural justice, institutional innovations, and epistemological approaches that enable meaningful participation of diverse Indigenous communities in EAs on their own terms (McGregor 2016). Building on such collaborative orientations toward TK, scientists are working to employ Indigenous expertise to direct and conduct more accurate and comprehensive scientific research, for example, with Indigenous communities selecting sampling sites and identifying priority areas of concern for scientific testing and monitoring (Wavey 1993). This approach requires training and hiring Indigenous scientists to carry out fieldwork and assessments, especially when establishing a baseline measure (MacDonald et al. 2009). First Nations have also called for traditional use studies to map the many ways diverse communities use their land base and water bodies for subsistence use, or other cultural purposes, in a contemporary context (Tobias 2009). However, the assessment process to date has focused on “extracting data” from Indigenous peoples and inserting “palatable” information into externally driven and motivated environmental regimes. TK in this scenario is treated as supplemental to Western science (Whyte 2018). This current model for conducting EAs does not fully consider the underlying governance and legal systems that support Indigenous knowledge systems (McGregor 2014).

Although the “extractive” paradigm for using TK in environmental assessment is problematic, applying TK through dominant ecological frameworks can still benefit EA outcomes and increase “the value afforded to Indigenous knowledges in dominant science, research, and policy circles” (Latulippe 2015, 121). For example, TK accumulated over many years can provide the most relevant environmental baseline measure for ecosystem health in EAs (MacDonald et al. 2009). Environmental baselines provide critical reference points for determining acceptable risk levels from environmental contaminants and are crucial for interpreting the results of monitoring, sampling, and testing activities. Baselines that account for long-standing traditional knowledge systems give more accurate measures of place-specific environmental and social conditions prior to development impacts. Thus environmental baselines can provide one

mechanism for including Indigenous perspectives in decisions regarding restoration and restitution, raising the bar for sustainability and social equity standards applied to development projects (Diver 2017). Since TK held by First Nation communities contributes a valuable measure of ecosystem health, EAs should always include First Nations' input—especially for communities experiencing a long history of industrial impacts (MacDonald et al. 2009).

At the same time, TK is rooted in the dynamic nature of natural ecosystems, based on the history of First Nations recognizing and responding to changes in ecosystems as they occur, and can be used to dramatically improve existing monitoring activities and assessment strategies in an adaptive management capacity (Alessa et al. 2016; Borrows 1997; Deloria 1970). Important collaborations across knowledge systems are occurring through technical working groups drafting guidance documents with First Nations communities, and other processes that guide the participation of First Nations through the EA process (Canadian Environmental Assessment Agency 2016; First Nations 2010; Plate et al. 2009). This strategy has helped develop the scientific and technical skills of Indigenous scientists, generate valuable scientific data from inaccessible locations, and promote active participation of First Nation representatives in all aspects of the EA process.

Despite some limited attempts to harmonize TK and Western science, inherent tensions are involved in efforts to link multiple knowledge systems. For example, high-stakes science and policy negotiations consistently reveal structural barriers to knowledge production that includes Indigenous peoples (Johnson et al. 2016; King 2014; Vaughan et al. 2016). Linkages between Indigenous knowledge and Western science are often highly contentious because working across knowledge systems requires each side to “assimilate something of the other” (Watson-Veran and Turnbull 1995, 363). There are also problems with the tendency to use Western science to “validate” traditional knowledge before it is accepted as a legitimate way of knowing (Matsui 2015). Additionally, the information-sharing expectations of more dominant scientific community or government agencies often propagate uneven power relations (Hakopa 2011; Pearce and Louis 2008). Researchers emphasize the importance of Indigenous communities gaining additional capacity and resources to better represent themselves in environmental decision-making processes (Darling et al. 2018). This work includes enabling Indigenous communities to develop, analyze, and present their own environmental plans and assessments that do not require communities to fit Indigenous knowledge systems into the predefined, state-driven bureaucratic processes (Diver 2017, 2018). Indigenous researchers have also highlighted the significance of using Indigenous research methodologies to ensure that Indigenous communities have the opportunity to adhere to their fundamental practices and protocols while participating in research and other initiatives, as well as conducting ethical research with Indigenous communities and recognizing the distinctive Indigenous ways of knowing (Arsenault et al. 2018; Chief et al. 2016; Chilisa 2012; Smith 2012).

## Best Practices for EAs: Some Considerations for Achieving Meaningful Indigenous Engagement and Improving Governance Outcomes

There are numerous examples of external accountability strategies and procedural mechanisms that can facilitate greater Indigenous self-determination, prevent human rights violations, and assist in improving relationships, participation, and project outcomes for all involved (Hanna and Vanclay 2013). These examples include (1) involving proponent management in discussions to ensure commitments are made respecting human rights, (2) ensuring training is provided to employees and contractors working with Indigenous communities, (3) establishing grievance mechanisms for affected Indigenous communities, and (4) identifying performance indicators to monitor whether human rights are being respected, as well as the establishment of evaluation tools to monitor whether improvements are being made (Udofia et al. 2017). And according to Canada's Expert Panel for the Review of Environmental Assessment Processes, procedural mechanisms to ensure meaningful Indigenous participation should be combined with effective enforcement measures and sanctions that can be invoked if procedural requirements are not met, including the ability to suspend or revoke approvals (Ministry of Environment and Climate Change 2017).

In Canada, industry can work with government agencies as an intermediary for engaging and consulting with First Nations, but some proponents (often industry) choose to establish direct relationships with Indigenous communities based on the advantages of doing so. A critical first step for proponents in establishing and maintaining relationships with Indigenous communities is to ensure effective contact and communication with communities in preliminary project stages, throughout project development, and after project completion (Udofia et al. 2017). Udofia et al. claim that communities whose lands and traditional resources may be impacted by development should be involved in "project planning, assessments and decision making processes, and work with project proponents and regulators" (164) to outline how the identified impacts will be addressed during the project as well as during postproject restoration.

Using examples from mining in Saskatchewan and the Enbridge Northern Gateway Project, Udofia et al. (2017) and McCreary and Milligan (2013) determine that historical mistrust, a lack of understanding of Indigenous TK, and a lack of community capacity are the main challenges for Indigenous participation in EA processes. Meaningful community involvement has not occurred because of "a lack of clarity and understanding concerning participation," problems of "insufficient information available to project proponents about rights holders and stakeholders," and the lack of "documented traditional knowledge" available to proponents. These factors, among others, lead to "adversarial" environments and "increased litigation" (Udofia 2017, 168–171), which perpetuates an ineffective EA process. First Nations across Canada have expressed a lack of trust in the EA process, view it as a biased and flawed process, and often choose not to participate (Ministry of Environment and Climate Change 2017).

**Table 1**

Selected Approaches and Tools for Cultivating Meaningful Indigenous Participation and Respectful Inclusion of Traditional Knowledge in Environmental Assessments

<i>Approach</i>	<i>Examples</i>	<i>References</i>
Training and hiring Indigenous scientists as community-based monitors	<p>The <b>Indigenous Observation Network</b> is an Indigenous-led community-based water quality monitoring network coordinated by the <b>Yukon River Inter-Tribal Watershed Council (YRITWC)</b>. Indigenous community members in Alaska and Canada participate in baseline water quality monitoring programs that acknowledge Indigenous knowledge systems in the Yukon River Basin.</p> <p>The <b>Indigenous Leadership Initiative</b> has partnered with <b>Dechinta Bush University</b> in developing the <b>Guardians Pilot Program</b>, a training opportunity focused on core skills for Indigenous guardians to conduct land use planning, monitoring, and other management projects.</p>	<p>Wilson et al. (2018); <a href="https://yukon.fieldscope.org/">https://yukon.fieldscope.org/</a>; <a href="http://www.yritwc.org/">www.yritwc.org/</a></p> <p><a href="http://www.ilinationhood.ca/">www.ilinationhood.ca/</a>;  <a href="http://www.dechinta.ca/">www.dechinta.ca/</a>;  <a href="http://www.canada.ca/en/environment-climate-change/services/environmental-funding/indigenous-guardians-pilot-program.html">www.canada.ca/en/environment-climate-change/services/environmental-funding/indigenous-guardians-pilot-program.html</a></p>
Creating environmental baselines using traditional knowledge	<p><b>Traditional Use and Occupancy Studies</b> use GIS and interviews to document and visualize all the ways Indigenous communities use their lands, waters, and resources, in both historical and contemporary contexts.</p> <p><b>Indigenous mapping</b> is mapping by and with Indigenous peoples, where Indigenous knowledge systems and interests guide mapping approaches, implementation, and use.</p>	<p>Tobias (2009); <a href="http://www.ubcic.bc.ca/chief_kerry_s_moose">www.ubcic.bc.ca/chief_kerry_s_moose</a></p> <p>Pearce and Louis (2008); <a href="https://umaine.edu/canam/publications/">https://umaine.edu/canam/publications/</a></p>

**Table 1**  
(Continued)

Approach	Examples	References
Drafting planning documents with Indigenous communities as equal partners	<p>Creating <b>environmental risk baselines</b> with Indigenous communities (e.g., reassessing multipathway exposure scenarios associated with Indigenous lifeways and foodways, as with the <b>Spokane Tribe</b>) works to create policies that prevent unsafe exposures to environmental contaminants for Indigenous peoples and the broader public.</p> <p>Community-based methodologies developed by the <b>University of Victoria Indigenous Law Research Unit</b> can establish new baselines for environmental regulation by understanding Indigenous laws regulating environmental use within a specific Indigenous community and territory.</p> <p>Directly engaging with traditional knowledge holders/practitioners on policy and governance through a “<b>knowledge-sharing framework</b>” is an open, nonextractive knowledge exchange process among TK holders/elders, as with the <b>Chiefs of Ontario</b> approach to Great Lakes water quality governance.</p> <p>Creating the policy space for Indigenous communities to work with other government agencies to <b>co-develop and implement environmental plans and regulations</b></p>	<p>coming-home-map/ http://mappingback.org/ Harper et al. (2002); www.spokanetribe.com/upload/ FCKeditor/Final%20Revised% 20Water%20Quality% 20Standards.pdf; www.ciea-health.org/  Craft (2017); Napoleon (2007); www.uvic.ca/ law/about/indigenous/ indigenoulawresearchunit/ index.php Arsenault et al. (2018); www.chiefs-of-ontario.org/  Vaughan et al. (2016); http://dlnr.hawaii.gov/dar/ announcements/haena-</p>

<p>Supporting Indigenous communities in developing their own plans, assessments, and standards</p>	<p>based on customary Indigenous law, as with the <b>Há'ena Community-Based Subsistence Fishing Area</b>.</p>	<p>community-based-subsistence-fishing-area-rule-signed-by-governor/ Diver (2017); <a href="http://www.xcfc.ca/">www.xcfc.ca/</a></p>
<p>Legal and regulatory frameworks recognizing Indigenous governance authority provide essential support for Indigenous science and planning. Examples include the US Clean Water Act "<b>Treatment as a State</b>" provisions, enabling federally recognized tribes to establish their own water quality standards and management decisions.</p>	<p>Indigenous self-representation in policy negotiations is greatly enhanced when Indigenous peoples conduct their own <b>Indigenous-led scientific assessments and land management plans</b>, as with the Xaxli'p Community Forest planning process. This work requires funding for Indigenous communities to hire their own technical experts.</p>	<p>Diver (2018); <a href="http://www.epa.gov/wqs-tech/tribes-and-water-quality-standards">www.epa.gov/wqs-tech/tribes-and-water-quality-standards</a></p>
<p>Conducting scientific assessments with Indigenous peoples requires respecting <b>place- and people-specific protocols</b> for conducting ethical research with Indigenous communities and recognizing distinct Indigenous ways of knowing. This also includes recognizing <b>First Nations ownership, control, access, and possession</b> of their own intellectual property.</p>	<p>Conducting scientific assessments with Indigenous peoples requires respecting <b>place- and people-specific protocols</b> for conducting ethical research with Indigenous communities and recognizing distinct Indigenous ways of knowing. This also includes recognizing <b>First Nations ownership, control, access, and possession</b> of their own intellectual property.</p>	<p>Chief et al. (2016); Arsenault et al. (2018); <a href="https://fmigc.ca/ocapr.html">https://fmigc.ca/ocapr.html</a></p>

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*Note.* All URLs last accessed June 27, 2019.



For this reason, there are many cases where communities are developing Indigenous methodologies for pursuing environmental assessments and monitoring. Table 1 describes five key approaches: (1) training and hiring Indigenous scientists as community-based monitors; (2) creating environmental baselines using traditional knowledge; (3) drafting planning documents with Indigenous communities as equal partners; (4) supporting Indigenous communities in developing their own plans, assessments, and standards; and (5) following Indigenous research methodologies and protocols. These community-based approaches can be implemented in conjunction with the external accountability strategies and procedural mechanisms discussed earlier. For example, the Indigenous Leadership Initiative aims to improve community capacity by training and hiring Indigenous scientists as community-based monitors, as part of a growing Indigenous guardian movement. Arsenault et al. (2018) discuss how knowledge-sharing frameworks can better include elders and cultural practitioners in Indigenous-led planning initiatives. When capacity-building resources are made accessible, Indigenous communities can develop their own plans, assessments, and environmental standards to improve Indigenous self-representation in policy negotiations and regulation (Diver 2017, 2018).

### **Pathways for Improving Collaboration, Partnerships, and Environmental Outcomes**

Indigenous traditional knowledge emphasizes a more holistic approach to environmental regulation and can be used to improve the EA process. It calls for a different set of monitoring tools that are specific to place and peoples, which have the potential to drive new innovations in water science and governance (Arsenault et al. 2018; Diver 2018). Researchers working with Indigenous communities have expressed a need to develop and apply methods for assessing environmental and ecosystem health using tools that can be easily deployed in remote locations without involving a laboratory (Health Canada 2011). As one example, bioassays provide an inexpensive and rapid approach for Indigenous communities to conduct their own toxicology assessments. This is because bioassays can assess overall toxic effect of multiple, interacting contaminants, as opposed to looking only for a relatively small list of contaminants (Gartiser et al. 2010). More holistic tools that adhere more closely to Indigenous research methodologies, like bioassays, can be used in conjunction with biomonitoring techniques and other analytical practices to improve data sets, detect new contaminants that are unknown or not yet addressed in regulatory frameworks, and measure cumulative effects from multiple contamination sources (Booth and Skelton 2011).

Despite advances made over time, the Canadian EA process remains problematic because it fails to account for Indigenous constitutional rights, the United Nations Declaration on the Rights of Indigenous Peoples, and nation-to-nation relationships (Ministry of Environment and Climate Change 2017).

Working toward greater Indigenous participation in EA processes remains an important priority, given the opportunity for linking traditional knowledge with Western science to transform the way we understand human–environment relations to create a more holistic EA process (Johnson et al. 2016). Studies have shown that TK and Western science can co-exist, if the strengths of each are viewed as collaborative concepts in a new assessment framework (Whyte 2013; Whyte et al. 2016). For example, Chief et al. (2016, 350) consider the possibility of “braiding traditional knowledge with water management” and emphasize the importance of having scientists “actively support the production of local or indigenous knowledge systems, not just the integration of local knowledge into Western science frameworks.” This approach recognizes the distinct contributions TK and Western science can make to a more holistic approach to sustainable environmental governance (Arsenault et al. 2018).

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