

Gaining Insights About Water: The Value of Surveys in First Nations Communities to Inform Water Governance

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Abstract

Knowledge of how water is perceived, used and managed in a community is critical to the endeavour of water governance. Surveys of individuals residing in a community offer a valuable avenue to gain information about several of these aspects of water. This paper draws upon experiences in three First Nation communities to explore the values of surveys to illuminate water issues and inform water decision-making. Findings from experiences with surveys in Six Nations of the Grand River, Mississaugas of the New Credit, and Oneida First Nation of the Thames reveal rich information about how surveys can provide insights about: the connection of individuals to the land, water and their community; reasons for valuing water; perceptions of water quality and issues surrounding water-related advisories; and, degree of satisfaction with water management and governance at different scales. Community partners reflected upon the findings of the survey for their community. Dialogue was then broadened across the cases as the partners offer benefits and challenges associated with the survey. Community surveys offer an important tool in the resource managers' toolbox to understand social perceptions of water and provide valuable insights that may assist in improving its governance.

Keywords

water quality; water governance; community engagement; community surveys; First Nations

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1.0. Introduction

Access to safe drinking water is a significant and ongoing challenge in many of Canada's First Nation communities. In 1995 the Department of Indian Affairs and Northern Development (DIAND) and Health Canada conducted a study that revealed one quarter of on-reserve water systems were a potential risk to the health and safety of the First Nations people living in the affected communities (Christensen, 2010). Although the Canadian Government responded to these findings by establishing a series of funding initiatives between 1995 and 2003, a 2001 study by Indian and Northern Affairs Canada (INAC) found that seventy-five percent First Nations water systems posed a significant risk to drinking water quality or safety (Office of the Auditor General, 2005). Even after the Government of Canada launched the First Nations Water Management Strategy in 2003 and the Expert Panel of Safe Drinking Water for First Nations in 2006, First Nations communities in Canada continue to face drinking water quality problems (Office of the Auditor General, 2005; Christensen et al., 2010; Walkem, 2007) and one report states that 39% (314) of the water and wastewater systems for First Nations in Canada that were inspected are "high risk" and pose threats to health, safety and the environment (Neegan Burnside Ltd., 2011).

Boil water advisories are a strong indicator of the water quality problems faced by Canada's First Nations communities. Health Canada (2009) reported an average of 123 First Nations drinking water advisories in place every year between 2003 and 2007. A more recent Health Canada report indicates that a total of 161 water systems in 116 of Canada's 633 First Nations communities were under some form of drinking water advisory as of January 2012 (Health Canada, 2012; Christensen et al., 2010). This is equal to nearly one in five (18%) of Canada's First Nations communities being under a drinking water advisory (Troian, 2011). The Federal Government's 2009-2010 National Assessment of First Nations Water and Wastewater Systems found that the drinking water advisories in Canada's First Nations communities affect up to 18,900 people, representing nearly 4% of Canada's 484,300 on-reserve population (Aboriginal Affairs and Northern Development Canada, 2011).

While securing a consistent supply of safe drinking water of adequate quantity often requires overcoming technical barriers, it is rarely the only, or even most substantive, obstacle. An equal or greater challenge is that of water governance. Water governance involves the "range of political, social, economic and administrative systems that are in place to develop and management water resources and the delivery of water services, at different levels of society" (Rogers & Hall, 2003, p. 16). The increasing interest in water governance is important because it acknowledges and emphasizes 'people issues' as the most important factor in contemporary water problems and broadens the dialogue about who should make decisions about water and how those decisions should be made beyond the government or state (de Loë & Kreutzwiser, 2007).

Water quality issues in Canada's First Nations communities provides an effective illustration of the importance of seeking and understanding indigenous and local knowledge in making decisions about the environment. There are distinct differences in

the way that Canada's First Nations communities use and perceive water when compared to Canada's non-First Nation communities (Blackstock, 2001). Water plays a vital role in the cultural, spiritual, emotional, physical and intellectual welfare of indigenous people, and therefore serves many different uses to various people in First Nations communities (McGregor, 2009). Water is used in spiritual ceremonies and is understood to be a life-providing substance that inspires the desire for continuity, both in terms of human life and the natural environment (McGregor & Whitaker, 2001). As both water and females are believed to be life givers, females tend to share an especially strong relationship with water (McGregor, 2009). The strong connection that indigenous people have to water, particularly females, means they are highly knowledgeable of long term physical and sociological changes that have occurred to the water in their community. First Nations therefore tend to also have a good understanding of the actions necessary to ensure that water continues to provide its life-giving properties over the long term (Cassels et al., 2001).

Improving water governance requires recognizing and incorporating indigenous and local knowledge of water into decision-making processes. Despite distinct differences between indigenous and western science knowledge systems, there are several aspects that make the two systems highly complementary of each other while pursuing a common objective (Berkes, 1998; Agrawal, 2005). This is particularly evident in environmental decision making, where indigenous knowledge can help to improve the decision making process by offering different and complementary perspectives to science (Huntington, 2000; Ellis, 2005), can be a viable means of informing and promoting sustainable resource use and management (Paci et al., 2002; Ellis, 2005), and can provide a more complete understanding of the relationships between human societies and their physical environments (Huntington, 2000).

Incorporating indigenous and local knowledge into water governance in Canada's First Nations communities also requires acquisition of place specific information and understanding of context. How to most effectively and efficiently gain this information is an essential question for water managers and decision-makers. Surveys are one way to gain such information knowledge, public perceptions, and concerns about management and decision-making. Several strengths of surveys have been identified: they can be used in a broad range of different contexts to capture a variety of public perceptions and attitudes that decision makers need in order to design effective policies and make informed decisions (Beierle, 1998; Bord et al., 1998; Doria, 2010); they reveal the range and dominant of perceptions about a resource issue within a community or among communities (Jones et al., 2006; Tran et al., 2002; McDaniels et al., 1997); and, they gain the information needed to make effective water management decisions and to efficiently allocate water use (World Health Organization & UNICEF, 2006). Although considerable survey research has been carried out to investigate the concerns and attitudes of Canada's public water users (see for example McDaniels et al., 1998; Dupont, 2005; Turgeon et al., 2004), few published studies have examined the perceptions of Canada's four million private water users (Jones et al., 2006). Knowledge of how water is perceived, used and managed in First Nations communities is a particularly limited area of study.

This paper explores the merits and challenges of using surveys to inform water governance in First Nation communities. It utilizes and builds upon the survey results from the research project *First Nations and Source Waters: Understanding Vulnerabilities and Building Capacity for Governance*, which are presented elsewhere (Bharadwaj et al., in progress; Plummer et al., in review; Baird et al., in progress), to focus specifically on the experiences of community partners with the survey process. The paper is structured into four sections. The following section describes the methods used in the research. The results are then presented for each case study and emphasize the reflections of the community partner concerning the survey results. Community partners broaden the dialogue across the cases in the discussion by considering the benefits and challenges of their experiences with the survey. Advantages and challenges of utilizing surveys as a tool to gain information and understanding about water and inform water governance in First Nations communities are highlighted in the conclusion.

2.0. Methodology

The multiple case study method (Yin, 2003) was used in this research to investigate insights on water and the value of survey instruments in three First Nations communities in Southern Ontario. The method was selected because it is well suited to the in-depth investigations of complex and multi-faceted phenomenon in a contemporary context, facilitates cross-case comparisons, enables the use of multiple forms of inquiry, and is considered to produce more robust results than single case study research (Yin, 2003; Gerring, 2004).

First Nations communities in Southern Ontario were the primary unit of analysis because of the persistence of drinking water problems, the increasing stresses on water resources, their reaction to the Walkerton Inquiry¹, and their interest in learning about how traditional knowledge can be used in source water protection (Cassels et al., 2001; McGregor & Whitaker, 2001; Lavalley, 2006; Chiefs of Ontario, 2007). Six Nations of the Grand River, Oneida of the Thames, and Mississaugas of the New Credit First Nation were the three communities selected as cases. These three communities were well suited to the purpose of the study because they represent many of the drinking water issues being faced by First Nations in Southern Ontario and were eager partners in the research. The university researchers and community partners co-developed a living ethics protocol for the research project and gained ethics clearance through the research ethics board at Brock University (REB # 08-314) and in each of the communities.

Data collection and treatment in each community took place in two ways. First, a survey instrument was developed and pilot tested by the research team. The survey sought to gain information on the water-related vulnerabilities (biophysical and social) in each community. From the experience of the community partners, it was advised that an intercept approach to sampling was most appropriate because of its flexibility in terms of the various venues or events it targets. The variation of the intercept method makes it an effective way to obtain information from certain “hard to reach” populations within an

¹ Inquiry into the May, 2000 *Escherichia coli* contamination of the municipal water supply in Walkerton, Ontario that caused seven deaths and more than two thousand illnesses

efficient timeframe (Muhib et al., 2001). Posters and mail-out information sheets were used to advertise the event in each community. During the event, the surveys were verbally communicated by First Nations community researchers who were trained by the research group. Participants were asked to respond to specific questions concerning their water uses, the state of water and water-related concerns in their community; and the connection community members (and their community) have with water, the natural environment, and each other. Historical issues of mistrust in the community between the Elected Council and community members, dating back to when the Federal Government implemented Elected or Band Councils, led to a further question about mistrust and suspicion in the community in relation to water quality. The intent was to understand if there was a connection between the lack of trust and the reason why people don't drink tap water and whether they trust the Elected Council in decision-making and management of water resources. The survey included a variety of question types. Open-ended questions were used to give respondents the opportunity to state their own perceptions, while closed-ended questions were aimed at obtaining more definite responses about water quality issues. The closed ended-questions primarily consisted of multiple choice questions and questions based on a Likert scale ranging from 1 – strongly disagree to 5 – strongly agree (or, in the case of satisfaction with water quality, from very poor to very good). The community members who completed the survey received a payment of \$20 in acknowledgement of their time, as suggested by community partners. House numbers were collected and plotted using GIS to ensure the sample was geographically representative of the community. Data was entered into an MS Excel spreadsheet and scrutinized for any entry errors. Quantitative data analysis occurred using the Statistical Package for the Social Sciences (SPSS). The results of the survey in each community were communicated by having an information display at a popular community event, such as a fall fair. The community partner and university researcher were also on hand to talk about the research.

After the results of the survey were available, the partner from each community on the research team was asked to reflect on survey findings for his/her community as well as critically appraise his/her experience with the survey. Reflections were collected in person and/or by telephone, transcribed by the interviewer, and then sent back to the individuals for member checking to ensure accuracy. Qualitative analysis was undertaken on the transcripts to thematically code similar statements together while keeping the richness of the information.

3.0. Results

Results are presented for each case study. In each case, contextual information on the community and salient highlights from the survey are succinctly provided. Consistent with the main intent of this research, the results focus on the reflections by the community partner about the findings to his/her specific community.

3.1. Six Nations of the Grand River

Six Nations of the Grand River is Canada's most populous First Nation community (24,000 people with 13,000 living on reserve). The community is situated in the intensely developing area of Ontario's Greater Golden Horseshoe region. Their land claim extends 6 miles on either side of the Grand River under the Haldimand Proclamation of 1784. Drinking water is primarily drawn from the Grand River and a treatment and distribution system services the main settlement of Ohsweken. Cisterns and wells supply most of the private homes in this rural area. Development pressures and upstream water use are now major concerns in the community due to the relative proximity of the reserve to the rapidly growing Grand River Watershed. The poor conditions of water wells, capacity of the treatment system, and off reserve land-use influences are additional drinking water concerns in the community. Wells are in poor shape with coliform and *Escherichia coli* (*E.coli*) (see Neegan Burnside Engineering and Environmental, 2005) contamination and the community's water intake is towards the end of the Grand River, where water quality is often very poor (Schultz et al., 2004). The community has already initiated a source water planning process (www.sixnations.ca/SWP) in response to these growing concerns.

A total of 100 surveys were completed and returned in Six Nations. The survey instrument asked the individuals in Six Nations to indicate how they valued different uses of water. The results indicate that Six Nations community members value water most highly for recreation, ecosystem support and drinking water (Table 1). In this community, water is considered to be important for cultural purposes and is used on a regular basis for traditional food. Although not rated as the most important, many participants also use water for making a living ($n=24$). In terms of perceptions of water quality, respondents indicated being somewhat satisfied to neutral in terms of their satisfaction with tap water. The overall response to general water quality satisfaction was found to be even lower, averaging between very poor and poor (mean = 1.94) (Figure 1). The most common contamination sources were perceived to be runoff from cities ($n = 14$), general pollutants ($n=13$), runoff from landfills/garbage ($n=11$), and agricultural pollution ($n=9$).

The survey also queried about connections to the community as well as perceptions of water management and decision-making. Connectedness to place was found to be relatively high in general, with younger respondents reporting a weaker connection than the older respondents. The same response pattern was evident in regard to the sense of community and togetherness. When asked if there was mistrust and suspicion of other community members, the respondents were in moderate agreement with the statement (mean = 4.02). Respondents indicated that individuals, the community, and all levels of government shared an equal responsibility for drinking water quality. Respondents were neutral about the statement that individuals are fairly represented in elected council decision-making. However, respondents rated the elected council poorly in terms of the amount of attention given to the environment (mean = 2.5). When respondents were asked about their level of knowledge of, interest in, and involvement in water-related issues, the majority were neutral.

Upon considering the findings, the Manager of the Six Nations Eco-Centre offered two initial points of reflection. First, the Manager was surprised by the low amount of attention the Elected Council was perceived to give the environment. His surprise came

from the fact that he believes “the Elected Council focuses a lot of attention on the environment but like most community governments they get stuck working on a lot of different issues and so it looks like they are not working on the environment”. He went on to explain that with a lack of funding there is only so much money to distribute to the different departments and how this may contribute to the perception that the Elected Council is not doing enough on the environment. A second point of interest that emerged from the survey findings for the Eco-Centre Manager concerned the growing division between the elderly and the younger generations. “We have been trying for a lot of years to build this connectedness in the community. For example, we have the Mohawk and Cayuga immersion schools. There has been a fair bit of work on community connectedness but it is not showing in the numbers. I thought we bridged that gap, I really did.”

The Manager identified three main benefits from the results of the survey. First, the information gained has the potential to change people’s minds and perceptions about water related issues. Second, the research illuminates previously unknown gaps that need to be addressed. The specific example of the generational divide in perceptions was identified as an issue that was thought to have been addressed. According to the Manager, one of the clear benefits would be to conduct a subsequent study that examines the generational division and the interconnectedness of youth in particular to the community. Third, the Manager suggested that the findings “at the very minimum they might get people talking, it might open an opportunity for discussion”.

The Manager also reflected upon the challenges of using the information revealed in his position to enhance the environment in Six Nations of the Grand River. He expressed that while the survey conveys the perceptions of the community “it is difficult because educating the community or not they still have their own beliefs and perceptions”. In addition, making concerted changes to some of the perceptions revealed are really difficult because the drivers of change reside beyond the borders of the reservation. For example, the Manager expressed concerns about the difficulties in improving connectedness to water and the environment due to influences of an increasing population within the Grand River watershed.

3.2. Oneida Nation of the Thames

Oneida of the Thames has a population of 5,000 people (2,000 on reserve) and is located along the Thames River. The community’s primary drinking water source is an aquifer fed by the Thames River. The present drinking water system consists of an infiltration gallery, water main network, and storage reservoir. Despite a relatively new community treatment facility, there is a lack of confidence in water quality due to concerns associated with agricultural runoff, downstream influences from the City of London, and potential contamination from the nearby Green Lane Landfill (Union of Ontario Indians, 2007).

The 100 Oneida respondents who completed the survey indicated that they considered water to be important for all purposes. When were asked to identify their water uses and

the level of value they associate with each use, the most highly valued water uses were recreation, ecosystem support and drinking water (Table 1). Respondents indicated that they use water in a number of different ways and at different frequencies. Water is used seasonally for cultural purposes and for traditional medicines; it is used monthly for traditional food; and it is also sometimes used to make a living ($n = 36$, 20 use it daily). Younger community members (aged 35 or less) were found to use water more frequently to make a living than the older respondents (aged 35 - 64 years). Although respondents considered water important for all purposes, perceptions regarding water quality were relatively low. Figure 1 displays the participants' level of satisfaction with tap water quality. The average rating for tap water quality satisfaction was neutral (mean = 2.98), and surrounding water quality was rated, on average, to be poor (mean = 2.28). Community members identified a number of perceived influences on water quality. The most common responses were garbage and landfills ($n = 27$), agricultural pollution ($n = 6$), and cities and industrial pollution ($n = 6$). Although not as common, septic/sewage pollution ($n = 4$), general pollution ($n=3$), and intentionally-added chemicals were also listed as water quality concerns ($n = 1$).

The survey also asked participants about their connections to the community and their impressions of water management and governance in Oneida. Respondents rated connectedness to place very high (mean = 4.6), and rated a sense of togetherness slightly lower, averaging between a neutral response and moderate (mean = 3.85). The older generation of respondents (over 65) were found to exhibit a stronger sense of togetherness than the younger respondents. The majority of the respondents indicated that they felt a high degree of care for the community (mean = 4.85). Community members were also asked about any feelings of mistrust or suspicion in the community. On average, the respondents indicated a moderate degree of agreement that such feelings existed within the community. Responsibility for drinking water quality was perceived to be approximately equal for all levels of government, as well as for individuals and the community as a whole (mean = 3.6-3.8: some responsibility to a great deal of responsibility). The average response to the question of whether the elected council's decisions fairly reflect the preferences of the community fell between a neutral response and agreement. There was a significant positive correlation between this question and the community's sense of togetherness, and a significant negative correlation for fair reflection of the community's preferences and evidence of mistrust and suspicion in the community. On average, the amount of attention given to the environment by the elected council was rated between disagree and a neutral response. When asked about themselves, respondents rated their awareness of water issues fairly high (mean = 3.83: neutral to moderately agree), and their knowledge of water issues slightly lower (mean = 3.38).

The Oneida Environmental Coordinator offered several reflections upon the findings of the survey in her community. The Coordinator felt that the findings accurately represented the frequency of water use for cultural and traditional purposes in Oneida. The results confirmed several perceptions which the Coordinator anticipated. The Green Lane landfill, which is located to the east of Oneida's land area, is a major concern for individuals in Oneida and therefore the primary concerns for poor water quality

confirmed this ($n = 27$; garbage and landfills were identified four times more often than any other negative influence on water quality. Younger people tended to feel less connected to the community in comparison to the older generation. The Environmental Coordinator suggests several reasons why: younger people have more outside societal influences (e.g., television and cell phones); they have less exposure to traditional values/activities; and older people have lived in the community longer. The Coordinator felt that some other findings were less relevant for Oneida and indicative of many communities. For example, the survey results revealed that there were some feeling of mistrust and suspicion in the community. The Coordinator recognized that the lack of trust “can come with any community doesn’t matter where you live”.

The survey also illuminated several unanticipated and useful insights for the Coordinator. The Coordinator would have expected the respondents to rate tap water quality lower based on the number of people using bottled water in the community. She was also surprised to see that the community perceived an equal level of responsibility by all groups for water quality because individuals tend to have the least control over managing drinking water quality. This may be due to the community’s sense of responsibility to protect the river by voicing their concerns. The Coordinator was pleased to learn of neutral to general agreement regarding the Elected Council’s making decisions that fairly reflect the preferences of the community. She shared that “it is rare for someone to call you and tell you they are pleased with whatever it is you are doing, so I was pleased that the survey showed these results regarding the elected council’s decisions fairly reflecting the preferences of the community”. Overall, the Coordinator expressed that since the findings reflect the community’s perspective “I think the findings will provide the Elected Council with more guidance about what the community’s concerns are”. The Elected Council is going to work on incorporating the relationship to the environment and culture into administrative programs.

3.3. Mississaugas of the New Credit First Nation

Mississaugas of the New Credit First Nation is located near Hagersville, Ontario with a registered population of 1788 (approximately 847 on reserve). A communal water supply, which is piped in from the City of Nanticoke (sourced from Lake Erie), serves the majority of community members. However, there are still water quality concerns with contaminants entering the remaining wells that have not been decommissioned and deteriorating cisterns. Rising water demands from nearby municipalities has raised concerns about New Credit’s future water access for growth and development. The community is also concerned about the groundwater contamination risks associated with both the Tom Howe Landfill, which borders the New Credit reserve, and the nearby gypsum plant that is located outside the community, near Hagersville Ontario.

A total of 101 completed surveys were returned from the New Credit survey. Respondents to the survey were asked to identify the different ways that they use water and to rate the importance of water for each use. The most highly valued water uses were recreation, ecosystem support and drinking water (Table 1). The majority of respondents considered water to be only moderately important for cultural uses, which is less than the

other two communities surveyed. New Credit respondents indicated that they only used water occasionally for both traditional medicines and for traditional food purposes. Water is used by a small percentage of the community to make a living (20%), and is valued, on average, lower for this purpose than in other communities surveyed (mean = 3.65: neutral to somewhat important). When asked about water quality perceptions, most respondents were fairly positive. The average response to being satisfied with tap water was 3.8, representing a response between somewhat satisfied and satisfied. However, respondents perceived the surrounding water quality to be lower than tap water, rating it, on average, between poor and okay (mean = 2.5) (Figure 1). Respondents identified only a few negative influences on water quality, the most commonly reported influences being garbage and landfills ($n = 9$) and agricultural pollution ($n = 6$). A few respondents also identified general pollution and septic/sewage as negative influences.

Individuals in New Credit were also asked about their connections to the community and their impressions of water management and governance. In response to the questions about community connectedness, the respondents rated connectedness to place as high, and a sense of community and togetherness between neutral and moderate. Older respondents (over 65) ranked a sense of togetherness higher than younger community members. When asked if there was some mistrust and suspicion of others in the community, the average response fell between neutral and somewhat agree (mean = 3.30). When asked who should be responsible for drinking water quality, the majority of respondents indicated that most levels of government, individuals and the community as having a fairly similar level of responsibility. The average response was relatively neutral to somewhat favourable to the statement that individuals are fairly represented in Elected Council decision-making (mean = 3.28). When asked to rate the amount of attention the Elected Council gives to the environment, the participants responded in the range of neutral to somewhat appropriate (mean = 3.19). In terms of awareness and level of knowledge of water-related issues, the majority of respondents were relatively neutral. However, the awareness and knowledge ratings in New Credit appeared to be lower than in other communities surveyed, but not a statistically significant difference.

The Councilor for New Credit offered several reflections on the findings from the survey that he found to be intriguing. Based on his experiences as a member of Council, the overall general perception in the community that surrounding water quality is poor and that community's piped water is good was not surprising. However, the surrounding water (i.e., Lake Erie) that the community perceives to be of poor quality is the same water that the community uses for their drinking water. The Councilor explained that this is likely because "they trust the treatment system to provide them clean drinking water." The Councilor initially thought that New Credit would have had a higher connection to water for cultural purposes. While the finding was surprising, he believes that the lack of connection to water for cultural purposes is tied to the loss of culture and language.

When reflecting on the community connection results, The Councilor indicated that the difference between the togetherness and sense of community in the older and younger respondents "has a lot to do with how we were brought up". He illustrated this difference by sharing a story: "when I was growing up, my older brothers and sisters there was a lot

more growing food in gardens and sharing food with people, so there was a greater sense of connectedness between people and food. I remember that growing up, I would be sitting there eating a green bean right from the plant”. In regards to the issues of mistrust and suspicion, the Councilor pointed out that he “shouldn’t be surprised, but I was because it was the first time I saw real documented results about that”. He explains these issues go back “to the low level of connectedness and sense of community because we spend less time with our relatives and neighbours, so I think they are related”. While it is too early to understand the implications of the results for the community, he feels that it is part of his role as a Councilor and environmental manager to effectively get feedback from the members of the community as it signals the extent to which they understand water issues and perceive their water concerns are being addressed.

4.0. Discussion

The discussion section of the paper builds upon the reflections of the survey results in each community and focuses on the experiences with the survey process more broadly. The discussion is presented as a cross-case dialogue by the community partners about the benefits and challenges of using surveys in First Nation communities. The dialogue is supplemented with connections to the scholarly literature.

4.1. Benefits of Using Surveys in First Nation Communities

The three community partners identified common and different benefits of using the community survey to collect information about water resources. The ability of the survey to gain information and insights about water uses and community perceptions that otherwise may not have been considered and to inform the Elected Council in making future decisions was considered a main benefit by all. This was illustrated by the New Credit Councilor who, referring to the vulnerabilities identified through the analysis of the results that were provided in a report to each community partner, expressed that the “survey results will help New Credit Chief and Council develop policies and resources needed to address some of those barriers”. The survey results have already specifically helped to support a decision in New Credit to invest money in installing additional water lines, a top priority for the New Credit Chief and Council. Beckley et al. (2006) lend support to this observation and argues that surveys are one of the most effective tools to accurately gain the public perception information needed in decision making and are advantageous because their anonymity allows participants to openly express personal views and opinions on otherwise silent issues.

All community partners highlighted the value of the survey in reinforcing concerns in their community about water, but also creating opportunities beyond their community. Having data or ‘actual numbers’ was identified as being especially beneficial when communicating with those outside of the community (i.e., non-First Nation people) and also when applying for funding. For example, the Manager of the Six Nations Eco-Centre is actively using the results in meetings with upstream water managers as “it is impacting all the other projects I am involved in with managing the watershed. It is certainly influencing my opinions. Knowing the opinions or perceptions of community members is

changing the way I address the committees I sit on within the watershed”. The effectiveness in capturing and voicing the perceptions of First Nations peoples (a minority population in Southern Ontario) about water issues is a valuable attribute of surveys. It is also consistent with previous findings by Beckley et al (2006) of the unique ability surveys to capture and also to vocalize the views of ‘minority stakeholders’.

The community partners also emphasized how their inclusion in all aspects of the survey process enhanced the legitimacy of it within their communities. The Councilor for New Credit, for example, highlighted several positive aspects throughout the research process (e.g., the development and use of ‘Living Ethics’², engagement in the survey design, administration of the survey by a community member) and observed how the survey process “really empowered us as a community to be involved in our own research. It was really different from any other research I have been involved in”. The Oneida Environmental Coordinator shared that her involvement in the survey process was helpful for her professional development: “I learned how to do surveys, how to get people out, and a good number of surveys to make it meaningful”. Such benefits support the growing emphasis on the importance of community participation in conducting research in general (Flicker et al., 2008) as well as the specific benefits of ‘action research’ such as include enlightenment and empowerment of the those involved in the research process, as well as the production of information and knowledge that is directly useful to the group involved through research and education (Berg, 2004; Stringer, 1999; Reason, 1994).

The opportunity to implement the survey in the future to identify changes over time was identified as a benefit by the participants. The effectiveness in illuminating community perceptions about water and revealing differences between generations were noted as key reasons. For example, the Oneida Environmental Coordinator suggested that it would be especially beneficial to re-administer the survey in the future as a way to determine if the community’s perspective differs after making administrative changes in the community. She stated that “if we don’t measure it we don’t know if anything has changed”. The ability to track changes over time is one of the most valuable aspects of using survey research (OECD, 1998).

4.2. Challenges of Using Surveys in First Nation Communities

The community partners also discussed challenges based on their experiences with the survey. In terms the survey design, the Oneida Environmental Coordinator and the Manager of the Six Nations Eco-Centre expressed concerns that respondents may not have accurately understood portions of the survey. The Manager of the Six Nations Eco-Centre, for example, witnessed confusion of respondents when completing the survey. He suggested that it may have been beneficial to spend more time clarifying concepts and

² The living ethics document outlined the principles for the research team (Brock University researchers and First Nations communities representatives) to work together, stating that “The living ethics principles were developed by the research team for the First Nations and Source Waters: Understanding Vulnerabilities and Building Capacity for Environmental Governance Project with the words of the Thanksgiving Address in mind. As a team, we recognize that we depend on each other for success, and it is these principles that will provide the foundation for how we will work together throughout this project to reach that success.”

wording to maximize its accessibility to all members of the community. Although the Oneida Environmental Coordinator generally felt the reports back to each community were useful, she also expressed concerns about community members having difficulty understanding a few of the graphics within the report. Such challenges associated with cultural differences between researchers and those being researched are well recognized in the literature (McGorry, 2000). The differences between Aboriginal and western thought creates challenges for outsiders looking to conduct survey research in First Nations communities, where scientific research often conflicts with traditional Aboriginal sensibilities (Costellano, 2004). Although there is evidence of academic institutions, organizations and research councils adhering to ethical guidelines for Aboriginal research, many First Nations remain sceptical of the purpose, meanings and outcomes of Non-First Nations research that involves them (Costellano, 2004). Outside researchers coming into First Nations communities are challenged to conceptualize their research in a way that meets community research needs and priorities (Assembly of First Nations Environmental Stewardship Unit, 2009). Problems arise if the respondents lack the understanding needed to make an informed decision and resort to guessing or selecting “don’t know” (Beckley et al., 2006) as past studies have established that survey participant confusion can result in invalid data being collected and thus inaccurate study conclusions (McGorry, 2000). The persistence of these challenges in this research, which involved community partners throughout the entire survey process (including the pilot of the instrument, training session and administration), highlight how difficult it is to overcome such barriers.

Finally, two of the three community partners expressed a strong need to improve the dissemination of the survey results. Even with a concerted effort made by the community partners to communicate the results to community members (e.g., information booths at fall fairs and other such events) they were not pleased with the extent to which information was broadcast. The experience of the community partners in this regard is certainly not unique as it is especially challenging when conducting community level research or research in indigenous communities (Ball & Janyst, 2008). Effective dissemination of results to a small or indigenous community is critical to ensuring that the community feels engaged in the research process and maintains trust with the researchers (Robinson et al., 2005). While past research suggests that Canadian indigenous communities are relatively supportive of various dissemination methods such as summaries on community websites and community brochures (Ball & Janyst, 2008), experiences by the community partners suggest communicating the results in meaningful way remains a considerable challenge.

5.0. Conclusion

Water quality is an important and persistent concern for First Nation communities in Canada. Considering governance, more specifically the need to seek and understand indigenous and local knowledge in making decisions involving water, is imperative to addressing contemporary water challenges. Surveys are often used to gain perceptions and information about water, but their application in First Nation communities has been limited. This paper explored the merits and challenges of using surveys to inform water

governance in First Nation communities. Community partners from Six Nations of the Grand River, Oneida Nation of the Thames and Mississaugas of the New Credit reflected upon the findings from surveys in their respective communities. The discussion broadens the dialogue by the community partners across the cases to probe the benefits and challenges of surveys.

Surveys can provide a useful tool for practitioners to better understand the perceptions and needs of their communities for water governance. From the experiences gained by the community partners in their part of the research project -*First Nations and Source Waters: Understanding Vulnerabilities and Building Capacity for Governance* project, surveys are advantageous because they gather accurate information about public perceptions about water issues, management and decision making, have the ability to illuminate and vocalize minority views, and allow respondents to anonymously express opinions on otherwise silent issues. Challenges of surveys identified from this experience include selecting the most appropriate sample, ensuring comprehension of questions by respondents, and effectively disseminating the results to members of the community. The usefulness of surveys in relation to water governance is evidenced by experiences in the three communities where information gained is already informing decision making, leveraging knowledge gained through a community survey beyond the community, enhancing communication with non-First Nation audiences, and availing new funding alternatives for related initiatives are powerful associated opportunities.

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Table 1. Reasons water resources are valued in the three First Nations communities.

Primary reasons	Six Nations			Oneida			New Credit		
	<i>1st</i> ¹	<i>2nd</i>	<i>3rd</i>	<i>1st</i>	<i>2nd</i>	<i>3rd</i>	<i>1st</i>	<i>2nd</i>	<i>3rd</i>
Recreational	45 ²	0	0	47	0	0	56	0	0
Cultural/Spiritual	17	9	0	24	10	0	17	5	0
Agricultural use	27	18	0	15	22	0	22	22	1
Industrial use	0	3	0	2	3	0	1	2	0
Ecosystem support	7	54	4	7	43	5	4	64	1
Aesthetics	0	2	0	0	3	1	0	2	1
Drinking water	3	10	82	4	13	72	1	5	92
None	1	0	0	0	0	0	0	0	0
Other	0	3	10	1	4	12	0	0	3

¹ Respondents chose the three primary reasons they value water
² Numbers in bold represent the most common response for each community for each ranking

Figure 1. Community satisfaction with drinking and surrounding area water quality.

