



## Research article

# Community-Based Monitoring as the practice of Indigenous governance: A case study of Indigenous-led water quality monitoring in the Yukon River Basin



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## 1. Introduction

Indigenous peoples, or those communities that claim a historical continuity with their traditional territories (Corn tassel, 2003), have been governing the waters and lands within their territories since time immemorial (Borrows, 2002; Napoleon, 2013). Environmental governance is understood as the set of regulatory processes, mechanisms and institutions through which political actors, including communities, influence water-related decisions, actions and outcomes (Bridge and Perreault, 2009). Indigenous governance, however, refers to the innumerable ways that Indigenous peoples have governed themselves and continue to do so despite historic and ongoing colonialism, which continues to profoundly affect Indigenous peoples ability to protect the lands and waters that are important to their ways of life, health, and culture (Alfred,

2005; Corn tassel and Witmer, 2008; Coulthard, 2014; McGregor, 2014; Simpson, 2014). Indigenous peoples have engaged Community-Based Monitoring (CBM) – a process where parties “collaborate to monitor, track and respond to issues of common community concern” (Whitelaw et al., 2003, p. 410) – to document the effects introduced by resource development and global environmental change (Kotaska, 2013; Lowe, 2016; Parlee et al., 2012); such CBM programs can be found in Canada; the USA (Johnson et al., 2015); Australia (Wiseman and Bardsley, 2016); New Zealand (Harmsworth et al., 2011) and across the polar regions due to the disproportionate effects of climate change at high latitudes (Alessa et al., 2015; Fidel et al., 2014).

Despite a growing number of programs involving Indigenous peoples, the CBM literature rarely refers to Indigenous peoples as governing their traditional territories. Berkes et al. (2007) suggest that involving Indigenous ‘stakeholders’ in CBM can “bring a wider range of knowledge to understand ecosystem change” (p.145). From this perspective, Indigenous peoples are considered ‘knowledge holders’ whose engagement in CBM can improve understanding of environmental change (Johnson et al., 2015; Wiseman and Bardsley, 2016). At the same time, the underuse of CBM data in decision-making is identified as one of the greatest challenges facing these programs (Buckland-Nicks et al., 2016; Buytaert et al., 2016; Conrad and Hilchey, 2011; Hunsberger, 2004). Previous research on the connection between CBM and decision-making has usefully specified factors contributing to this problem including concerns about data quality and credibility (Legg and Nagy, 2006), the frequent mismatch between the data collected and the decision-context (Conrad, 2006), and data fragmentation due to inconsistent funding and data collection protocols (Bliss et al., 2001). However, these studies do not identify Indigenous peoples as either CBM participants or decision-makers. Overall, the common assumption that Indigenous peoples are ‘stakeholders’ who contribute their knowledge, rather than governments who make decisions, has meant the potential for CBM as a tool for asserting sovereignty and jurisdiction has rarely been explored (c.f. Parlee et al., 2012; Kotaska, 2013).

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To achieve a better understanding we develop a framework to compare Indigenous peoples' roles in governance and CBM programs. [Danielsen et al. \(2009\)](#) established a typology of community participation in monitoring programs, where program design ranges from externally driven, professionally executed monitoring to autonomous local monitoring programs ([Fig. 1](#) top). While not specific to Indigenous CBM, these categorizations are useful when considering the degrees of engagement and control Indigenous peoples have within a spectrum of monitoring programs. This approach identifies the range of possibility for CBM, but is not specific to the ways Indigenous peoples are engaging CBM as a tool to assert their sovereignty and jurisdiction. Toward that end, we juxtapose the typology of program design with a rough typology of governance arrangements where the latter ranges from settler governance to co-governance arrangements (i.e., settler and Indigenous driven co-governance) through to Indigenous governance arrangements ([Fig. 1](#) bottom) (Adapted from [Hill et al., 2012](#)). Indigenous-led CBM programs take the form of both collaborative and autonomous monitoring, with varying levels of involvement for external parties, and tends to correspond with Indigenous-led co-governance or Indigenous governance ([Fig. 1](#), top – black box).

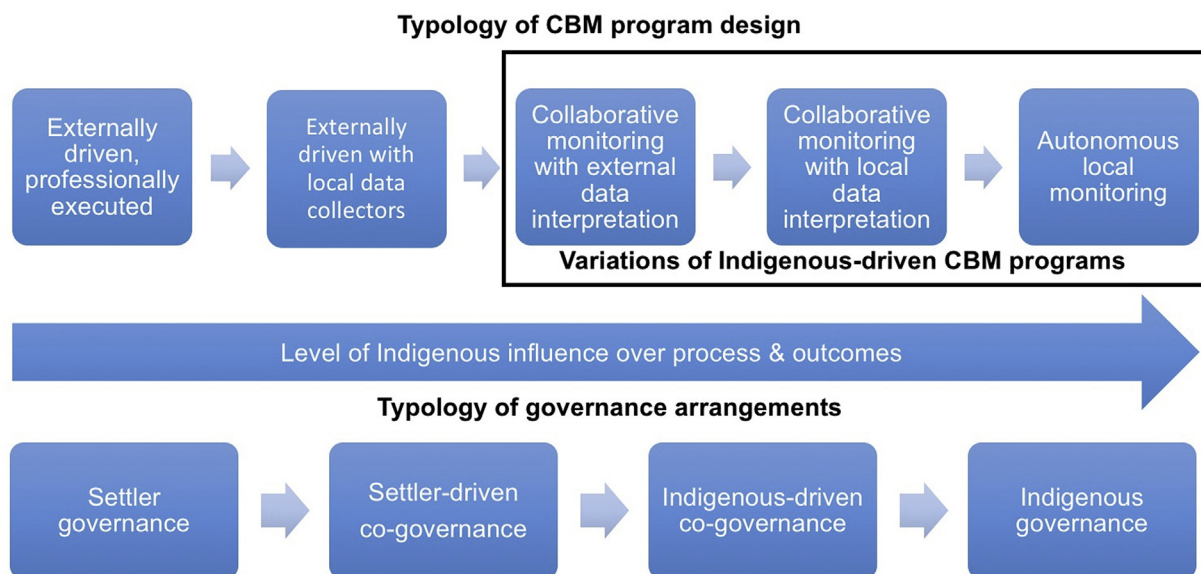
In this paper, we seek to expand understandings of the roles of Indigenous peoples in CBM programs and their relationship to Indigenous governance. We examine a case study of the Indigenous Observation Network (ION) – an Indigenous-led community-based water quality monitoring network involving First Nations in Canada and Alaska Native Tribes (Indigenous governments), coordinated by the Yukon River Inter-Tribal Watershed Council (YRITWC) – in the Yukon River Basin (YRB). A case study approach is used to analyze Indigenous peoples' conceptualizations of CBM concerning governance including CBM as a method for generating data useful for decision-making and an expression of governance itself. Next, we examine the challenges Indigenous peoples face to linking CBM data to decision-making processes. This includes the importance of data quality, trust and legitimacy of the organizations and people involved in CBM programs as well as the accessibility and relevance of the data to the Indigenous communities for specific decision contexts. Lastly, we discuss the elements of CBM program design

that can improve these linkages including, the role of leadership, networked governance and capacity, as well as tighter integration of governance strategies with CBM.

## 2. Research setting

The ION is a transboundary Indigenous initiative that aims to combine Western Science and IK to research, sustain and protect the water and Indigenous people of the YRB, who are facing the dramatic effects of global environmental change and resource development ([Herman-Mercer et al., 2016; Wilson et al., 2015](#)). ION is facilitated by the YRITWC – an Indigenous grassroots organization, consisting of 75 signatory First Nations and Alaska Native Tribes dedicated to the protection and preservation of the YRB. Of these Indigenous governments, thirty-four participate in the ION to conduct water quality monitoring at 54 sites from the headwaters to the mouth across the entire YRB ([Schuster and Herman-Mercer, 2015](#)). ION is supported by a Memorandum of Understanding (MoU) between the United States Geological Survey (USGS) and the YRITWC. The MoU represents a formal agreement to cooperate and engage in research to develop and continue a baseline water quality monitoring program using protocols and methods derived from the USGS and that acknowledges Indigenous culture, knowledge and perspectives ([USGS, 2009](#)). At present, ION is considered the largest Indigenous water quality network in the world ([Fig. 2](#)) and it incorporates IK in conjunction with high-quality field, laboratory, and data analysis methods.

As of 2015, thirty-six samplers from thirty Indigenous governments dedicated their time to the collection, processing, and shipping of water quality samples for ION. Samplers include the U.S. Environmental Protection Agency funded Indian General Assistance Program (EPA IGAP) Coordinators from Alaska Native Tribes as well as First Nations youth and environmental staff, whom together conduct bi-weekly surface water sampling during the open water season (June to October) and in some cases during the winter months ([Fig. 3](#)). USGS and YRITWC research scientists train samplers following USGS protocols and field methodologies. Water quality monitoring includes *in situ* measurements of pH, dissolved



**Fig. 1.** Typology of CBM program design compared to the typology of governance arrangements involving Indigenous peoples. Each depicts increasing levels of Indigenous leadership or control. Programs designs on the far right (black box) can be considered Indigenous-led CBM and with varying levels of involvement from external parties (Adapted from [Danielsen et al., 2009; Hill et al., 2012](#)).

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