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Change Mackenzie

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Tracking Change
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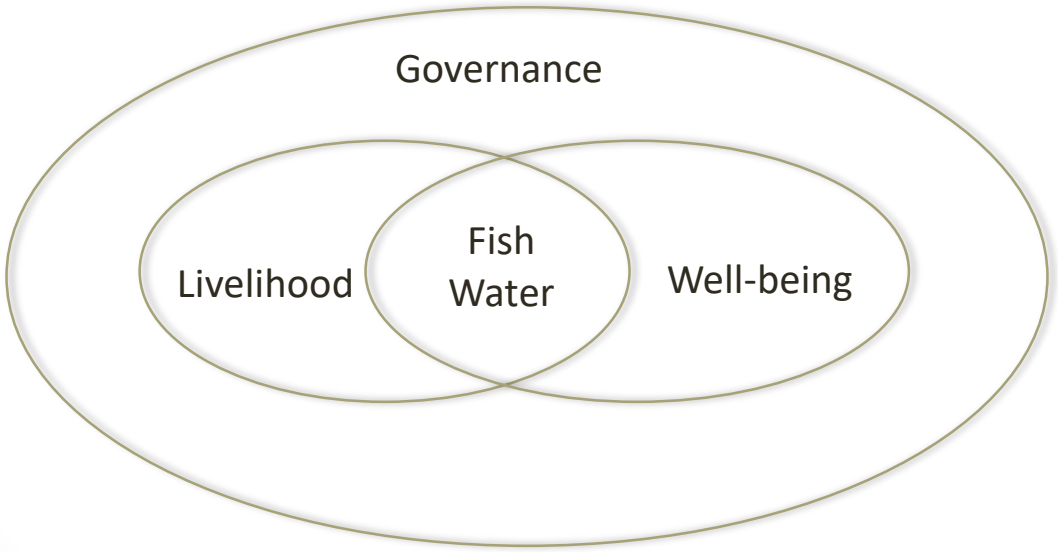
trackingchange

Goal and Objectives

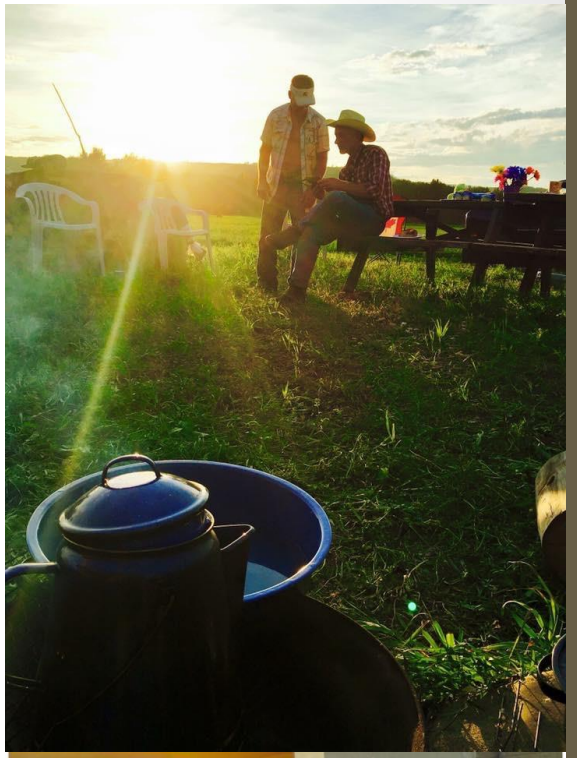
Goal

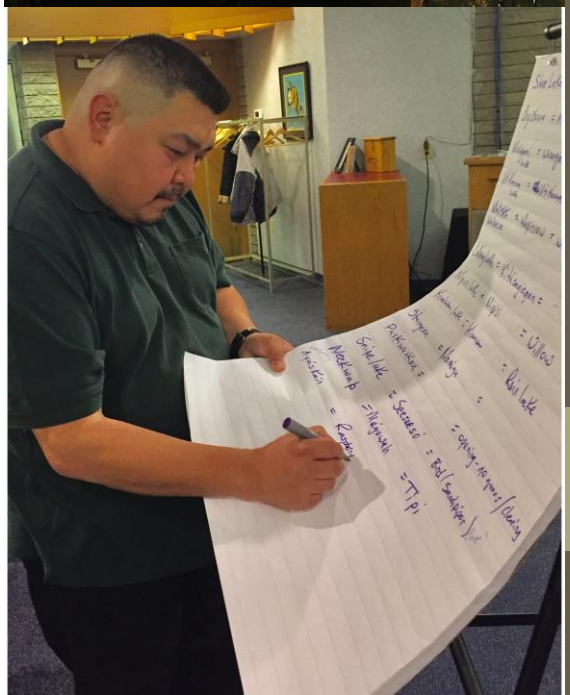
- The goal is to determine and demonstrate the importance of local and traditional knowledge (LTK) to our understanding of social and ecological change in the Mackenzie River Basin and contribute to regional, territorial/provincial and federal decisions about its continued sustainability.



Conceptual Approach

- **Social-Ecological -** Fishing Livelihoods; /Fishing
- **Place-based** knowledge of changes in Mackenzie Basin;
- **Empirical and experiential**
  - Example – changes in water levels, new species of fish, pressures from resource development;
- **Multiple scales** (community – regional – territorial – federal – global);
- **Dynamic** perspective (ecological variability, ecological change);
- **Interdisciplinary** capacity (sociology, history, economics ecology, biology);
- **Relationship oriented** (social-ecological relations – river connections).






Mackenzie-Great Bear
Peel
Great Slave
Liard
Peace
Athabasca
Inuvik
Fort McPherson
Peel River
Peel Sub-basin
Norman Wells
Great Bear Lake
Mackenzie Great Bear Sub-basin
Mackenzie River
Northwest Territories
Yellowknife
Great Slave Lake
Great Slave Sub-basin
Fort Simpson
Watson Lake
Liard River
Liard Sub-basin
Hay River
Fort Smith
Fort Nelson
Peace River
Fort Chipewyan
Cree Lake
Athabasca Sub-basin
Fort St. John
Peace River
Fort McMurray
Grande Prairie
Lesser Slave Lake
Athabasca River
Whitecourt
Hinton

What Indicators are useful for Tracking Change?

CAN I FIND ENOUGH FISH TO MEET MY FAMILY'S NEEDS?

- Timing of fish runs
- Timing/location spawning
- Total catch
- Diversity of catch
- Catch / unit effort
- Condition - fish harvested
- Invasive species
- Barriers / opportunities to Access valued fishing sites
- Total harvest

CAN I EAT THE FISH?

- Total quantity of habitat
- Habitat quality
- Fish quality
- Fat (length/weight ratio)
- Fish Condition
- Perceived contaminants in fish/habitat

CAN I DRINK THE WATER?

- Muddy water / sediment
- Greening of water (algae)
- Tea scum
- Taste
- Warming water
- Water flow
- Perceived Contaminants in Water

CAN I FIND GOOD WATER?

- Access to clean water from the land
- Water levels
- Disturbance from development (e.g., barriers, losses)
- Integrity of sacred water sites

Who benefits?
Why are we Tracking Change?

HOW IS KNOWLEDGE BEING GENERATED AND SHARED?

How is knowledge being generated?
What knowledge is being shared and how?
How accessible is knowledge to communities?
How does knowledge contribute to social learning?
How does knowledge contribute to decision-making at different levels?

IMPLICATIONS

Are stresses on the sustainability of freshwater ecosystems increasing?
Will the Mackenzie River Basin be more or less healthy in the future?
Will we be able to eat more or less fish form the Mackenzie River Basin in the future?
Will our grandchildren still be able to eat the fish and drink the water?

What management actions and policy changes are needed to ensure sustainability of the basin?

Watching the Peace River (2016)– Photo Credit Brenda Parlee

The Peace River watershed is home to many Aboriginal peoples of the Treaty 8 region who have lived in the area since time immemorial. The Peace River and its tributaries have always been an important travel corridor for First Nations, Metis and other settlers and was a foundation for subsistence fishing for many many generations.

The watershed has undergone significant change in recent decades as a result of resource development including hydro-electric development (e.g., WAC Bennett Dam), forestry and petroleum development. Although there is some documentation of the combined social and ecological changes, much local and traditional knowledge has not been documented.

Knowledge research in the Peace River as a result of inquiries into the impacts of the W.A.C. Bennett Dam. There is limited Traditional Knowledge related to water quality documented in the Peace River watershed. Many Aboriginal communities have observed a marked decline in water quality in the Peace River according to such indicators as color, tea scum, algal growth and proximity to development.

The level of contaminants in the Peace system due to development is another major issue. In addition to hydroelectric development, forestry, conventional and unconventional petroleum exploration is an increasing focus of research. A limited amount of data has been collected about the effects of climate change from the perspective of local and traditional knowledge holders.

Indigenous Water Security Levels

Neal Spicer

MSc Candidate

Community Risk and Resilience – University of Alberta

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- Water security for Indigenous communities within Canada has been a widely acknowledged problem since the 1990s.

- Despite the prevalence of the problem, there is very little research which examines water issues for Indigenous communities in Canada.

- Up till now, there has been no comprehensive Water Security Assessment Tool for Indigenous communities.

- 2 components – Household water security Levels and Natural Water security Levels

Water security can be defined as:

- the sustainable use and protection of water resources that integrates acceptable levels of water risk to ecosystems and humans, while providing access to water of proper quantity and quality that can support livelihoods, economic development, human and ecosystem health, national security and protection against water-related hazards.

Research Outline

- Research was conducted in collaboration with the communities to address their concerns over drinking water, both within the home and natural source water.

- Semi-structured interviews were utilized to examine various aspects of drinking water consumption patterns, both within the home and while on the land, and how water security issues were impacting their way of life.

  - Dene Tha First Nations (49 interviews in total) – 3 communities of Chateh, Meandeing River, and Bushe River around High Level, Alberta

  - K'atl' odeeche First Nations (50 interviews in total) - 1 community on South shore on the Great Slave Lake, NWT

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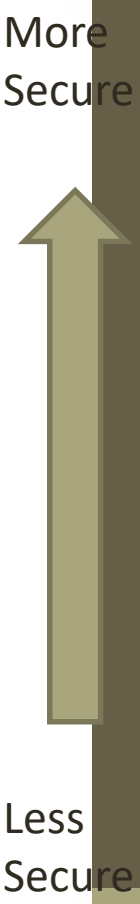
Natural Source Water Security

Capacities				Natural Environment		
Individual/Household			Community	Environmental Disturbance	Environmental Disasters	Environmental Impacts
High level of concern and or awareness of potential problems	Holds significant knowledge about natural water Sources	Drinks a lot of water from natural sources	Complete control over resources and their extraction within TT	Low overall levels of land disturbance within TT and water basin	Minimum impacts of natural disasters such as flooding	Minimum impact from environmental changes
Moderate level of concern and or awareness of potential problems	Holds some knowledge about natural source water	Frequently drinks water from natural sources	Some control over resources and their extraction within TT	Medium overall levels of land disturbance within TT and water basin	Low impacts of natural disasters	Low impacts from environmental changes
Low level of concern and or awareness of potential problems	Holds little knowledge about natural source water	Sometimes drinks water from natural sources	Little control over resources and their extraction within TT	High overall levels of land disturbance within TT and water basin	Medium impacts of natural disasters	Medium impacts from environmental changes
No concern and or awareness of potential problems	Holds no knowledge about natural source water	Drinks no water from natural sources	No control over resources and their extraction within TT	Very high overall levels of land disturbance within TT and water basin	High impacts of natural disasters	High impacts from environmental changes



Level of Knowledge of Potential Problems

- The capacities of individuals is an important component when examining water security as the level of knowledge of potential problems associated with natural water sources can play a crucial part of natural source water security (Dickson, Schuster-Wallace and Newton, 2016).

- In most traditional areas of Indigenous communities within Canada, there are numerous potential issues such as pollution and contamination that can directly impact the quality of water and the levels of water security.

- This component will be scored on the number of concerns voiced during the interview process over natural water sources ranging from:
  - no concern or awareness of problems (no complaints or concerns - 0 points),
  - low levels of concern or awareness of problems (one complaint or concern - 1 point),
  - moderate levels of concern or awareness of problems (two complaints or concerns - 2 points);and high levels of concerns or awareness of problems (three or more complaints or concerns - 3 points).
  - If individuals have a lack of awareness and concern over the potential problems, this can directly be related to low levels of water security in that they may be drinking unsafe natural source water.

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Amount of Water Drank from Safe Water Sources

- The last individual capacity component is the frequency of drinking from safe natural water sources of individuals while on the land.

- The availability of safe natural source water is a major component of natural water security (Dickson, Schuster-Wallace and Newton, 2016).

- The ability to drink from safe natural sources regularly is directly linked to the level of natural source water security for indigenous groups and is a crucial part of their participation in traditional activities. Members of indigenous communities often go out on the land, hunting and fishing, for weeks at a time and having available safe natural sources of water verses having to transport bottled water plays a large factor in overall natural source water security levels.

- This component will be scored from:

  - does not drink natural source water sources (0 points);
  - sometimes drinks safe natural source water (1 point);
  - frequently drinks safe natural water source water (2 points); and
  - and always drinks safe natural water sources (3 points).

- Unavailable safe natural sources of water will result in lower natural water security and individuals will either have to bring bottled water with them or drink from questionably safe or unsafe water sources which could result in health complications. Indigenous communities that have greater numbers of safe natural water sources will typically have higher levels of natural source water security.

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Level of Control over Resources and Degree of Consultation

- Source protection and shared governance over water bodies by all shareholders plays a crucial part of natural water source security (CCME, 2004; WWC 2000; Cook and Bakker, 2012; Bakker and Morinville, 2013; Black and McBean, 2017; Lautze and Manthrithilake, 2012).

- For the community capacities category of Indigenous natural water source security, there are two factors examined that potentially impact it that include the degree of consultation over the natural resources within the traditional territory and the degree of control of the extraction of those resources.

- These two variables play an important role in natural source water security as they allow the communities to help potentially minimize the impacts of resource extraction and protect natural water sources (Dickson, Schuster-Wallace and Newton, 2016).

Level of Control over Resources and Degree of Consultation

- Ascertaining the levels of natural water security within this component will be examined with the variables of:
  - no control over the resources and the extraction process within their TT (no effective consultation and no ownership of natural resources - 0 points);
  - has little control over resources and the extraction process (some effective consultation and no ownership over resources within their TT -1 point),;
  - has some control over resources and extraction process (effective consultation and some ownership of resources within their TT - 2 points); and
  - complete control over resources and extraction process (full control over the natural resources within their TT - 3 points).

- Indigenous communities that have full control over the natural resources within their territory and able to minimize the impacts of extraction through a fully effective consultation process should have resulting higher levels of water security as it will help to minimize the impacts on natural water sources. Those communities that have little or no control of their natural resources and/or do not minimize the impacts of the extraction will typically have lower levels of natural water security due to contamination associated with poor management and regulation.

Level of Environmental Disturbance

- Within the natural environment component of Indigenous natural water security there are three factors that include environmental disturbance, environmental disaster and environmental impacts - all of which can play important factors (Lautze and Manthrithilake, 2012; Dickson, Schuster-Wallace and Newton, 2016).

- A crucial part of natural source water security is the amount of land disturbance, both in the immediate area and within the entire water basin. Resource extraction can result in large impacts on levels of natural source water security (Bates, Kundzewicz, Wu and Palutikof, 2008; Medeiros et al, 2017; Cook and Bakker, 2012). This is especially true when there is lack of regulation or unsustainable practices that impact the natural water supply (WWC, 2000).

- This component will be assessed as:
  - high level of disturbance both with the TT (3 or more projects) and the overall water basin (more than 5 projects) (0 points - overall very high levels of disturbance);
  - High disturbance within TT (3 or more projects) and medium level of disturbance within the overall water basin (3 to 5 projects) (1 point - overall high levels of land disturbance);
  - Medium disturbance (2 projects) within the TT and within the overall water basin (3 to 5 projects) (2 points - overall medium levels of disturbance); and
  - low disturbance both within the within the TT (zero or 1 project) and within the overall water basin (2 or less projects) (3 points - overall low level of disturbance).

Level of Environmental Disasters

- Another important part of natural water security within the natural environment component is the impacts of environmental disasters (WWC, 2000; Cook and Bakker, 2012; Mascarenhas, 2007).

- Impacts of natural disasters can be directly related to the levels of natural source water security within many Indigenous communities as they are situated in flood prone areas due to the historical treaty process.
- Indigenous communities that are located in a floodplain and plagued constantly with flooding events will often have lower levels of natural source water security as the water sources will have higher levels of disturbance and contamination.

- Therefore, this component will be will be assessed using the following scoring:
  - from high impacts of natural disasters (average of one flooding event every year or two - 0 points);
  - medium impacts of natural disasters (flooding events averaging every two to five years - 1 point);
  - low impacts of natural disasters (flooding event average every five plus years - 2 points),; and
  - minimum impacts of natural disasters (flooding events rarely, if ever, occurring - 3 points).

- Indigenous communities that are less prone to natural disasters due to the location of their community and TT will typically have higher levels of natural source water security.

Level of Environmental Impacts

- Increasingly, impacts from environmental changes are challenging communities and their sources of natural sources of water (Bates, Kundzewicz, Wu and Palutikof, 2008; Medeiros et al, 2017; Instanes et all, 2015).

- Due to the impacts of climate change, many Indigenous communities are reporting lower levels of water, less snow and rainfall which is further impacting the quality of natural source water as the water is warmer, more turbid and has higher levels of contaminants.

- To assess this component there are four levels that include:
  - high impacts from environmental changes (three or more reported climate change impacts on natural source water - 0 points);
  - medium impact from environmental changes (two mentioned climate change impacts on natural water source - 1 point);
  - low impacts from environmental changes (one mentioned climate change impacts on natural source water - 2 points); and
  - minimal impacts from environmental change (no mentioned climate change impacts on natural water sources - 3 points).

- Many Indigenous communities, especially those in the far north, have higher impacts of environmental changes which often results in lower levels of natural source water security.

- Those Indigenous communities that are being less impacted by environmental changes and the resulting problems are often associated with higher levels of natural source water security within this component

Conclusion:

These findings are important because:

- Water security is crucial to First Nation communities and their well being.
- Helps to address the current gap in the literature in the examination on natural source water security for First Nation communities.
- Provides a set of variables that helps to further develop the concept of First Nation water security.
- Helps to expand the community network and work being conducted under the Tracking Change Project.

Questions?

Tracking Change…

Local and Traditional Knowledge in Watershed Governance

Arctic Borderlands Knowledge Coop
Athabasca Chipewyan First Nation
Federal University of Rio Grande do Norte
First Nations Technical Services Advisory Group
Inuvialuit - Fisheries Joint Management Committee
Government of the Northwest Territories
Gwich'in Renewable Resources Board
Keepers of the Athabasca
Mikisew Cree First Nation GIR
Prince Albert Grand Council
Sahtu Renewable Resources Board
Saskatchewan Water Security Agency
Treaty 8 First Nations of Alberta
Treaty 8 Tribal Council of British Columbia
Universidade Federal do Rio Grande do Sul
University of Wisconsin – Madison

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Chris Furgal, Trent University
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Henry Huntington, Huntington Consulting
Shalene Jobin, University of Alberta
Erin Kelly, Government of the Northwest Territories
Trevor Lantz, University of Victoria
Melissa Marschke, University of Ottawa
Priscila Macedo Lopes, Universidade Federal do Rio Grande Norte
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