

Capacity Needs for
Source Water Protection
Plan Implementation:
Lessons from the
South Saskatchewan River

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Résumé

Dix ans après l'incident de contamination de l'eau à Walkerton, Ont. (2000) et North Battleford, Sask. (2001), les politiques et stratégies de la protection des sources d'eau (PSE) demeurent sous-développées au Canada. La protection des sources d'eau consiste en un processus d'aménagement des terres et de l'eau visant à prévenir la contamination de l'eau non-traitée à la source. Alors que plusieurs juridictions canadiennes, à tout le niveau de gouvernements, continuent d'adopter des plans et des politiques de la protection des sources d'eau, il semble avoir très peu de recherche sur l'efficacité de l'implémentation des politiques et stratégies de la PSE. Sur la base d'interviews d'acteurs-clés, cet article examine les facteurs qui facilitent ou limitent l'implémentation de la PSE sur la base du plan de protection des sources d'eau pour le sud de la Saskatchewan (2007). En ce qui concerne les provinces des prairies de l'Ouest, la gestion de l'eau est cruciale en termes de qualité et de quantité afin de minimiser les risques de contamination et de pénurie. Les résultats de l'analyse confirment à la fois l'importance de développer des plans pour la PSE et de développer les outils nécessaires pour les autorités locales afin d'implémenter les plans pour la PSE. Les écarts entre les capacités locales sur au niveau technique, institutionnel, financier et social constituent d'importantes barrières à l'implémentation des politiques et stratégies de la PSE dans le Sud de la Saskatchewan. L'article suggère qu'une implémentation efficace des politiques et stratégies de la PSE conduira à un meilleur accès aux données, à des opportunités éducationnelles et de formation; renforcera l'implémentation des politiques et régulations gouvernementales et la création de liens et de réseaux entre les organisations ayant des objectifs similaires.

Mots clés: protection des sources d'eau (PSE), l'implémentation des politiques et stratégies de la PSE, Saskatchewan.

Abstract

More than ten years after the water contamination events of Walkerton, ON, (2000) and North Battleford, SK, (2001) the practice of source water protection (SWP) remains a topic of policy development in Canada. SWP is a land and water planning process designed to prevent contamination of untreated water at the source. While many Canadian jurisdictions at all levels of government continue to adopt SWP plans and policies there is relatively little research on the effectiveness of SWP plan implementation. Through key informant interviews, this paper examines factors that facilitate and constrain SWP plan implementation based on the South Saskatchewan SWP Plan initially adopted 2007. Water in the western Prairie Provinces has been described as being in a condition of impending crisis in terms of both quality and quantity. The results confirm the importance of developing SWP plans as well as the importance of building local capacity to implement these plans. Capacity gaps in the areas of technical, institutional, financial, and social capability were found to be significant barriers to SWP plan implementation in the South Saskatchewan. This paper suggests more effective plan implementation will result from improved access to data, training, and educational opportunities; greater enforcement of government legislation and regulations; and greater linkages and networks between organizations with similar objectives.

Keywords: source water protection, Saskatchewan

INTRODUCTION

The need to protect sources of drinking water from human-induced contamination caused by land alteration, climate change, freshwater withdrawals, and waste water discharge is well documented in the literature (Gleick et al. 2007; Schindler and Donahue 2006; Mitchell 2005; Global Water Partnership 2000). Recent water contamination events in Canada point to the importance of source water protection (SWP) as a means of reducing risk to community water supplies (O'Connor 2002; Laing 2002; Carter et al. 2005; Davies and Mazumder 2003). For example, in Walkerton, ON, the May 2000 well water contamination event resulted in 7 deaths and 2300 illnesses. Within a year a second contamination event cause hundreds of residents in North Battleford to become seriously ill as a result of sewage contamination entering the municipal surface water source of drinking water. These are not isolated cases. In 2008, more than 1,700 boil water advisories were in effect across Canada (Eggerston 2008). Admittedly not all of these were the result of local water contamination. In many instances source water is of poor drinking water quality owing to naturally occurring organics, salts, and other natural contaminants. Increasingly, various governments in Canada have introduced broad policy, and in some instances legislation, to support SWP (Patrick 2011; Plummer et al. 2011). Yet, despite the introduction of policy and legislation there remain challenges facing the uptake of SWP at the local community level (Ivey et al. 2006A; de Loë et al. 2002).

Part of this challenge is the absence of local capacity to undertake SWP. The importance of capacity, and capacity building, is found in a wide variety of sectors ranging from health services, economic development and resource management. In the field of resource management, specifically water resource management, the concept of capacity has gained increasing attention since the early 1990s (de Loë and Kreutzwiser 2005). For example, the 1996 amendments to the *United States Safe Drinking Water Act* identified the potential for capacity limitations of water treatment plant operators in small communities to meet new and stricter standards of operation. Capacity in this sense is defined as the ability, or capability, of a local community to meet regulations, policies, or standards that have been established in a SWP plan. Within the literature the term 'capacity' has been further broken down to include technical, financial, social, managerial, institutional, and other forms of capacity. In this paper the capacity of a local organization to implement the policies prescribed in a SWP plan include technical, financial, institutional, and social considerations. In the absence of local capacity to develop and implement SWP plans, small and poorly resourced municipalities may fall behind in their ability to be proactive in planning to protect their drinking water sources and instead pursue reactive measures such as investment in expensive water treatment technologies.

This paper focuses on the role of capacity to facilitate and constrain SWP implementation at the local level based on a case study of the South Saskatchewan River watershed (SSRW). The SSRW, like many other watersheds in Canada, is subject

to impacts ranging from urban development to agriculture and surface mining activities all with potential to negatively impact ground and surface water supplies. In 2004 the Government of Saskatchewan commenced SWP protection planning at the watershed scale. The watershed is generally supported in the literature as the most appropriate scale of water planning and management (Sheelanere et al 2013; Noble et al. 2011; Warner et al. 2008). In the sections that follow we provide the context for SWP followed by a description of the case study area and research methods. We then present the elements of capacity central to this research and conclude with specific recommendations to advance SWP implementation at the local level in Saskatchewan, and elsewhere. In this paper we rely on four main categories of capacity commonly found in the water resources literature, these are: technical, financial, institutional, and social. Together these forms of capacity cover the core operational and regulatory aspects of water resources management (de Loë et al. 2005).

SOURCE WATER PROTECTION

SWP is the first barrier in the multi-barrier approach to safe drinking water. The goal of the multi-barrier approach in drinking water management is to reduce the risk of drinking water contamination through system redundancies, or barriers, built into the water system (Patrick 2005). The remaining barriers include water treatment, maintenance of the drinking water system, water testing and monitoring, and an emergency response planning (CCME 2004). SWP refers to the protection of the quality and quantity of untreated surface water or groundwater that is a public drinking water supply (Simms et al. 2010; Pollution Probe 2004; Lecesse 1998). SWP is a land and water planning process that seeks to identify possible sources of drinking water contamination (Goss and Richards 2008; Patrick et al. 2008). SWP planning involves the delineation of the groundwater or surface water source, identification of risks to source water, development of management actions to address the identified risks followed by an implementation schedule. Management actions can be as simple as using a fence to keep cattle away from a river (Bender 2005) or restrictions on certain land use activities (Patrick 2011; Patrick 2009; Ivey et al. 2006A). SWP combines land use planning with water management in order to prevent contamination of a water source.

However, moving SWP from theory into practice has proven to be problematic (Kreutzwiser et al. 2011; Patrick et al. 2008; Carter et al. 2005). Research has identified the importance of capacity-building to support SWP efforts at the local, municipal level (Patrick et al. 2008; Timmer et al. 2007; de Loë and Kreutzwiser 2005; Ivey 2006A; Litke and Day 1998). Local capacity in the context of SWP refers to the ability of municipalities to manage water quality to effectively prevent source water contamination (Ivey 2006B; de Loë and Kreutzwiser 2005). In this paper we divide local capacity to implement SWP plans into four main categories: institutional, technical, financial, and social capacity (see Table 1).

TABLE 1: Characteristics of capacity to protect sources of water supply*

TYPES OF CAPACITY	DESCRIPTION
Institutional	Refers to the policies, regulations, legislation, protocols as well as the delineation of responsibility to provide safe drinking water
Technical	Refers to the physical and operational ability of an organization to perform source protection adequately
Financial	Refers to the ability to acquire adequate funds to pay for the operation and maintenance of planning and management of source water protection programs
Social	Refers to social agents of capacity, public awareness, stakeholder involvement, community support, public and private partnerships, and communication between and among different groups and interests

*Characteristics based on Timmer et al. 2007; Ivey et al. 2006b

STUDY AREA

The South Saskatchewan River is a transboundary watershed including a small portion of drainage in Montana, USA. Most of the water flowing in the South Saskatchewan River originates in the Rocky Mountains flowing eastward out of Alberta before entering western Saskatchewan and draining into Lake Diefenbaker, a reservoir lake filled in 1967 formed by the Gardiner Dam and the Qu'Appelle Dam. The river then flows north through the city of Saskatoon until reaching its confluence with the North Saskatchewan River just passed Prince Albert to form the Saskatchewan River that eventually drains into the Hudson Bay (see Figure 1). The ownership of waters of a river system flowing through several jurisdictions can create conflict respecting water allocations and water quality problems given that water use within one province may impact another province. This is certainly the case for waters in the South Saskatchewan River which ultimately flow through three prairie provinces. To ensure water resources are shared fairly, the Provinces of Alberta, Saskatchewan, and Manitoba and the Government of Canada created the Prairie Province Water Board in 1948. In 1969, the four governments signing the Master Apportionment Agreement (MAA) requiring that an upstream province pass at least 50% of the natural flow of a river to the adjacent downstream province. The MAA is silent on issues of local or provincial capacity-building to support water quality protection. The MAA pre-dates the concepts of the multi-barrier approach and SWP.

The portion of the SSRW that lies within Saskatchewan drains an area of 35,000 square kilometres and the river flows over 700 kilometres through this watershed (SWA 2007). Sixty-five percent of land cover in the basin is cropland, while another twenty four percent consists of native grassland (SWA 2007). There are nineteen irrigation districts in the basin, covering a total of 672,000 acres. Economic activities in the region consist of a variety of agricultural activities including livestock and irrigated and dry land crops, as well as seven potash mines and many more oil and gas

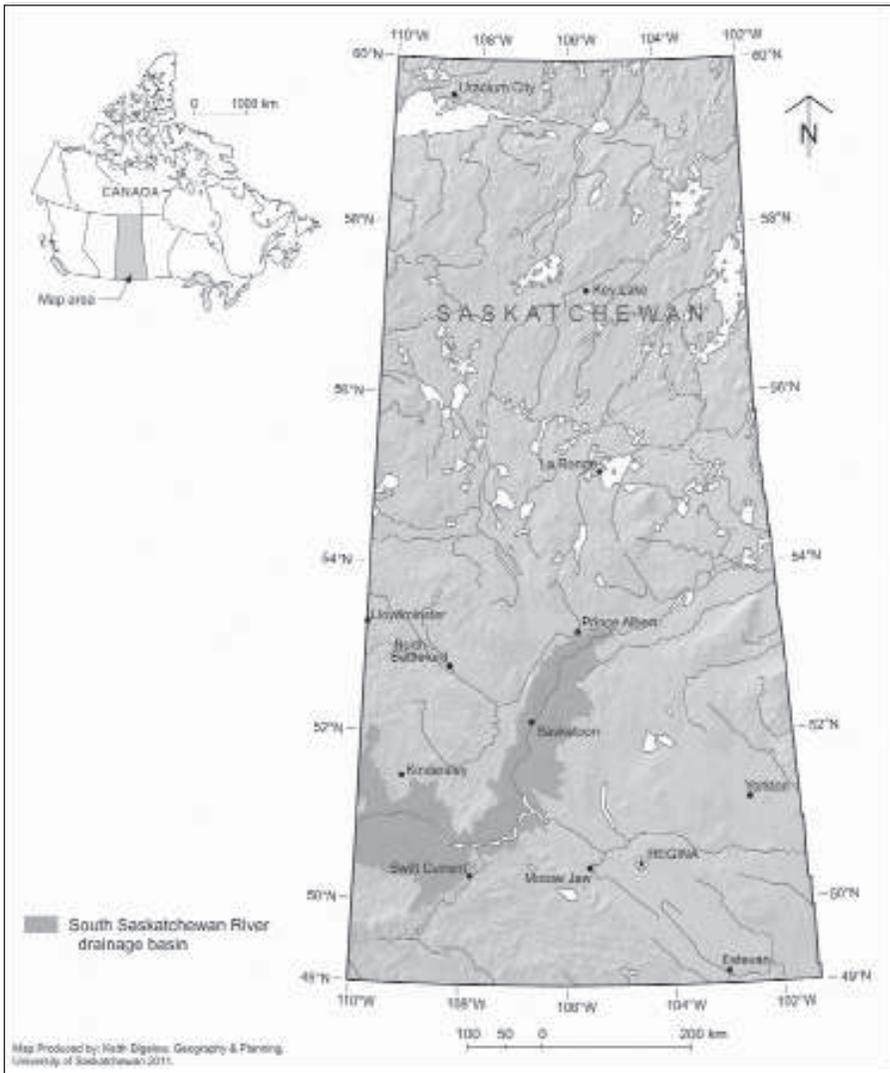


FIGURE 1: South Saskatchewan River watershed in Saskatchewan

production wells particularly in the western portion of the watershed.

The South Saskatchewan is the most heavily populated watershed in Saskatchewan with roughly 300,000 residents (SWA 2007). Saskatoon's urban growth projections for 2055 are for a population of 400,000 in the city, almost doubling the 2011 population, with potential impacts on the river system. Most of the municipalities in the watershed get their drinking water from the river, including Saskatoon. However, most individual land owners in the watershed tap into aquifers through private wells. Nearly half of the province's population depends on the South Saskatchewan River for their source of drinking water (SWA 2007).

WATER GOVERNANCE IN SASKATCHEWAN

Land use planning is a municipal responsibility, although provinces define the powers of municipalities and therefore oversee their planning systems. Water management in Saskatchewan is solely a provincial responsibility. The literature argues that governance structures that integrate water management and land use planning are necessary for successful protection of drinking water sources (Plummer et al. 2011).

The Government of Saskatchewan's response to drinking water safety following the Walkerton tragedy was to create the *Safe Drinking Water Strategy* (Saskatchewan 2002A), which involved Saskatchewan Environment, Saskatchewan Health, Regional Health Authorities, Saskatchewan Watershed Authority (SWA), Saskatchewan Government Relations, SaskWater, and Saskatchewan Agriculture and Food. The goals of the *Safe Drinking Water Strategy* were to protect source waters, to improve water treatment, to provide safe, clean, and sustainable drinking water, to develop a clear and effective water regulatory system, and to ensure that consumers trust and value drinking water and the operations which produce it (Saskatchewan 2002A).

In 2002, the Government of Saskatchewan developed a *Long Term Safe Drinking Water Strategy* to protect source water quality by combining its resource management and stewardship functions. This led to the key piece of water legislation, the *Saskatchewan Watershed Authority Act (2005)* in response to the Report on the Commission of Inquiry into public drinking water in North Battleford (Laing 2002). The new agency that resulted, the SWA, combined the watershed management responsibilities of SaskWater, Saskatchewan Environment, and Saskatchewan Wetland Conservation Corporation (Saskatchewan 2005). At this time, SaskWater also received a new mandate to provide water and wastewater services, and was no longer responsible for watershed management, well testing or SWP (Saskatchewan 2002). However, the president of SWA still reports to the SWA Board Chair (who is also the President of SaskWater) and to the Minister of Environment.

According to its mandate, the SWA "leads management of the province's water resources to ensure safe drinking water sources and reliable water supplies for economic, environmental and social benefits for Saskatchewan people" (SWA 2010B). More specifically, SWA has legal jurisdiction to implement its mandate, which can be found in Appendix A.

SWA is leading an SWP planning process for each of the watersheds in the province. Each plan typically takes three or four years to complete and is facilitated by SWA planning staff, but led by stakeholders. Following integrated watershed management practices, each planning group consists of a watershed advisory committee (WAC) and a technical committee. The WAC group members are stakeholders from diverse backgrounds such as representatives from municipalities, First Nations, industry, non-governmental organizations, and provincial and federal government. The technical committees consist of experts from government, universities, and non-governmental organizations who provide information to the WAC members in order to make more informed decisions. Once the available information is shared, stressors relevant to the watershed are evaluated and ultimately used to create a prioritized list of key actions. Corresponding departments responsible for carrying out those key actions are also identified.

Following the release of the official SWP plans, each WAC then becomes a legal entity, creating a watershed-based stewardship group responsible for implementing these plans across their local jurisdictions. The groups consist of volunteer board directors and staff, when funds are available. In the South Saskatchewan watershed, upon completion of the South Saskatchewan SWP plan in 2007, the WAC group formed the South Saskatchewan River Watershed Stewards Incorporated (SSRWS). In 2008, the WAC groups formed an independent umbrella organization—the Saskatchewan Association of Watersheds (SAW—to identify common issues across watersheds and to act as a liaison or link between all the different WAC groups.

RESEARCH METHODS

The watershed of the South Saskatchewan River in Saskatchewan was selected for this study because of the opportunity to assess the implementation of a four-year-old plan, the *South Saskatchewan River Watershed Source Water Protection Plan* (see Figure 1). Data was gathered for this study through interviews with employees and residents involved with, and knowledgeable in, SWP in the SSRW. The interviewees were either employees of a municipal or provincial government or were land owners, non-governmental workers, or individuals involved in SWP plan implementation in Saskatchewan.

A review of the capacity literature relating to source protection facilitated development of an interview guide with an ordered list of questions; however, specific questions were tailored to each individual participant's knowledge and expertise.

Semi-Structured Key-Informant Interviews

A total of twenty-five key informant semi-structured interviews were conducted in person, between June 2009 and January 2010. Key informants represented two main groups: government and non-government. Individuals from government (twelve key informants) included elected officials (rural, town, resort village), employees of the City of Saskatoon, and provincial government workers from the Ministry of Environment as well as the SWA. A number of non-government groups and organizations were

also interviewed. Individuals from non-government (13 key informants) included the SSRWS, Saskatchewan Environmental Society (SES), Meewasin Valley Authority, Partners FOR the Saskatchewan River Basin, SAW, North Saskatchewan River Watershed Stewards (NSRWS), WaterWolf Planning Commission, private landscape architect & community planner, Saskatchewan Network of Watersheds (SNOWS), Provincial Council of Agriculture Development and Diversification Boards (PCAB), and the MidSask Regional Economic Development Authority.

Analysis

The decision to separate the interviewees into two categories, government (GOV) and non-government (NGOV), was made after the interviews had been conducted based on the distinct difference in many of the responses between the two groups. All transcriptions were coded according to the four areas of capacity previously identified: technical, financial, institutional, and social. For example, when a participant referenced monetary issues, that response was tagged as “Financial Capacity.” Sub-categories for each question were coded and tallied for each specific category. Indicator questions used to identify facilitating or constraining capacity areas are shown in Table 2.

TABLE 2: Indicator Questions

CAPACITY AREA	INDICATOR QUESTION
Technical	<ul style="list-style-type: none"> • Is there data available to delineate drinking water sources, watersheds and aquifers, and groundwater recharge areas? • Have potential contaminations sources and their threats to the water sources been identified?
Institutional	<ul style="list-style-type: none"> • Do training and educational opportunities exist for staff members involved in SWP? • To what extent can existing and future land use activities be controlled or managed by your organization in sensitive or vulnerable areas (municipal well fields, recharge and watershed supply areas)? • Do provincial legislation and policies provide adequate guidance for drinking water protection at the local level?
Financial	<ul style="list-style-type: none"> • Are you able to access funding for SWP projects? • Do water rates for customers reflect the full cost of protecting and providing municipal drinking water?
Social	<ul style="list-style-type: none"> • To what extent, and how, have stakeholders participated in the selection and development of SWP tools? • Has community awareness and support for watershed protection been developed? How has this happened? • Are there active relationships between municipal and provincial agencies? • Are there active relationships among organizations that share SWP as a common goal?

RESULTS AND DISCUSSION

Interviewees were given the opportunity to express ways in which they practice SWP. The responses indicated that the interviewees possess the appropriate knowledge on how to protect source waters, yet it was also stated that they were unable to protect source waters in certain instances. When probed about this situation certain areas of capacity limitation were identified. These limiting capacity areas will now be described in the following section.

Technical Capacity

Technical capacity can be defined as the physical and operational ability of an organization to perform SWP adequately (Timmer et al. 2007; Ivey et al. 2006B). In other words, it describes whether there is sufficient data available and accessible and whether qualified, skilled, and dedicated staff is available, or training opportunities exist to have the ability to carry out SWP. Three questions were asked and analysed relating directly to technical capacity to support SWP implementation. These questions address data availability for watershed mapping, identification of water contamination sources, and training and educational opportunities. The results of the first three questions are reported in Table 3.

TABLE 3: Technical Capacity Results

TECHNICAL CAPACITY	GOV	NGOV
Data on water sources, aquifers, and groundwater recharge zones is accessible	89%	27%
Information on contamination sources is available	75%	12.5%
Training opportunities are available	91%	50%

GOV = government; NGOV = non-government

Data Availability

More government respondents said that they had access to data needed for implementing SWP than did the NGOV group (89% versus 27%). When asked if the respondents had access to data that delineates drinking water sources, watersheds and aquifers, and groundwater recharge areas, only 3 of 11 non-government respondents stated that information is available compared to 8 out of 9 government employees. Most of the government employees who said that information for SWP was available also clarified that information on groundwater was limited or lacking. Many of the non-government group also pointed out groundwater information as being limited, but several also focused on other data limitations such as water quality and baseline information. Others noted that they did not know what information was available or where to look for the information.

The provincial government is responsible for much of the water quality and water licensing in the province and as a result, they are often the body collecting data and information on water. Therefore, it is logical that more government respondents claimed to have access to information, perhaps simply because they are part of the information gathering process and are aware that it exists. Some NGOV respondents seemed to indicate that they would not even know where to look to find certain data sets.

The overall sentiment among respondents was that more data collection could always help for better SWP implementation, but that other capacity areas including staff time, funding, or a lack of training restricted the ability to collect more information. The provincial government is currently in the process of conducting a four-year water availability study aimed at filling possible data gaps and adding to current knowledge around water availability.

When asked specifically about data regarding contamination sources, six of eight government employees said that data was available, compared to only one of eight non-government respondents. GOV respondents pointed out that contamination risks were identified as part of the SWP planning process and therefore information is available to anyone who has access to the plan. Many participants also specified that many point sources such as intensive livestock operations or urban wastewater effluent are known and monitored, but that non-point sources are very difficult if not impossible to track accurately.

Despite these efforts for gathering water information, many groups have identified gaps in the information currently available. A representative from the SSRWS expresses: “there is a lack of strategic design in the water quality monitoring programs in our province. Gaps exist in the number of monitoring stations, the frequency at which sampling takes place, and in where those monitoring stations are located” (SSRWS 2011).

Some of the respondents pointed to a lack of information sharing as the reason for not having access to data, rather than the data not actually existing. In many cases, information on a water source, or contamination source, or other relevant data might have once been collected, but over time the data was either lost due to inefficient organization systems or it was proprietary to only one group. This lack of sharing of information came up more than once between both groups, as did the costs of obtaining certain types of information, such as GIS shape files, which can sometimes be prohibitive. This quote from a NGOV participant gives a sense of the lack of data sharing: “you push them [the provincial government] and they say, well we do have something, somewhere, but they couldn’t give us any data.” Another says this: “In Canada, we’ve got this attitude that everybody who wants to do GIS work has to pay for data and pay, pay, pay, pay. It’s a pay system.”

There are some avenues available for sharing and accessing information. For example, the provincial government developed an informational website called SaskH2O in 2008 to provide water information to residents across the province (SaskH₂O 2008). However, a number of respondents stated that the necessary data simply does not exist. “I think there’s an assumption in public that we have all this

data in some computer somewhere and we can just flip a switch” says one government respondent. For example, a consistent comment among most respondents was that groundwater and aquifer mapping in the province is insufficient and incomplete.

A municipal planner interviewed also pointed out that planners do not have maps identifying sensitive areas or groundwater recharge areas. As a result, municipal planners do not address SWP planning in the same way that they do in other areas of planning, such as zoning and land use. If certain developments are more or less of a risk to source water quality based on location, those areas must be identified and made available for planners and land owners—the ones who are deciding how land is managed, because land use management is intricately related to water quality management. The planner interviewed said that, “if we want to encourage land use planning that positively affects SWP then we need the geographical information on what areas are most sensitive to development.” The planner went on to state that planners rarely have access to such information. As a result, some of the NGO participants said that they did not trust the information out there because it was “sketchy” and others noted, “Some councillors make anecdotal decision because they do not have access to good data.”

Training and Educational Opportunities

Government respondents claimed to have more access to training to help with SWP implementation than their non-government counterparts. Ten of eleven of the GOV respondents said that they had access to training or educational opportunities to learn more about SWP including conferences and workshops, compared to only half (5 out of 10) of the NGO respondents. This difference between the two groups may be due to a lack of funding or other resources such as staff time, which can be common in non-governmental organizations. Training opportunities mentioned by interviewees include professional development courses, participating in committees that work on SWP, collaboration with academic institutions, and attending workshops, conferences, and seminars offered by the American Water Works Association (AWWA), Prairie Conservation Action Plan, Canadian Water Resources Association, Saskatchewan Water and Wastewater Association (SSWA), SAW, and SWA.

One NGO respondent said that formal training did not exist: “No, I’d say there’s not a lot of training opportunities, instead it’s kind of an after-the-fact, professional development, learn as you go, learn from others, who can you replicate, whose examples do you want to avoid.” This sentiment was quite common, especially among the non-governmental organizations and organizations who had a large reliance on volunteer work such as the watershed advisory committee, whose board of directors are all volunteers. Others felt that they did not necessarily have training for SWP specifically but more that “the training we have had...it’s more about here’s what some of the resources are and here are some of the go-to places to get it and here’s some of the things you should get.”

There was also a strong sentiment that training was not needed in terms of technical skills, but that rather, in organizational and management training. Many of the organizations working with water were relatively new and suggested that they could use help building their organizational structure and with human resources and management. This interviewee explains: “we don’t need it [training] in the aspect of technical skills; we probably need it in more human resources and management.”

Overall, the results indicate that there was a need for more training for those tasked with implementing the SWP plan, in particular among the NGOV interviewees. More organizational training, more technical expertise to gather baseline data, and more training on how to communicate effectively were all mentioned as skills that participants would value but did not currently possess.

Institutional Capacity

Institutional capacity refers to the policies, regulations, legislation, protocols, and the delineation of responsibility to provide safe drinking water protection (Timmer et al. 2007; Ivey et al. 2006B). In this subsection, two questions were asked, each relating to institutional capacity. These questions address the extent to which interviewees or their organizations could control existing and future land use activities in sensitive or vulnerable areas, as well as whether the participants thought provincial legislation and policies provide adequate guidelines for providing safe drinking water protection at the local level. The results from these questions are shown in the following table (Table 4).

T A B L E 4: Institutional Capacity Results

INSTITUTIONAL CAPACITY	GOV	NGOV
They have control over land use activities in sensitive or vulnerable areas	45%	33%
Provincial legislation and policies provide adequate guidance for drinking water protection at the local level	82%	20%

GOV = government; NGOV = non-government

Control Over Land Use Activities

Even though most participants from both groups responded that they did not have control over land use activities on sensitive or vulnerable land areas, the majority of all respondents said that they did not see that as necessary for their role in SWP. If those interviewed currently do not have authority to influence land use, they said that they do not want that power. Most of the respondents viewed land management as a duty that was up to individual landowners and municipalities to decide. They would rather educate and inform land owners about how to improve their land use practices and then help them to make the necessary steps to adopt those better land use management practices.

It was clear among all the respondents that they did not want to force land owners to manage their land a particular way, and equally, land owners wanted the freedom to decide how to best manage their own land. S WA employees especially stressed that the “government can’t just strong-arm” landowners into certain land practices. An agrologist from S WA explained: “I would like to say that there is no control, that it’s up to the land owner to manage their land as they see fit. So the biggest role we can play is to try and provide that information so that they can manage to improve or maintain the health of their land.”

Legislation

Based on the results of this research, the control of land use was consistently viewed as a right of the individual land owner and not a responsibility of the government; however, participants’ views on legislation seemed to be contradictory, because many also thought that water legislation should be stricter and more rigorously enforced. When asked whether provincial legislation and policies provided adequate guidance for drinking water protection at the local level, there was a clear divide between the GOV respondents and the NGOV group. Eighty-two percent of the GOV participants thought that policies and legislation were adequate, whereas only twenty percent of the NGOV responded that they thought the current legislation was enough to ensure safe drinking water.

When asked if the current regulations were adequate to maintain clean source water, an NGOV participant said: “Not at all. [It’s] not enough. The regulatory framework is a bare minimum approach.” Some participants mentioned that they did not like the current method of enforcement of water regulations, which is a complaint-based system. For example, a S WA agrologist stated that: “It’s if they [landowner] have a complaint, they [S WA employees] have to follow up, they can’t just say: don’t worry about it. And another thing is if they [S WA employees] see something themselves that they don’t think is right, until they get a complaint, they can’t act on it.” A PCAB employee stated the following in relation to enforcement of regulation:

The province is really lacking in the ability to stand up. They feared that it will scare development off. There’s lots that I, that us as a province, we’re falling really short, really short on...just regulation, just absolute, specific requirements and regulating it. I don’t get why we can’t just require some of the most basic requirements: minimal disturbance, you know, non-stripping type methods that are quite acceptable. They’re not out there, they’re not going to halt development, they’re not going to scare development away.

Municipalities are responsible for meeting provincial standards for wastewater and SWP through wastewater effluent. Accordingly, most of the municipal officials interviewed said they thought that there were high standards for wastewater ef-

fluent and that they are doing a good job of protecting water, as expressed by a town councillor: “Yes and we’re very conscientious about making sure that all of the regulations are followed very carefully.” A manager for the Ministry of Environment pointed out that the Canadian Council of Ministers of the Environment (CCME) recently created a Canada-wide strategy on wastewater effluent, which included stricter standards; however, he also stated that CCME has no jurisdiction in provincial or federal government.

The SWA is the primary provincial government department responsible for water allocation and licenses in Saskatchewan. There is no limit set as a maximum eligible quantity that an individual or organization can apply for, so licenses could be for very large quantities. There is also not an established priority use system for water licences, so all water license applications are treated equally. Water allocation and water quantity in general was not mentioned as a concern among those interviewed for this research. Inter-provincial regulations of the Prairie Province Water Board as set out in the MAA regarding allocation and quality and were not mentioned by key informants in this research. This suggests that capacity issues relating to SWP planning and policy are scaled at the local level and not at the provincial or inter-provincial level.

Financial Capacity

Financial capacity is the ability to acquire adequate funds to pay for the operation and maintenance of SWP processes (Timmer et al. 2007; Ivey et al. 2006B). Two questions were asked relating directly to financial capacity to support SWP implementation. These questions address access to funding sources for SWP projects and whether the interviewees thought that water rates where they live reflect the full cost of protecting and providing safe drinking water. Results from these questions are found in Table 5

The majority of people interviewed said that they had access to funding for SWP projects (9 out of 10 GOV participants and 10 out of 11 NGOV people interviewed). Interviewees from provincial government said that they had a budget for SWP projects, while most of the representatives from municipalities did not have part of their budgets dedicated to SWP initiatives. Only two of the NGOV participants said that they dedicated resources specifically for SWP; however the others said that it was indirectly funded through their overall water initiatives, such as water awareness campaigns, which would be considered SWP.

Although most of the organizations interviewed said that they had access to funding for SWP, it should be noted that many of these same groups were unsure of how long that funding would last since it was usually only confirmed annually. Many participants from non-governmental agencies expressed their concern of not being able to rely on the funding for SWP year-to-year because of annual budget cycles. In relation to funding permanency, one participant was concerned about government restructuring, which might result in cancelling SWP funding programs.

TABLE 5: Financial Capacity Results

FINANCIAL CAPACITY AREA NEED	GOV	NGOV
Participant is able to access funding for SWP projects	90%	91%
Municipal water rates do not reflect full cost of protecting and providing safe drinking water	83%	100%

GOV = government; NGOV = non-government

SWA's annual contribution to each watershed association, such as the SSRWS, is \$92,500 each year (Government of Saskatchewan 2011). Additional funding for the watershed advisory committees comes from their individual member fees. The SSRWS charge their members, which are predominantly municipalities, based on population size. Municipalities pay between \$100-1,000 depending on the size of the community. The City of Saskatoon is an exception, paying \$20,000 to the SSRWS for a membership fee (SSRWS 2011). This amount does not leave a lot of extra money for project funding once full-time staff salaries have been paid.

There was concern among some of the NGOV participants interviewed about spending a significant amount of staff time applying for additional funding opportunities. "You spend so much of your time chasing after dollars and then doing the reporting on the dollars, that you don't have a lot of time to actually use the dollars and get things done." A lot of SWP funding currently goes toward supporting projects or infrastructure, rather than staff time. For example, farmers who undergo an environmental farm plan for their farm can then apply for funding to share costs for best management practices that they implement through the Canada-Saskatchewan Farm Stewardship Program.

Most respondents from both groups (10 out of 12 of the GOV participants and all 13 of the NGOV participants) thought that municipal water rates do not reflect the full cost of protecting and providing safe drinking water. When asked to identify a capacity area that is limiting their effort to effectively implement the SWP plan, 34% of GOV and 21% of NGOV respondents identified financial capacity as one of the most limiting factors for their efforts to implement SWP plans. These results imply a need for greater funding opportunities and in particular, more long-term, consistent funding.

Social Capacity

Social capacity can be thought of as people-oriented capacity: public awareness, stakeholder involvement, leadership, partnerships, and communication (Timmer et al. 2007; Ivey et al. 2006B). Four questions were asked relating to social capacity needs. These questions addressed stakeholder participation in the planning and implementation stages, community awareness of SWP, and what types of relationships existed both vertically across different governmental levels and horizontally among different organizations involved with SWP.

Overall, the interviewees identified social capacity as an area needing more work, including increased networking opportunities to share resources and information, greater stakeholder involvement, and more community awareness about SWP and what community members can do to help. Table 6 below describes the results from the questions asked that address social capacity.

TABLE 6: Social Capacity Results

SOCIAL CAPACITY	GOV	NGOV
Greater stakeholder involvement needed	18%	64%
Increased community awareness needed	54%	58%
More vertical linkages needed (connections across different levels of government and different organizations)	0%	36%
More horizontal linkages needed (connections across similar organizations and government departments at the same level)	36%	36%

GOV = government; NGOV = non-government

Stakeholder Involvement

There was a difference of opinion between the two groups interviewed in terms of whether there has been sufficient stakeholder involvement in the SWP planning and implementation processes. Only 18% of the GOV group thought that greater stakeholder involvement was needed, as compared to 64% of the NGOV group. Most GOV respondents agreed that there was a lot of stakeholder involvement in SWP planning and implementation, that the whole process was ‘stakeholder-driven’ and stakeholders came from a diverse background: municipalities, technical committee members, farmers, ranchers, et al. Whereas roughly two thirds of the non-government respondents thought that there was not enough diversity among those involved in the planning process or that too few people were involved. They also felt that there was not as much involvement in the implementation stage and that not all stakeholders understood the planning process. This discrepancy in results between the two groups could be a potential barrier to SWP planning. If GOV believe there is enough stakeholder involvement already, they may be reluctant to increase stakeholder involvement.

The level of stakeholder involvement in SWP planning and implementation was reported high according to the GOV respondents. The NGOV participants who thought that greater stakeholder involvement was needed usually explained this because they did not feel that their voices were heard, they did not think that enough groups were represented at the planning stage, or that involvement from different groups dropped significantly after the SWP plan was completed. However, one NGOV coordinator said that she was very impressed that all the WAC members were able to contribute to the list of possible threats to water sources and to then prioritize those threats. That said, one WAC member voiced his suspicion about how the SWP planning committees

were first formed: “when it is government pushing an organization, you were sort of suspicious so, you go to these planning meetings, and not knowing what it’s going to be about and you have somebody from government trying to push the agenda.” This same individual liked that SWA turned over the control of implementing to local officials though: “when we actually took control, people felt more comfortable that it was a local person that was leading it instead of government. Government had a hard time letting go, because I’m sure that wasn’t part of their agenda.” However, other NGOV participants wanted more support from SWA for implementation as this WAC committee member comments on SWA’s involvement in SWP: “we’re done the planning stages and now you’re into the implementation stage and you’re on your own type of thing.” PCAB employees have heard the same sentiment from many farmers: “it just seems they developed a plan and dropped it on our lap. What are we supposed to do with it?” This concern about a poor post-plan involvement by government departments is expressed by this NGOV participant’s disappointment:

SWA, they led this process, they said this is your plan, and then they kind of, like are trying to get, (laughs) I’m going to get shot for saying this, they’re trying to just take the fault off themselves. They’re trying to take the responsibility and pass it on. Here’s this plan. You know, like you’ve developed this plan, here you go! Well, ok, but you’re the body that’s in charge of water, so great, I’m glad you’re wanting people to take charge of themselves, but now: hey, we’ve got all the SWP plans, we’re what, not going to fund them, not going to help them meet their goals, anything that they’ve asked the SWA to do in their plans is not getting done or is getting done at like way on the bottom of the SWA’s list...government, get off your butt and do what you’re saying you’re going to do.

Community Awareness

Roughly half of both groups (54% of GOV and 58% of NGOV) interviewed thought that increased community awareness of SWP initiatives was necessary for successful SWP implementation. These participants thought that although community awareness is increasing, greater education is still needed. The SSRWS is tasked with implementing, and arguably promoting, the SWP plan principles and actions to residents and businesses within the South Saskatchewan watershed. According to their website, three of the six goals of the SSRWS involve raising awareness watershed stewardship or building an appreciation for protecting the water supply (SSRWS 2011). In an effort to raise awareness within the watershed, the SSRWS hosts a number of different field days and attends tradeshow and workshops relating to water management including a watershed stewardship multimedia competition for high school students to raise awareness about SWP (SSRWS 2011).

In the interview, SSWRS claimed that they are not as effective in awareness building as they could be because funders place a higher priority on projects than on awareness initiatives: “what I find a little bit frustrating is that we, as such a new organization, we need to put energy and funds into our communications strategy but we’re very much being pushed (by S WA) to implement projects immediately, without establishing a presence or anything.” A number of other water groups also contribute to raising awareness about SWP, including S WA , S N O W S , individual municipalities, P C A B , and others. Some organizations that are not necessarily mandated to promote SWP have still done a lot of work on raising awareness on the importance of protecting our water sources; one such group is Ducks Unlimited Canada, for example.

P C A B has a staff position called the watershed awareness advisor. These watershed awareness advisors raise general awareness about what a watershed *is* and what producers can do on their land to help protect their water source. The P C A B employees interviewed for this research also said that they thought that general awareness has been developed—specifically that producers are aware what a riparian area is, where it is on their land, and the value of protecting that area in order to maintain water health. According to the P C A B employees, this awareness about riparian areas did not exist even six years ago. However, SSWRS directly contradicted this sentiment when interviewed, saying that most residents within the watershed do not know what the term watershed means. That interviewees also thought that the public does not think that water quality or quantity are threatened in Saskatchewan and as a result do not see the importance of taking extra measures to protect their water source.

Networking—Horizontal Linkages

Networking opportunities and relationships between organizations working towards SWP were analysed in two ways: those relationships that exist across different levels of government, for example municipal governments working with different provincial departments of government (known as vertical linkages); and the cooperation of similar organizations, such as many municipalities sharing information or different environmental organizations working together (known as horizontal linkages), the results of which will be shown here. The majority of those interviewed, from both groups (seven out of eleven of both the GOV respondents and the NGO V group), thought that there was communication and cooperation between groups with similar goals and organizational structure (horizontal linkages). A lot of the programs that exist to explicitly bring different groups together were mentioned as effective tools for bridging gaps. For example, producer cooperation was given as an example by a number of different interviewees, in particular through the agro-environmental group plans (A E G P). Town mayors pointed to regional municipality committees. Several of the individuals interviewed were members of the W A C that formed to create the original SWP plan, and they pointed to this W A C group as a useful way to get to know others committed to protecting source water and building those networks.

One respondent named SAW as a group that helps avoid duplication between groups because they speak for all the WAC groups across the province.

The high number of GOV interviewees who indicated effective horizontal linkages could point to a well-established communication system between governmental departments. The government departments are aware of the mandates and directives of other governmental departments, which facilitates cooperation. Interestingly, there was a difference between the reported sentiment of government employees and the perception from those outside the government; a few NGOV interviewees responded that they perceived the horizontal linkages between provincial governments to be ineffective and that government departments act as individual silos.

Of the individuals who thought that cooperation was currently ineffective on SWP efforts, they mentioned the need for more funding and the competitive nature of grants and financial opportunities as one of the reasons that some groups, in particular smaller municipalities and non-governmental organizations (NGO) would not want to work together and share resources. This SWA employee observes, “I see some real inconsistencies and I see a lot of organizations out there trying to do similar things...it’s a bit of scramble for funding.” There might also be some cases where there is a lack of partnership or a relationship is unreported simply because there is a lack of awareness of the different groups that exist and that *could* be a potential ally. The water issues coordinator for the Saskatchewan Environmental Society says, “a real disconnect between...all levels, even between NGOs, you know, one NGO will go and do some work, and then some other groups will be doing the same work or similar work and you know they would have been doing it for a year and you’ll say to them, have you talked to so and so at this group? And they say no. And I’m thinking you should because they could tell you all about it, really. I think that’s a common problem across the country.”

Other reasons mentioned for a lack of cooperation between groups included the physical size of Saskatchewan makes it difficult to facilitate cooperation on some of these issues and to share resources. Also it was mentioned that a mentality shift is needed to overcome capacity barriers. This mentality of “us versus them” is explained by one interviewee: “we’re still very much *me* focuses instead of *us* focussed. Until we can get to the *us* side, I think we’re going to continue to struggle with this [SWP] agenda.”

Networking—Vertical Linkages

All government respondents thought that there was good cross-communication across different levels of government and between the different groups involved with SWP and that those relationships were useful for SWP. A few NGOV participants (4 out of 11) were less content about their relationships with other levels of organizations or other levels of government when it came to working on water issues. Those four identified the following reasons for a lack of vertical connections: rural municipalities want to be too autonomous, data is not being shared, or that NGOV respond-

ents have lost their contact with SWA because a government liaison staff was laid off.

This lack of vertical linkages was also explained by an apparent distrust of authority positions held by some of the individuals or organizations interviewed. Even among some of the NGO respondents who answered yes to that question (that vertical linkages do exist), expressed this distrust of others, leading to a lack of partnerships. Some individuals expressed a distrust of the motives of scientist: "that's one of the reasons why I got involved is because I, we have a significant ranching company that our family owns and I began to question some of these so-called scientists who have blamed one sector of society over another and I'm not into that. I don't believe in doing that." Other individuals expressed a distrust of government, presumably provincial government: "when we actually took control, people felt more comfortable that it was a local person that was leading it instead of government...pushing their agenda."

Similar to the horizontal linkages that exist between organizations, many of the people interviewed referred to some of the existing groups that bring together different groups at different levels, such as the SSRWS WAC and the technical advisory committee for that group as well, which helped form vertical linkages. The SWP planning process aimed to include a variety of stakeholders and as a result, a variety of groups made connections at that stage of the SWP plan process and this was pointed out by a number of respondents. However, a number of others mentioned that there was little effort to keep those connections active, now that the SWP plan was published.

The provincial government, led by the Ministry of Environment, is currently working on creating a new comprehensive water management strategy, which will redefine each government department's role for water management in the province. This is in its preliminary stages of consultation with stakeholders, but will likely act as a useful tool for bringing together different organizations who work on water and will hopefully aim to build those connections further. In general, more than half of all those interviewed thought that horizontal and vertical connection exist between different organizations and government departments working on implementing SWP.

Capacity Needs Assessment

Both groups listed more constraints to implementing SWP plans than facilitating factors. According to the government participants, funding and social capacity were both the most limiting areas for SWP (with eight responses each). Technical capacity (five responses) was the third most limiting area and only two GOV participants thought institutional capacity was the most limiting capacity area. Some of the main comments from this group included a need for more: money, education/awareness, participation, and networking/communication.

Alternatively, 13 NGO participants claimed that technical capacity was the greatest limiting factor. Six participants also thought that both financial and institutional capacity were limiting and only 3 participants noted that social capacity needed

improvement. Some of the main comments from those interviewed from the NGO V category included a need for more staff, leadership, and equipment to collect data; more relationship building, and better organizational structure. Money was usually only mentioned in reference to meeting a need from one of the other capacity areas. They also mentioned low turnout to the planning sessions, conflicting interests for land use, weak legislation, and poor provincial government involvement.

CONCLUSION

Interviews were conducted with twenty-five key informants to assess local capacity to implement SWP in the SSRW. The participants were divided into two groups for analysis: those who work for the government and those who do not. The results were also analysed and discussed according to four capacity areas including technical, institutional, financial, and social capacities to implement SWP plans. According to the interview results, the GOV group reported that local capacity needs were being met in all four capacity areas. Fewer than half of the NGO V participants thought that the following capacity areas were being met. In the NGO V group, 91% of those interviewed reported availability of some funding for SWP projects, and 54% of those interviewed thought that good vertical and horizontal linkages existed between organizations and governmental departments. Of each of the capacity areas discussed, more than half of the GOV group thought that the capacity needs were currently being met. For the purposes of this research all four categories of capacity are presented here as being equally important. There was no intention of showing one form of capacity to be more important than another.

The main implication of these results is that improvements are needed to build capacity to implement SWP plans in this watershed. There is a number of local capacity areas that need improvement, especially according to the non-government individuals involved in this study. The results of this study indicate that if an effort is not made to improve these weak capacity areas, SWP may not be effectively achieved and source water in this watershed could be at risk of future contamination. The research findings also identified a clear disconnect between government and non-government perceptions of current capacity needs for SWP. This could mean either that resources are not available to non-government groups or that these groups are not aware of the resources at their disposal. Government initiatives need to be made more accessible and visible to NGO groups involved in SWP implementation. In most cases, many of the non-government groups involved with this study are new organizations and therefore more time may resolve some of these issues.

Several capacity needs were identified through this research. More data is needed to fully understand how to best protect water in this watershed, especially concerning aquifers and groundwater recharge zones. Greater training and educational opportunities for non-government groups are needed. Provincial legislation and policies should be more strongly enforced to ensure adequate protection of drinking water sources.

Funding needs to be more reliable for non-government groups working to develop, or coordinate, SWP planning. Another need identified by most respondents was for greater linkages across organizations and governmental levels including information and resource sharing, as well as more networking opportunities. Non-government participants thought that there should be greater follow through in the post-plan stage from the government and clearer roles and better communication between all groups involved with implementing SWP.

These findings suggest an opportunity for government to re-evaluate the SWP planning and implementation processes in order to improve effectiveness of existing watershed plans. Part of this plan evaluation could assess the current level of effectiveness at protecting source water in each watershed.

These research findings contribute to a growing body of literature on local capacity to implement SWP. While other research has taken place on source protection in other regions of Canada, this study has enhanced our understanding of the prairie conditions for effective SWP planning and implementation. This research is based on a single watershed in the Canadian Prairies; however, the results provide insight into plan implementation generally and capacity limitations respecting plan implementation more specifically.

Many resources were available during the SWP plan making phase in the South Saskatchewan River Basin, but as expressed by many of the NGO responses, there is a need to continue that support from the provincial government at the plan implementation stage. For example, a technical advisory group was established during the plan making stage that helped inform the key actions of the plan. However, the technical advisory group was discontinued after publication of the SWP plan. This is seen as unfortunate as the group would be a valuable resource for those responsible for plan implementation. It is a recommendation of this research that an evaluation of SWP plan implementation be incorporated into future SWP plans of the provincial government.

An important outcome of this research is the lessons learned around moving from plan making to plan implementation. Many respondents noted the tendency for more support during the plan making stage as opposed to the implementation stage. Watershed planning research to date has lacked sufficient attention to plan evaluation, particularly in the area of plan implementation evaluation (Laurian et al. 2004; Brody and Highfield 2005). Attention to capacity needs to support plan implementation remains a critical area for further research. Research evidence has noted that in the absence of capacity some of the best SWP policies may never reach implementation.

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