DEVELOPING METHODOLOGIES AND TOOLS

FOR BOTTOM-UP PARTICIPATORY TECHNOLOGY DEVELOPMENT PROCESSES IN INDIGENOUS COMMUNITIES

KHOSROW FARAHBAKHSH, UNIVERSITY OF GUELPH (formerly)

Research conducted 2012-2015, Report published September 2016

Canadian Water Network

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WHY DID WE DO THIS PROJECT?

News of drinking water advisories in many Indigenous communities in Canada is becoming a common occurrence. As of April 2016, there are over 157 drinking water advisories in 111 First Nation communities in Canada[1,2]. For decades, decision makers at the federal level focused on providing technical solutions through new treatment plant infrastructure. However, many now believe that technical solutions that do not meaningfully incorporate a community's perspective and local knowledge will eventually fail, irrespective of their level of sophistication. Involving the local community and leadership in decision making around issues such as water and wastewater management ensures that the solutions are more appropriate to unique local conditions, increases the community's buy-in and support, and builds long-term capacity at the local level. When it comes to design and planning of water and wastewater infrastructure in Indigenous communities, community engagement and participation for the most part has been sorely lacking. As one of the participants in our project aptly expressed, "They didn't ask First Nation Peoples what their priorities would be. Somebody in an ivory tower set those priorities. And when I look at them? They're the exact opposite of what ours are here."[3] This problem is even more pronounced in remote communities with limited road access.

The introduction and passing of Bill S8 (an Act respecting the safety of drinking water on First Nation lands) by the federal government in 2013 has been critiqued by many who point to insufficient First Nations contribution and involvement, despite repeated calls by the First Nations for "meaningful participation" in the decision-making process. The Chiefs of Ontario in their 2001 submission to the Walkerton inquiry stated: "First Nations have an inherent right to fully participate in decision making on water quality issues which affect their ways of life, and possess valuable knowledge of water which they are willing to share if non-natives are willing to listen."[4]

WHO WAS INVOLVED?

This 2012-2015 project involved researchers from four universities and Indigenous elders and practitioners from across Canada and four Indigenous communities representing diverse political, cultural and geographical conditions.

WHAT DID WE DO?

The Indigenous communities were located in northern Labrador, northern Ontario and northern Saskatchewan. These communities represented unique cultural and socio-political settings, geography and climate conditions. We assembled a cross-disciplinary team of researchers that included engineers, anthropologists, sociologists and Indigenous researchers. We also solicited the help of Indigenous leaders and practitioners to help us refine our research methodologies.

THE GUIDANCE TEAM

We invited a group of Indigenous leaders and practitioners to help us develop appropriate methodologies prior to approaching Indigenous communities. The Guidance Team included elders, operators, Indigenous community leaders and water managers. A number of important principles were emphasized; foremost among them was the importance of building relationships and creating trust, as well as regular and meaningful community presence.

COMMUNITY-BASED RESEARCHERS

Community presence is an important aspect of engagement. We often heard stories of consultants and researchers visiting the Indigenous communities for short periods, without sufficient time to clearly understand the community's unique circumstances, needs and priorities. Having a member of the local community as part of the project/research team presents many advantages and is a cost-effective way of ensuring community presence. The community-based researchers can keep the community and the researchers/consultants abreast of any development and conduct important groundwork for community engagement. Community-based researchers were hired and supported in three of the four Indigenous communities for the duration of the project.

DECOLONIZING RESEARCH METHODOLOGIES

Many believe that root causes of water and wastewater management challenges in Indigenous communities come from institutionalized colonial processes and policies that have prevented Indigenous people in Canada from taking control of decision making for their own communities. Colonial processes are often top-down and ignore or devalue the local knowledge system. Researchers and practitioners must be cognizant of these underlying processes if they hope to meaningfully engage Indigenous communities in decision making around water and wastewater management. There are a number of decolonizing strategies, such as OCAP®[5] that emphasizes that Indigenous communities must have at all times ownership and control of engagement processes and access to and possession of all data relating to their community involvement. Another approach is Indigenous research methodologies where researchers are asked to focus on local realities and context, be reflective about their assumptions and be integrative and system oriented.

WHAT DID WE LEARN?

Bottom-up approaches that encourage community engagement and support local decision-making offer many advantages:

- One clear advantage is the community's ownership and support for the decisions, which often results in more successful project implementation.
- Bottom-up approaches also help build local capacity that is needed if any infrastructure project is to be sustained over the long term.
- Solutions that are developed through a bottom-up approach are often more appropriate than those developed through conventional design and planning approaches.

Why aren't bottom-up approaches used more often? Researchers and project managers like consultants or government staff may believe that these approaches take a much longer time to initiate and make it difficult to come up with a solution in a timely fashion. In reality, there is no data to support this assumption. More importantly, the project team learned that there are few tools that have been developed and tested for implementing projects using a bottom-up approach. Historically, researchers and project managers have been really good at top-down approaches and don't have a lot of experience with the bottom-up way of doing things.

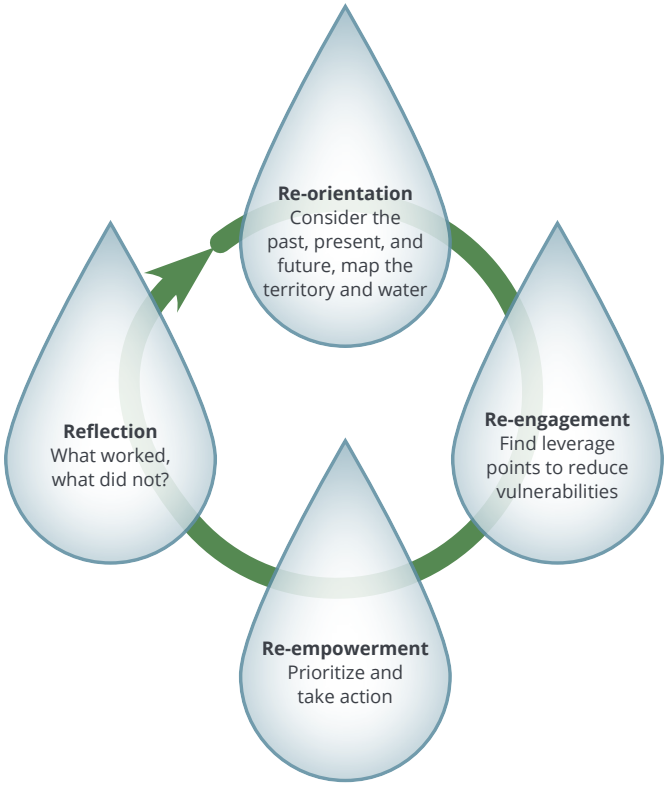


Figure 1: A First Nations' driven framework for water security.

During the second phase of this project, we invited a group of First Nation researchers and practitioners to help develop a First Nation driven framework to water safety planning (WSP). We began with the existing World Health Organization (WHO) framework for WSP, but soon recognized that the framework needed substantial modification to become decolonized and bottom-up.

The four stages of the framework are intended to address First Nations' ties with the land, and the importance of both the watershed and the territorial water and land. The stages are also intended to systematically decolonize the decision making and planning process. The modified framework (see Figure 1) encompasses all the elements of the WHO framework and allows local First Nation communities to determine how best to implement various phases. For example, the WHO framework calls for the establishment of a team for implementing WSP. The bottom-up framework also calls for the establishment of inclusive spaces where teams and individuals can make their contributions.

TOOLS FOR BOTTOM-UP DESIGN AND DECISION MAKING

Several tools were developed for various the phases of the bottom-up framework:

- Water Stories (orientation phase)
- Decision Matrices and Flexible Policy Tools (empowerment and engagement phases)
- Digital Water Resources Mapping (orientation and engagement phases)

WATER STORIES

Typical consultant reports are often long, hard-to-read and full of technical jargon that makes them inaccessible to the community's members and leadership. Over time, a community may also receive contradictory information from different consultants' reports. The piecemeal manner in which information on drinking water systems is provided makes community participation in the decision making process extremely difficult.

For this project, we developed water stories with our partner communities. These short and clearly written reports summarized the state of the community's water and wastewater system in a manner that was easy-to-understand and culturally appropriate. The water stories also included a brief historical perspective as well as traditional/local knowledge about the community's water systems. We received many comments that these short synopses were used often by the community members and leadership when discussing water issues at the community gatherings.

DECISION MATRICES

Decision matrices are common tools for engineering decision making. However, we were surprised to learn that this tool was not used in consultants' design reports. This may be due to the fact that decision matrices are very generic and may not be culturally appropriate. However, we were encouraged by many Indigenous practitioners to develop a more specific decision matrix. The matrix in Figure 2 focuses on water systems in Canada's cold regions and was developed following significant consultation with various researchers and practitioners. Our intent was to make decision making and its outcome more transparent to all end users.[6]

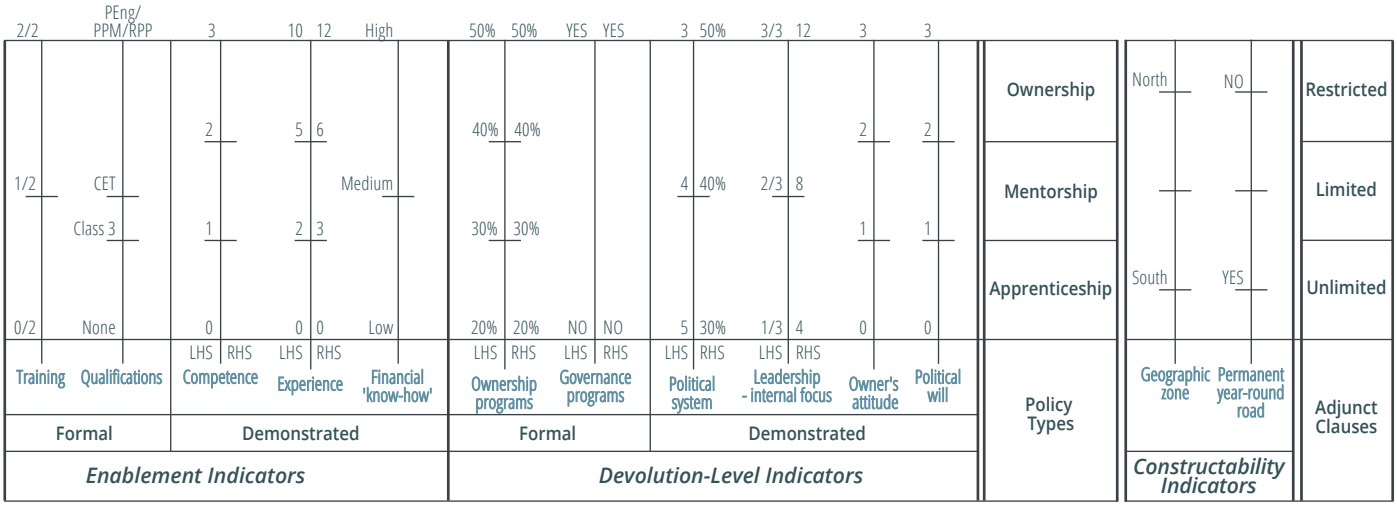
DESIGN CONSTRAINTS			Design Option #1		Design Option #2		Design Option #3	
			Pass ☑	*Fail* ☑	*Pass* ☑	*Fail* ☑	*Pass* ☑	*Fail* ☑
Climatic			☐	☐	☐	☐	☐	☐
Site Assessment			☐	☐	☐	☐	☐	☐
Regulatory			☐	☐	☐	☐	☐	☐
Energy			☐	☐	☐	☐	☐	☐
Affordability			☐	☐	☐	☐	☐	☐
Accessibility			☐	☐	☐	☐	☐	☐
Availability			☐	☐	☐	☐	☐	☐
DESIGN CRITERIA			Design Option #1		Design Option #2		Design Option #3	
	Locally Assigned Criteria Weight[1]	*Suggested Criteria Weight Range[2]*	**Rank[3]** *(Assign # from 1-4)*	**Score** *(Rank x Weight)*	**Rank[3]** *(Assign # from 1-4)*	**Score** *(Rank x Weight)*	**Rank[3]** *(Assign # from 1-4)*	**Score** *(Rank x Weight)*
Affordability	25	*20-25*						
Time to Construct	2.5	*0-5*						
Robustness	10	*10-20*						
Simplicity	25	*15-25*						
Consistency/Reputation of Vendor	5	*0-10*						
Environmental Impact	5	*10-20*						
Use of Local Resources	10	*10-20*						
Local Participation	10	*10-20*						
Additional Project Specific Criteria #1: Quality of Drinking Water Produced	10	*10-20*						
Additional Project Specific Criteria #2: BLANK	n/a	*10-20*						
		Note: Sum of assigned weights must be equal to 100						
TOTAL SCORE *(Sum of all scores for each design option)* **FINAL RANK** *(Identify design option with highest score)*								

Notes:
[1] When assigning a weight for the criteria, a low relative weight (i.e. 10) means that this criterion is not as important as another criterion that is ranked relatively higher (i.e. 30).
[2] The suggested range for criteria weighting is based on general infrastructure priorities identified by Rigolet residents and technical experts in Winter 2013-2014.
[3] When ranking individual design options; 4 is considered 'very good', 3 is 'good', 2 is 'neither good nor poor', 1 is 'poor', and 0 is 'inadequate or unacceptable'.

Figure 2. Example of decision matrix designed for the selection of future drinking water infrastructure in Rigolet, Nunatsiavut based on consultations with technical experts and Rigolet community stakeholders in 2013-2014.

FLEXIBLE POLICY TOOL

Effective policies can go a long way in building local capacity. First Nation practitioners and leaders repeatedly told us that the government's one-size-fits-all approach to funding ignores the inherent differences that exist among First Nations. For example, some communities are remote with only winter road or air access. In these communities, construction projects must fit very constrained time frames and conditions. Some communities are close to cities, where they have access to expertise year-round, while others struggle to get spare parts or complete repairs in a timely fashion. First Nation communities also have varying levels of capacity in construction management, operation and maintenance. The flexible policy tool[3] enables federal and provincial policy-makers to make locally-appropriate funding and policy decisions in collaboration with the local communities.



SELECTION CRITERIA

- ***Training***: Project management (1); Accounting (1). Sum out of 2.
- ***Qualifications***: Professional designation of project manager (Band).
- ***Comp.-LHS***: Band-operated utilities with successful service delivery. Sum.
- ***Comp.-RHS***: Band completed 'front-end' work outside of INAC process. Total last 10 years.
- ***Exp.-LHS***: Project manager (Band) years of experience in position (or similar). Sum.
- ***Exp.-RHS***: Project manager (Band) meetings with technical support system. Total per year.
- ***Fin.***: Band credit rating, or financial performance on Capital Works projects. Current 5-year average.
- ***Own.Pr.-LHS***: Water connections paying user-fees. Percent of total connections.
- ***Own.Pr.-RHS***: Homes owned by occupant or in home-ownership program. Percent of total.
- ***Gov.-LHS***: Formal tax-revenue collection system in place for on-reserve businesses. (Y/N).
- ***Gov.-RHS***: Formal community-level financial accountability mechanism in place. (Y/N).
- ***Pol.sys.-LHS***: Band Council terms. Total last 12 years.
- ***Pol.sys.-RHS***: Band Council members in 2nd consecutive term. Percent of total members.
- ***Lead.-LHS***: Band Council & community meetings on water service. Current 3-year average (x/yrs).
- ***Lead.-RHS***: Band Council & technical staff meetings. Current 2-year average annual total.
- ***Own.Att.***: Band-operated utilities with successful service delivery. Sum.
- ***Pol.will***: Band completed 'front-end' work outside of INAC process. Total last 10 years.

Figure 3. Flexible policy tool

DIGITAL WATER SYSTEM MAPPING

A digital mapping tool using Google Maps was developed in collaboration with public works managers and operators. This tool was intended to provide an easy-to-access and up-to-date repository of local water system conditions, knowledge and experience. The maps included water distribution and sewage collection systems, photos of different system components such as pumping and boosting stations, videos showing various system's maintenance and repairs, and notes that combined operators' specific experience, as well as the state of knowledge about particular operation or maintenance practices.[7] Digital mapping can also be used as an effective tool for documenting local knowledge management, mobilization and transfer.

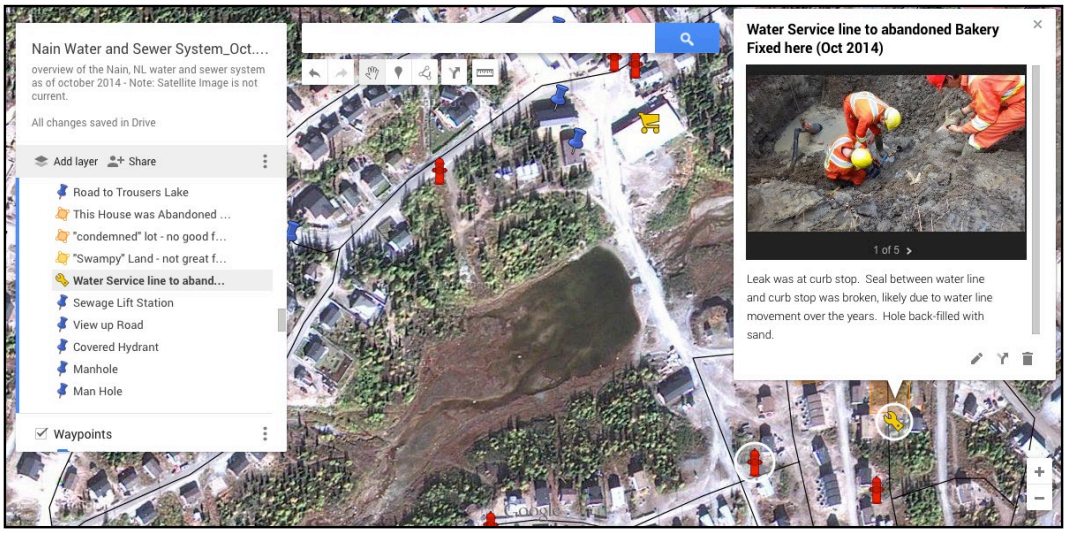


Figure 4. A custom Google Map of Nain, with embedded slide show of images taken during recent water service line repairs.

TO CONTACT THE RESEARCHER, EMAIL RESEARCHSPOTLIGHT@CWN-RCE.CA.
VISIT OUR REPORT LIBRARY AT WWW.CWN-RCE.CA

RESEARCH TEAM

KHROSROW FARAHBAKHSH, (former) Associate Professor, University of Guelph, (current) Integrated Water Management

BENJAMIN KELLY, Assistant Professor, Nipissing University

CARLY DOKIS, Assistant Professor, Nipissing University

KIM ANDERSON, Associate Professor, Wilfrid Laurier University

ROBERT INNES, Associate Professor, University of Saskatchewan

JASON MCCULLOUGH, (former) Research Associate, University of Guelph

JO-ANNE LAWLESS, (former) Research Assistant, Wilfrid Laurier University

ALLAN GORDON, (former) Research Associate, University of Guelph

MYLAN TOOTOOSIS, PhD student, University of Saskatchewan

PARTNERS

CURVE LAKE FIRST NATION

DOKIS FIRST NATION

JAMES SMITH CREE NATION

RIGOLET INUIT COMMUNITY GOVERNMENT

NUNATSIAVUT GOVERNMENT

ABORIGINAL WATER AND WASTEWATER ASSOCIATION OF ONTARIO

TIN ROOF GLOBAL

NOVUS ENVIRONMENTAL

REFERENCES

[1] HEALTH CANADA. First Nation and Inuit Health. Drinking Water and Wastewater. http://www.hc-sc.gc.ca/fniah-spnia/promotion/public-publique/water-eau-eng.php. Last accessed May 15, 2016

[2] FIRST NATIONS HEALTH AUTHORITY. Drinking Water Safety Program. http://www.fnha.ca/what-we-do/environmental-health/drinking-water-safety-program. Last accessed May 15, 2016.

[3] MCCULLOUGH, JASON. 2011. Square peg, round hole: Ontario First Nations technical staff perspectives on federal drinking water infrastructure policies, programs and processes. MASc Thesis. School of Engineering, University of Guelph.

[4] CHIEFS OF ONTARIO. 2001. Drinking Water in Ontario First Nation Communities: Present Challenges and Future Directions for On-Reserve Water Treatment in the Province of Ontario -Part II Submissions to the Walkerton Inquiry Commission.

[5] FIRST NATIONS INFORMATION GOVERNANCE CENTRE. http://fnigc.ca/ocap.html. Last accessed May 15, 2016.

[6] GORDON, ALLAN. 2014. Tools and Strategies to Address Uncertainties and Complexities of Infrastructure Design in Remote Northern Canadian Communities. MASc Thesis. School of Engineering, University of Guelph.

[7] GORDON, ALLAN, FARAHBAKHSH, KHOSROW. 2015. Review of Best Management Practices for Piped Water Distribution Systems in Northern Cold Regions. Submitted to the Nunatsiavut Government as part of the Sustainable Community Initiative. July 2015.