

# Southern Alberta Resource Economics Centre

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**SAREC Report 2010-9**

**Governance and Source Water Protection  
in Alberta  
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## **Abstract**

This report aimed to identify the various regulatory and non-regulatory means by which source water protection is accomplished in Alberta. As non-point sources of pollution are increasingly regarded as the leading threat to source waters, the specific ways in which these types of pollution are managed is addressed, where possible. Generally, Federal and Provincial legislation appear to do little to protect source waters from non-point sources of pollution. As water quality and management falls under the jurisdiction of provinces and territories, the limited role of Federal legislation in this regard is not unexpected. Provincially, Alberta's Agriculture and Operations Practices Act stands alone as the only piece of legislation to directly address a non-point source of pollution, through regulating activities related to livestock wastes. Alberta's water policy, the Water of Life Strategy, is heavily focused on aspects of source water protection, and makes mention of managing non-point sources of pollution to provide for healthy aquatic ecosystems. Some additional criticisms related to water quality governance include the non-binding nature and inadequate parameters of both federal and provincial water quality guidelines. While a federal water policy is essentially nonexistent, there exists strong support for a national water strategy. Increasingly, governments are no longer recognized as the sole authority when it comes to environmental decision-making. The Oldman Watershed Council, Watershed Planning Advisory Committees, Watershed Stewardship Groups, and scientific research play roles in source water protection, and can have significant impact as policy advisors and public educators.

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## **1. Introduction**

Increasingly, non-point sources of pollution are being recognized as the most dominant threat to source waters, with agricultural pollutants leading the way. Agriculture represents a potential source of nutrients, pesticides, sediments, waterborne pathogens, and endocrine disrupting compounds to both surface and ground waters. Given the dominance of the agricultural industry in southern Alberta, these types of pollution are a significant threat to source waters. Source water protection is the proactive measure of controlling and minimizing the contamination of surface and ground waters by pollutants. A wide variety of governance strategies, in addition to monitoring and surveillance programs, and non-regulatory advisory bodies, can play a role in source water protection. The purpose of this report is to identify the regulatory and non-regulatory mechanisms that protect source waters in Alberta, and address how they function towards source water protection. When possible, the report attempts to focus specifically on how source waters are protected from non-point sources of agricultural pollution. Additionally, this report attempts to address where and how governance fails to protect source waters, and the main criticisms surrounding existing legislation. Thus, the roles that federal and provincial legislation and policy, and the roles of the Oldman Water Council, the Watershed Planning Advisory Councils, and Watershed Stewardship Groups play in protecting source waters are addressed.

## **2. Governance (Legislation and Policy)**

Under the Constitution Act of 1867, the protection of water resources is primarily under the jurisdiction of territories and provinces. Although federal legislation does play a role in protecting water quality by regulating toxic substances and protecting and conserving fish habitat, provinces possess the primary responsibility for water management and protection. The most important federal legislation that impacts water management and protection are the Canada Water Act, the Fisheries Act, and the Canadian Environmental Protection Act. Alberta's provincial legislation and policies, in concert with federal legislation, form the basis for Alberta's source water protection.

### **2.1. Federal Legislation**

The Canada Water Act, originally enacted in 1970, is the national strategy for water resource management. Under this act, water resources and water quality are managed, and water management agreements are arranged with provincial governments. Thus, this act does little to directly influence source water protection. The Fisheries act is enforced by Fisheries and Oceans Canada, and is devoted to the protection and conservation of fish and their aquatic habitats across Canada. Particularly relevant to source water protection, the Fisheries Act prohibits the deposition of "deleterious" substances into waters habited by fish (Boyd, 2003b).

There are some legitimate concerns regarding the ability of the Fisheries act to successfully protect source waters. In 2002, a piece of legislation known as "schedule 2" was passed as part of the Metal Mining Effluent Regulation of the Fisheries Act; this schedule allows for multiple natural bodies of water to be redefined as "tailing impoundment areas" (Karunanathan, 2009). So far, Environment Canada has proposed a total of 16 lakes across Canada to be reclassified (Milewski, 2008). Although presently

no lakes in Alberta are under consideration for reclassification, this sets a frightening precedent, and does little to instill confidence in the ability of the Fisheries Act to protect source waters.

The Canadian Environmental Protection Act (CEPA), most recently revised in 1999, is the keystone for federal pollution control. This act manages the identification, assessment, regulation and control of toxic substances, and employs a wide range of tools to manage toxic substances and pollutants. CEPA has established several guiding principles, the most important of which are sustainable development, using ecosystem based approaches, pollution prevention, the virtual elimination of bio-accumulative, toxic, and persistent chemicals in the environment, science-based decision making, and in the instances where scientific certainty is lacking, the precautionary principle ensures measures against potentially harmful substances will be taken. Additional guiding principles include intergovernmental cooperation, national standards, and the polluter pays principle. The Act is primarily overseen by Environment Canada, though Health Canada plays a role in assessing and regulating toxic substances. Under CEPA, national guidelines for environmental water quality were developed.

Part of the 1999 amendments included the addition of a citizen enforcement tool, termed “environmental protection action” (Valiante, 2004). This amendment represented the first provision for “citizen suits”, which provide an opportunity for members of the public to bring civil action to enforce a statute, in Canadian Federal Environmental Law. Civil enforcement action has been practiced in the United States since 1970, with the passing of the Clean Air Act, and was the born out of Congress’ belief that anti-pollution laws were being insufficiently enforced by federal agencies (Valiente, 2004). Such developments within the United States likely provided the impetus for civil enforcement actions in Canadian Federal Law. However, the civil enforcement actions of CEPA are

not expected to play a major role in enforcement (Valiante, 2004); for further discussion on civil enforcement in Canadian law, see section 2.5.

## **2.2. Federal Policy**

### **Federal Water Policy**

The Federal Water Policy was established in 1987; it was borne out of the recognition that the policies and actions of federal departments and agencies needed to coordinate their water-related responsibilities (deLoe, 2008). The ultimate objective of the Federal Water Policy was to “encourage the use of freshwater in an efficient and equitable manner consistent with the social, economic, and environmental needs of present and future generations” (Environment Canada, 2009, ¶ 20). The Federal Water Policy presents two goals related to Canadian water resources; 1) to protect and enhance water quality, and 2) to promote efficient water management (Environment Canada, 2009). The policy defines enhancement and protection of water quality to include both the anticipation and prevention of Canadian water contamination. The ‘polluter pays’ principle is recognized as a means to ensure the costs of water contamination do not burden Canadian taxpayers. Further, recognizing the true price and value of water is established as a central component of promoting water efficiency. Through five strategies, including water pricing, science leadership, integrated planning, legislation, and public awareness, the Federal Water Policy aims to realize its goals (Environment Canada, 2009).

Regrettably, the Federal Water Policy was never fully implemented, and the role of the Federal Government in protecting freshwater resources has declined (Morris et al., 2007). Truthfully, it is unclear if the policy was ever implemented at all. The Federal Water Policy is accused of possessing “limited relevance”, and of being “badly outdated

(Morris et al., 2007; Council of Canadians, respectively). The inadequate role of the Federal government in water policy is believed to be a lack of political resolve, rather than lack of political mandates (Morris et al., 2007). This is part of the impetus behind the development of a Canadian National Water Strategy, which would serve as an overarching framework that integrates federal, provincial, territorial policies and strategies. Thus, a national water strategy would represent the national perspective, rather than a federal one.

### **Canadian National Water Strategy**

A wide number of groups have identified the benefits of an overarching national water strategy, including the Canadian Chamber of Commerce, Conference Board of Canada, Council of Canadians, Pollution Probe, Gordon Water Group (now the Forum for Leadership on Water), Friends of the Earth, and the Canadian Water Resources Association (deLoe, 2008). The latter organization has developed a working group mandated to map out and pave the way for the development of a Canadian National Water Strategy. Issues surrounding Canada's water resources have become increasingly varied over the last decade. Water management involves aspects related to drinking and wastewater treatment and distribution systems, water conservation programs, source water protection, watershed planning programs, water monitoring, water allocation, aquatic ecosystem health, instream ecosystem needs, irrigation, and hydroelectric power production, for example (deLoe, 2008). The increasing participation of non-governmental groups in environmental decision-making has led to a diversity of opinions in water management (deLoe, 2009). Proponents in favour of a Canadian National Water Strategy suggest diverse issues and opinions could be more efficiently and effectively addressed through the increased accountability, streamlined governance,

integration of water management and related sectors, and policy innovation that a national strategy would foster.

### **Canadian Water Quality Guidelines**

The Canadian Water Quality Guidelines (CWQG) were developed through a collaborative effort among provincial, territorial, and federal governments, and Health Canada. These guidelines represent nationally endorsed scientific goals for aquatic environments, and strive to produce parameters that, when followed, will produce negligible risk to aquatic environments (Canadian Council of Ministers of the Environment). The five guidelines include the Canadian Water Quality Guidelines for the Protection of Aquatic Life, the Canadian Water Quality Guidelines for the Protection of Agricultural Water uses, the Canadian Sediment Quality Guidelines for the Protection of Aquatic Life, the Guidelines for Canadian Drinking Water Quality, and the Guidelines for Canadian Recreational Water Quality. Although nationally endorsed, legislative implementation of these guidelines falls under provincial and territorial jurisdiction. It is recognized that given the extreme variations across the Canadian environment, sweeping guidelines on water quality are limited in their effectiveness. Thus, site-specific approaches that consider the local environment are believed necessary to produce effective standards for water quality.

These guidelines serve as the ideal standard for provincial and territorial water quality, for a variety of uses including irrigation, recreation, and drinking water. Unlike regulations, guidelines are non-binding, and therefore not enforceable. Thus, the federal government has no means to enforce provincial adherence to the Canadian Water Quality Guidelines. In contrast, the United States and the European Union both have enforceable drinking water quality regulations (Safe Drinking Water Foundation). Several

public interest research groups advocate for the presence of enforceable drinking water protection across Canada (Morris et al., 2007). In 1990, the Federal Government under Brian Mulroney pledged to introduce the “Drinking Water Safety Act”, which would provide enforceable drinking water standards for Canadians (Boyd, 2003a). This act was never realized, and no such legislation has been proposed in the subsequent 20 years.

Additionally, CWQG guidelines fail to provide effective guidance on certain parameters of water quality. For example, maximum acceptable concentrations (MAC) are outlined for a variety of microbes, including *E. coli* and fecal coliform bacteria. However, these parameters are poor proxies of protozoan parasites, such as *Giardia* and *Cryptosporidium*, which are extremely resistant to standard water treatment processes (Peterson and Fricker, 2008). Yet, protozoan parasites and enteric viruses are nonexistent as parameters in the CWQG. In contrast, the Environmental Protection Agency of the United States enforces federally developed water quality standards, which include a wider variety of microbial pathogens including both *Giardia* and *Cryptosporidium* (Safe Drinking Water Foundation).

The CWQG have also been criticized for not outlining MAC for certain chemicals, such as chloride, copper, ethylbenzene, iron, manganese, sodium, sulfate, sulphide, xylenes, and zinc (Safe Drinking Water Foundation). There is concern that data used to develop MAC do not sufficiently examine the effects of cumulative, low doses of contaminants, thus calling into question the legitimacy of some MAC. Further, a report by Peterson and Fricker (2008) suggest that MAC may be the result of political pressure, not scientific expertise. For example, maximum acceptable concentrations of trihalomethanes, a carcinogenic substance, and arsenic are reported to be higher than originally recommended by Health Canada, due to pressure from provinces (Peterson and Fricker, 2008).

## **Federal Water Monitoring Programs**

In 2006 Environment Canada launched a National Automated Water Quality Monitoring Network, as a component of the Water Quality Monitoring and Reporting Program. The automated water quality monitors measures and records certain chemical and physical parameters of water quality (including dissolved oxygen, pH conductivity, turbidity, temperature) (Environment Canada, 2009). Data is instantly uploaded to the internet, thus providing a highly accessible, valuable tool for early warning signs of poor water quality. Approximately 45 sites are involved in the network, including remote sites in the Northwest Territories (Environment Canada, 2009). A related goal of this integrated network is to develop a national standards methods manual, including quality assurance and quality control protocols.

Biological assessments of aquatic ecosystems, bioassessments, are extremely useful tools in evaluating environmental conditions and managing water quality (Karr & Chu, 2000). The physical and chemical properties of water are insufficient proxies of biological integrity (Karr & Dudley, 1981). Biological organisms provide a unique indicator of water quality, as biotas must contend with the synergistic effects of physical and chemical aquatic conditions. Indeed, biotic indexes of water quality have been shown to be more robust and sensitive than water quality indexes based on chemistry (Oberdorff & Hughes, 1992). Numerous biotic groups, including aquatic invertebrates, fish, plants, and algae, can serve as effective biological indicators, bioindicators, of various parameters of freshwater quality (Gaufin, 1973; De Pauw et al., 2006; Scardi et al., 2006; Prygiel & Haury, 2006). Both bioindicators, and specific markers within individuals (biomarkers) can be used to evaluate the cumulative effects of a wide variety of pollutants, such as nutrients (De Pauw et al., 2006), pesticides (Miller et al., 2009),

environmentally disrupting compounds (Matozzo et al., 2008), and heavy metals (Amiard et al., 2006).

Via the Canadian Aquatic Biomonitoring Network (CABIN), biological parameters are also included in Environment Canada's water quality monitoring and reporting program. To assess stream ecosystems, habitat and stream conditions, benthic (ground-dwelling) macro-invertebrates are collected at specific sites across the country. The goal is to collect data to provide control (or least-impacted) reference sites across Canada for use in studies assessing stream condition, thus offering a reference condition approach (Environment Canada, 2009). The reference condition approach is a widely used effective technique for bioassessment of before and after comparisons (Bowman & Somers, 2005; Reece & Richardson, 1999).

### **Reconciling Agriculture and Environment**

Policies designed to stimulate agricultural production can inadvertently lead to increased water pollution, which dominates as non point sources. As a result, environmental measures to reduce agricultural pollution frequently clash with agricultural policy (Scheierling, 1996). Thus, agricultural and environmental policy must find accordance within provincial legislation. The Federal government has acknowledged the importance of developing a balance between agricultural and environmental policy. The newly formed Agri-Environment Services Branch, of Agriculture and Agri-food Canada (AAFC), is mandated to promote a competitive agricultural and agri-food sector while maintaining a healthy environment (AAFC, 2007). This branch aims to create a competitive agricultural sector capable of adapting to changing environmental conditions, while making efficient and sustainable use of natural resources. Through agri-environmental science, knowledge and information tools, sustainable on-farm

practices, performance measurement and reporting, and continuous policy and program analysis and development, AAFC (2009) aims to realize their goals. The South Saskatchewan Watershed Stewards are currently hoping to develop an agri-environmental group.

One program designed to reconcile the agriculture industry and environmental health was the National Agri-Environmental Standards Initiative (NAESI). NAESI was the result of collaboration between Environment Canada and Agriculture, and Agri-Food Canada under the Agricultural Policy Framework. The program, which ran from 2004-2008, sought to develop science-based standards of environmental performance that were in congruence with the environmental goals outlined by Environment Canada and Agriculture and Agri-Food Canada. The standards were designed to address the specific role of agriculture in pesticides, air quality, water quality, and biodiversity. Ultimately, these standards are to be used to promote and implement beneficial agricultural management practices (AAFC, 2008). While the specific standards are currently undergoing peer-review and thus are presently unavailable, in general they will be:

- Non-regulatory instruments
- Quantitative or qualitative measures (descriptive benchmarks) of desired environmental quality that are scientifically-defensible and focused on key agri-environmental issues.
- Useful tools to inform landowners, decision makers and policy makers when setting targets for desired degrees of environmental performance for air and water quality, biodiversity, and pesticide use in agricultural areas.
- Defined in terms of: maximum concentrations of harmful substances; specified condition of the environment; or habitat standards (biodiversity)(AAFC, ¶ 2).

### **2.3. Provincial Legislation**

#### **The Environmental Protection and Enhancement Act**

The Environmental Protection and Enhancement Act (EPEA) outlines specific regulations for a variety of activities to protect and enhance the environment. Multiple facets of these regulations pertain to source water protection. The EPEA regulates industrial and municipal point-source discharges into surface waters, and functions to ensure municipal and industrial compliance pertaining to these discharges. Waterworks systems require the approval of EPEA. The EPEA also includes an environmental assessment regulation, which states that an environmental impact assessment must be conducted prior to the operation of many industrial or agricultural activities. The environmental impact assessment serves to examine the environmental, economic, social, and health implications of the project, decides if the project should be approved, outlines the conditions of approval, and monitors and ensures conditions of approval are met (Alberta Environment, 2009).

Through the EPEA, Alberta Environment has developed surface water quality guidelines to protect aquatic life, for agricultural uses, and recreation and aesthetics. These guidelines are designed for use in concert with water quality monitoring data, to assess areas of water quality concern. These guidelines are additionally used to set water quality-based approval limits for wastewater discharges, and include both acute and chronic limits for specific substances.

Alberta's water quality guidelines face similar criticisms to Canada's water quality guidelines. Briefly, both Alberta's drinking water and surface water quality guidelines are non-binding, which perpetuates a lack of accountability. Additionally, like the Canadian water quality guidelines, surface water quality guidelines lack parameters of pathogens such as *Giardia* and *Cryptosporidium* (Peterson & Fricker, 2008), a variety of chemicals (Safe Drinking Water Foundation), and many pesticides frequently detected in Alberta's source waters (Anderson, 2005).

## **The Alberta Land Stewardship Act**

The Alberta Land Stewardship Act, passed in the spring of 2009, recognizes the legal authority of the land-use framework, which establishes seven land-use regions, congruent with Alberta's seven watersheds (Government of Alberta, 2009). Each region will develop region-specific plans to address economic, social, and environmental needs, and assess the impacts of activities on the air, land, water, and biodiversity within that region (Government of Alberta, 2009). Regional plans will address concerns regarding the management of Alberta's growth, land-use pressures that accompany competing land-use demands and the desire for environmental sustainability, and the integration of a wide variety of land-use policies; amendments were made to 25 Alberta Acts in this regard (Government of Alberta, 2009). Regional plans will serve as provincial policy, backed by regulatory authority.

## **Agricultural Operations Practices Act**

The Agricultural Operations Practices Act includes regulations and requirements that pertain to the siting locations of agricultural operations, manure storage and application, feeding and bedding sites, livestock corrals, soil testing and analysis, in addition to compliance and enforcement of the act. The Natural Resources Conservation Board administers the act. This act outlines multiple management practices for agricultural operations that play a valuable role in source water protection, and more specifically, in reducing NPS of agricultural pollutants in source waters.

## **The Water Act**

The Water Act, 1999, Alberta's water management legislation, regulates surface water allocations within the province. Under the act, all surface water diversions require a license. A licensed user is granted a "water right"; the right to the maximum amount of water outlined in the license. The license identifies the water source being diverted, the location of the diversion, the volume, rate, and timing of the water diversion, and the priority of the water right granted by the license. The Water Act maintains the FITFIR (first in time, first in right) priority system. The Act is also responsible for developing a water management framework that ensures sustainable water management and healthy aquatic ecosystems; central to this framework is the Strategy for the Protection of the Aquatic Environment.

Issues surrounding water quality and water quantity are heavily intertwined, and thus water management plays an integral role in source water protection. In part 2, Division 1, the Water Act calls for the development of The Framework for Water Management Planning, of which the Strategy for the Protection of the Aquatic Environment is a central component (Water Act, 2000) This strategy outlines the government's plans to maintain, restore, and enhance Alberta's aquatic environments, which is indirectly involved in source water protection.

In 2008 Alberta Environment Minister Rob Renner announced that the Alberta government would re-examine Alberta's water allocation system. The minister's advisory group (MAG) developed a document that presents 11 recommended changes to the current allocation system. The summary of the recommendations are provided below, ad verbatim:

There is an urgent need to:

- Establish levels of Protected Water for the purpose of protecting the environment and aquatic ecosystems in all major river basins in the Province. The government should not allocate water for consumptive uses where allocations would reduce Protected Water

below the stipulated levels. Where existing licenses prevent the stipulated levels of Protected Water from being met, the government should establish and implement a plan to achieve legal protection for the stipulated levels within a reasonable period.  
[Recommendations #1, 2, 3]

- Invigorate the current process for transferring existing water allocations. The goal is to allow water to be transferred to its most highly valued uses, while ensuring that transfers protect or enhance the environment and respect the rights of other water users.  
[Recommendations #4, 5, 6, 7, 8, 9]

Alberta's water management and allocation system must achieve a number of more particular goals. In order to address the identified urgent needs, the Group recognized that it is necessary to:

- Provide an expedited process for establishing Protected Water and in particular for setting interim Water Conservation Objectives in those basins that do not already have them. [Recommendations #2, 3]

- Remove barriers to the transfer of water allocations except those that are genuinely required to protect the environment and the rights of other water users.  
[Recommendations #4, 5, 6, 7, 9]

- Facilitate participation in the process for transferring water allocations.  
[Recommendations #7, 9]

- Establish clear roles for regional and local stakeholder and advisory groups, such as Watershed Planning and Advisory Councils, and clear relationships between water allocation decisions, Water Management Plans and the Land-use Framework.  
[Recommendations #12, 13, 14]

- Increase the strategic use of existing and new storage as a beneficial tool in water management and allocation. [Recommendation #10]

- Take into account the inter-connection of groundwater and surface water, allowing the integrated, systematic management of groundwater and surface water.  
[Recommendation #11]

The Advisory Group urges the consideration of longer term issues identified but not dealt with in this report, including:

- Assessing additional mechanisms for unlocking existing unused water allocations.

- Examining alternative innovative regional governance approaches, including the use of basin commissions or authorities.

- Examining the relationship between irrigation districts, irrigation farmers and the transfer system by engaging in consultation with the Minister of Agriculture and Rural Development.

- Investigating whether the Province could accept money or other benefits in a transfer rather than simply holding back 10% of the water. This could be a consideration in cases where the monetary value of the water could be applied to improve instream flow

conditions with significantly greater benefit to the river system than the 10% holdback provided for in the Water Act. [Recommendation #15] (Minister's Advisory Group, 2009, p. i-iii).

As the MAG was developing their own recommendations, environmental groups Ecojustice and Water Matters published their own report. The resulting document, entitled "Share the Water", identified and summarized the central criticisms of Alberta's current water allocation system, and offered specific recommendations to protect and enhance water quality and security for the future (Droitsch & Robinson, 2009).

One of the primary criticisms of the current water allocation system is that little protection and consideration is offered to instream flows. Instream flow represents the amount of water in a river course required to provide for downstream uses; both human, and environmental. Studies have determined that instream flow needs are integral to healthy aquatic ecosystems (Arthington & Puse, 2003; Lasserre, 2007). Research suggests that Alberta's water allocation system offers only sporadic attention to instream flows, and the legal framework required to protect ecosystem flow needs is underdeveloped (Wenig et al., 2006). The instream flow needs in the South Saskatchewan River Basin, estimated to be approximately 75-80% of natural river flows, are vastly under-met by the present allocation system, which provides for a target of only 45% of the natural river flow to remain instream (Clipperton et al., 2003). Thus, Droitsch and Robinson recommend that instream flows should be under legal protection (2009). While the MAG (¶3, 2009) does point out an "urgent need to establish levels of Protected Water for the purpose of protecting the environment and aquatic ecosystems in all major river basins in the Province", they suggest evaluating whether the 10% holdback of water transfers could be replaced with monetary compensation, which in turn could be used to enhance the condition of instream flows.

Insufficient water quantities, and the junior statuses of some water licenses, threaten the security and quality of the basic human water needs of several small communities in Alberta. High River, Okotoks, Strathmore, Turner Valley, Black Diamond, Canmore, and Nanton are predicted to face water shortages in the very near future (Calgary Regional Partnership, 2007). Droitsch and Robinson observe that preference for the use of water for basic human needs is not recognized by current Alberta legislation (2009), despite the recommendation by the UN Committee on Economic, Social, and Cultural Rights to prioritize water rights for basic human needs (deLoe et al., 2007). This is closely tied to a third criticism of water allocation in Alberta; the insecurity of water supplies to junior licenses. For example, junior licenses in the Bow River region would find themselves overridden by the senior licenses held by irrigation districts and electricity generation (Droitsch & Robinson, 2009). Water conservation objectives, that is, water that is protected by the Water Act for instream flow needs, is represented by a junior license in the SSRB (MAG, 2009). Thus, the FITFIR priority system is competing with the instream flow needs of the fully allocated SSRB, which is cause for concern. The MAG proposed several actions to address this issue, including acquiring senior licenses to meet water conservation objectives (2009). However, the MAG supports the current FITFIR priority system.

A fourth criticism is that the allocation system of water employed by Alberta has the potential to promote inefficient, wasteful water use. In the United States, water allocation is recognized, and is protected under law, provided water is being used reasonably and beneficially. Actual consumptive water use is one requirement for the “beneficial use” of water allocations; unused water allocations may become forfeit. The granting of water rights for “beneficial use” is designed to promote water efficiency; for example, water allocation is granted for irrigation purposes if certain parameters, such

as irrigation efficiency, are met (Solomon & Burt, 1999). In Alberta, unused water allocations can be transferred to another party for monetary gain, and no regulations exist to enforce the prudent, efficient use of water allocations (Droitsch & Robinson, 2009).

Finally, there is strong criticism against the water rights trading system. The Water Act allows for all or part of a water license to be transferred to another party. Droitsch and Robinson (2009) point out several provisions in the Water Act which aim to prevent the abuse of water transfers; water transfers are publicly reviewed to ensure license rights are upheld, hydrological impacts of all water transfers are considered, and the Alberta Government withholds 10% of the transferred water allocation for instream use. Although water transfers were designed with the intent of reducing the threats of water shortages, despite the provisions to prevent the abuse of water transfers there is concern that water markets will promote the sale of unused water allocations, thus compounding the scarcity of source waters. Alberta's water markets are the first of their kind in Canada, and some have suggested that this effectively commodifies water. The commodification of water has severe implications in terms of water ownership; there is legitimate concern that water markets open the door for bulk transfer of water to the United States (Brandes et al., 2008).

An additional public concern is that water transfers would pave the way for water to be redefined as a "good", and subsequently subjected to North American Free Trade Agreement (NAFTA) rulings, which would in turn reduce Canada's and Alberta's control over domestic water resources ("Selling Canada's water," 2004). However, legal experts continue to debate the role of water in the NAFTA Implementation Act, and the role that water transfers would play in redefining water (Bakker, 2007). It should be noted that, independent of the role of Alberta's water transfers and water markets, similar concerns

regarding the domestic control of water resources are being raised through Canada's participation in the Security and Prosperity Partnership (Gabriel, 2008), though this is out of the scope of the current discussion.

The report compiled by Droitsch and Robinson offers multiple recommendations to address the aforementioned concerns, and improve upon Alberta's water allocation system (2009, p. 5). Recommendations include:

1. Legally enforceable water management plans for each basin, developed using the best available scientific evidence;
2. Legally enforceable objectives that protect instream flow needs for each basin;
3. Water entitlements based on water "shares" allocating a certain percentage of the water available in the excess of the water left instream. Water volumes allocated to each share are to be adjusted seasonally, and more often if needed, in response to predicted flows in the basin;
4. Provided water is secure for people and the environment, establish a water allocation and share trading system that facilitates the re-allocation of water from one use to another;
5. The ability of the public to hold shares for instream purposes;
6. The use of incentives to encourage water conservation and the efficient use of water; and
7. The inclusion of groundwater in the water management system.

Finally, Droitsch and Robinson (2009) suggest that beyond implementing new recommendations to the current water allocation system, a modified strategy is necessary to ensure sustainability of water resources for the future. Briefly, this strategy must recognize the need for adaptable water allocation and water market practices to confront droughts and climate change, the strategy must prioritize the use of water for basic human needs, regardless of license status, the strategy must incorporate the use of water in allocation decisions, it must factor in environmental water needs, it must provide greater water security and flexibility in the future, and finally decisions surrounding water allocation should be transparent, open to public debate, and subject to review (Droitsch & Robinson, 2009).

Generally, there is a concern that public consultation regarding alterations to the allocations system will be limited, at best. The public consultation process regarding

changes to water allocation is slated to occur, now that the Minister's advisory report has been released. The timing of public consultation raises the concern that the scope of public debate is reduced, as the debate will likely focus on the Minister's advisory report, rather than the Water Act itself (SACPA public meeting, 2010). Additional criticisms include the lack of consideration for non-market solutions by the MAG, and that a revision of the FITFIR priority system was considered. Thus, critics suggest the 2009 report possesses limited perspectives and innovation (SACPA public meeting, 2010).

## **2.4. Provincial Policy**

### **Water for Life: Alberta's Strategy for Sustainability**

Alberta's long-term water management strategy, Water for Life: Alberta's Strategy for Sustainability was released in November 2003. The strategy seeks to implement frameworks related to watershed management and source water protection. The primary directives of the Water for Life Strategy are to provide a safe and secure drinking water supply to Albertans, to promote healthy aquatic ecosystems, and to ensure a reliable high quality water supply to sustain Alberta's economy. The strategy aims to accomplish these directives via knowledge and research, partnerships, and conservation.

The knowledge and research component seeks to specifically improve the scientific knowledge of Alberta's water resources, to develop a greater understanding of emerging issues and opportunities related to Alberta's water resources, and to disseminate information related to water issues so that Albertans possess the knowledge and tools to make effective management decisions. Integral partnerships outlined by the Water for Life Strategy include the Alberta Water Council, the Watershed

Planning Advisory Councils, and Watershed Stewardship Groups, with AENV serving as the lead ministry. Water conservation efforts are to be accomplished through the establishment of a regulatory and monitoring system, and the use of economic instruments.

The Water for Life Action Plan, released by the Alberta government at the end of 2009, proposes some recommendations that can directly relate to source water protection. These recommendations are as follows:

1. Provide and maintain the availability and accessibility of information to Albertans on private water systems
  - Deliver the 'Working Well' education extension program for private well owners
  - Develop and deliver on-line and print information resources for private water supply owners
2. Review and improve the management of small public drinking water systems
  - Develop operating standards
  - Develop and deliver information resources
  - Conduct an initial audit based on a completed provincial inventory
3. Work co-operatively with First Nations, Métis communities, and the federal government to ensure safe drinking water in Aboriginal communities in Alberta
  - Provide on-going operator training and certification
  - Provide opportunity for participation in regional systems
  - Facilitate water needs assessments with participating First Nations communities
4. Develop a waterborne disease surveillance system and undertake waterborne contaminant research
  - Provide on-going drinking water quality testing and laboratory-based surveillance through the public health laboratories
  - Conduct domestic well water surveys of specific contaminants in identified areas (e.g. Beaver River and North Saskatchewan River Basins, etc.)
  - Undertake applied research in priority water contaminants and develop a public health risk management support system
5. Design and implement regional drinking water and wastewater solutions
  - Review delivery of the provincial drinking and waste water program including new funding support programs and governance
6. Develop innovative approaches to build and ensure long-term operational capacity in smaller Alberta communities
  - Develop operator consortiums
  - Provide on-going operator training and certification

7. Update water quality programs to support source protection information and planning
  - Work with Watershed Planning and Advisory Councils to incorporate drinking water source protection into watershed planning
  - Develop information on sector best management practices
8. Facilitate upgrades to drinking water facilities and wastewater facilities to meet standards and, where possible, integrate with regional systems
  - Develop a management framework to facilitate the safe use of reclaimed water for domestic applications in Alberta
9. Facilitate upgrades to drinking water quality in provincial parks and recreation areas to meet drinking water standards and, where possible, integrate with regional systems

(Government of Alberta, 2009, p. 13).

### **Monitoring programs**

Alberta Environment conducts water quality programs that monitor, report, and evaluate surface water quality. Specific water monitoring programs include the Long-Term River Network, and the River Water Quality Index, in addition to lake monitoring programs. Surface water quality is also monitored by industry and stakeholder groups. To ensure accurate and consistent data is gathered, Alberta Environment has developed multiple guidelines including Guiding Principles for Water Quality and Aquatic Ecosystem Monitoring, Guidelines for Quality Assurance and Quality Control in Surface Water Quality Programs in Alberta; and Aquatic Ecosystems Field Sampling Protocols.

## **2.5 General Criticisms of Existing Legislation**

### **Absence of legislation addressing non-point sources of pollution**

The diffuse nature of non-point sources of pollution makes it extremely difficult to monitor, regulate, and control. It has been estimated that only 10-20% of water pollution is due to municipal and industrial effluent, while non-point sources serve as the primary source of water contamination (Brower & Leon, 1999). Agriculture is generally considered the largest contributor of non-point pollution in developed countries (FAO,

1996), and given the intensity of this industry in Alberta, these sources of pollution represent a serious threat to source waters.

It is undisputable that non-point sources of pollution represent a serious threat and a unique challenge to source water protection. Although provincial legislation, policies, and strategies play a role in source water protection, direct measures to control non-point sources of pollution are notably absent. The Environmental Protection and Enhancement Act is designed to regulate municipal and industrial effluent point sources, while the Water Act is mandated primarily to regulate water allocations. Arguably, the most effective legislation that limits non-point sources of pollution is the Agricultural Operations and Practices Act. The best management practices outlined in the act regulate manure application in ways to limit the exposure of manure to surface waters, thus controlling non-point sources of agricultural-based pollutants, such as nutrients, pathogens, pesticides, sediments, and environmental disrupting compounds. However, it is clear that this is not the intent of the legislation, and a poor substitute. Without legislation that is directly designed to identify and manage non-point sources of pollution, and measures to enforce this legislation, source water protection is rendered incomplete.

### **Enforcement and Monitoring: Citizen Enforcement Actions**

The effectiveness of legislation is only as strong as it's enforcement; without it, compliance suffers (Valiante, 2004). The resources used to detect violations of environmental regulations, such as field inspectors and field investigators, are limited. Environment Canada has determined that it would require at least 300 staff to effectively enforce environmental legislation; as of 2003, only 93 enforcement officers were employed (Morris et al., 2007). A general criticism of enforcement and monitoring of Canadian and Albertan legislation is the belief that these assignments are often

burdened by small, under-funded NGOs. In the United States and United Kingdom, enforcement and monitoring agencies are large, well funded, and distinct from environmental departments (Bakker, 2007). One solution is to increase the role the public can play in the detection of offenses.

Canadian Environmental Law has long stood by the principle that enforcement of legal statutes should fall solely to government regulators. However, the role members of the public should play in enforcing environmental legal statutes continues to be strongly debated. This debate was renewed when the 1999 repeals of Canadian Environmental Protection Act included provisions for civil enforcement actions. However, as mentioned previously, it is suggested that these provisions will play a minor role in advancing the enforcement of CEPA, and similar civil provisions are unlikely to be adopted by other environmental legislation (Valiante, 2004). For example, the Species at Risk Act (Bill C-5) was originally drafted to include citizen suit provisions, though this was dropped at subsequent readings, due to industry persuasion (Lindgren, 2001; Valiante, 2004).

Thus, the debate regarding the role of civil enforcement actions continues. The greatest argument for civil enforcement actions is that the enforcement of an act is strengthened, as the efforts of governmental regulators becomes supplemented by citizen suits through enhanced detection and prosecution of offences (Valiante, 2004). Opponents to civil enforcement suggest that this has the potential to foster inadequate and inconsistent prosecution of offences (Valiante, 2004). Proponents suggest that the inclusion of citizens in the enforcement process is argued to promote democratic values, and conveys the message of a joint government and citizen responsibility towards the environment (Valainte, 2004). This notion of stewardship is certainly widely encouraged in the Water for Life Strategy. Perhaps the opposition to civil enforcement is the concern that this would move Canada and the provinces away from a cooperative style of

governance, towards the “endless litigation” approach observed in the United States (Valiante, 2004). The misuse of this provision by “citizens with an agenda” could promote environmental vigilantism (Valiante, 2004). While these provisions would offer more power to public interest research groups, alternatively money and resources typically devoted to education could be diverted to legal costs associated with civil enforcement actions (Valiante, 2004).

### **3. Source Water Protection: Role of Non-regulatory Bodies**

Governments are no longer the sole authority for decision-making when it comes to environmental governance (deLoe, 2009). This is highlighted in the Water for Life strategy, which places a high value on the use of partnerships to accomplish the three primary goals. Thus individuals, agencies, groups, organizations, and municipal and Aboriginal governments, in addition to scientists and the general public, have the potential to play an active role in decisions related to water resources of the province, including source water protection.

#### **3.1 Alberta Water Council**

The Alberta Water Council (AWC), established in 2004, is comprised of 24 members representing government, industry, and non-governmental organizations. The AWC plays an advisory role for the implementation of all aspects of the Water For Life strategy, and thus has the capacity to play a valuable role in source water protection. In 2008, the AWC released a report that aimed to create a working definition of healthy aquatic ecosystems. The report calls for the development more of parameters that can be used to assess the health of aquatic ecosystems, and for these data and information to be readily available (AWC, 2008). In 2009, the AWC presented several priority projects that would advance the goal of creating healthy aquatic ecosystems. One of the

recommended projects is the improved understanding and management of non-point source pollution. Specifically, the recommendation calls for a provincial assessment of data, knowledge, and tools related to non point source pollution. The report recommends the compilation of data sources for non-point source contaminants, the compilation of NPS data assessment tools, an evaluation of where knowledge gaps exist, and the development of a strategy to improve the management of non-point sources of pollution. Additionally the report recommends a review of policy and regulation governance as it relates to NPS of pollution, and suggestions for improving non-point source pollution management (AWC, 2009).

It is interesting that these recommendations stem from the Water for Life's mandate for the protection and enhancement of healthy aquatic ecosystems, when this issue is so pertinent to source water protection and ensuring a safe, secure drinking water supply. Clearly, improving the management of non-point sources of pollution has direct implications for the presence of nutrients, pathogens, pesticides, sediments, and endocrine disrupting compounds in source waters. Regardless of where the mandate for recommendations stems from, the recommendations outlined in this report is integral to source water protection in Alberta. However, the management of non-point sources of agricultural pollution should undoubtedly be examined in the context of public health, not just aquatic ecosystems.

### **3.2. Watershed Planning and advisory councils**

Watershed planning and advisory councils (WPACs) are nonprofit organizations composed of individuals, groups, agencies, and Aboriginal and municipal governments, whose mandate is to assess the conditions of their watersheds and develop strategies to address issues related to their watershed management. While WPACs do not possess

regulatory authority, these councils serve as a forum to address concerns regarding water resources. WPACs have the potential to play a significant role in SWP. WPACs publish State of the Watershed reports, which directly contribute to source water protection through identification of watershed health indicators, and gaps in data and research. Additionally, WPAC publish reports related to education, legislation, work plans, and water management. There are a total of 9 WPACs in Alberta; the Battle River watershed Alliance, the Beaver River Watershed Alliance, the Bow River Basin Council, the Lesser Slave Lake Watershed Council, the Milk River Watershed Council, the North Saskatchewan Watershed Alliance, the Oldman Watershed Council, the Red Deer River Watershed Alliance, and the SEAWA South East Alberta Watershed Alliance. Two additional WPACs, the Athabasca River Watershed, and the Peace River Watershed Board, are in the process of development.

To illustrate the potential role these councils can play in source water protection, one only needs to examine the activities of the Oldman Watershed Council. The Oldman River Basin Water Quality Initiative was formed in 1997, in response to concerns regarding water quality of the Oldman River. This initiative is now a component of the Oldman Watershed Council. The result of this initiative was an extremely in depth comprehensive overview of the state of the Oldman Watershed, through surface water quality monitoring, from 1998-2003 (Saffran, 2005)

The State of the Watershed Report for the Oldman Watershed Council, released in 2009, outlines the initiatives of multiple teams that have contributed to source water protection. The Data Collection and Integration team contributes to river water quality monitoring via an annual Water Quality Index Map for the Oldman River Basin, which contains information related to pathogens, algae, and macrophytes. Surface water quality monitoring programs include assessing the presence of waterborne microbial

pathogens, such as Giardia and Cryptosporidium, despite the fact that such monitorings are not suggested by the Canadian Water Quality Guidelines. This speaks to the ambition of these stewardship groups, in addition to what might be viewed as the shortcomings of the Canadian Water Quality Guidelines.

The Urban BMP Team conducted activities designed to address and raise awareness of storm-water quality issues, which represent a significant non-point source of pesticide and endocrine disrupting pollutants (OWC, 2008). The Rural team has played a role in raising awareness and providing financial support to the Alberta Environmental Farm Plan Company, which seeks to help both farmers and ranchers identify the agricultural challenges and opportunities related to the environment (OWC, 2007). Additionally, the Rural team has used surveys to identify some of the primary concerns and obstacles that rural residents face in the implementation of BMPs (OWC, 2007). Evidence provided by this survey indicates that the cost is the greatest challenge of implementing BMPs, followed by lack of knowledge, and time (OWC, 2007). This data is integral to understanding how to alter environmentally destructive behaviours, and how to market social change that can reduce non-point sources of pollution.

### **3.3 Watershed Stewardship Groups; Alberta Stewardship Network**

Watershed stewardship groups represent grassroots organizations, largely composed of volunteer citizens, which take proactive measures to protect local regions of their watershed. The government of Alberta provides grants to projects developed by the Alberta Water stewardship groups. Projects may include raising awareness and knowledge regarding local watershed issues, tool-building and team-building activities, measures of environmental and social indicators of watershed health, and community-based action (Alberta Stewardship Network, 2009).

### **3.4 Science based policy decisions**

Like WPACs, watershed councils, and watershed stewardships groups, scientists have the potential to play a role in source water protection, in an advisory capacity. Alberta's Water for Life strategy recognizes the need for water policy to be based on a strong scientific background. However, effective dialogue between scientists and policy makers hasn't always been successful in the past. It is generally agreed that regular interaction between scientists and policy makers is key for informed decision-making (Schaefer & Bielak, 2006). However, the integration of science and policy is often "indirect, episodic and diffuse" (Michaels, 1992).

In 2001 the Canadian Council of Ministers of the Environment convened several collaborative workshops to improve dialogue between water research and policy. These workshops were considered a success, with the overwhelming majority (90%) of both policy and program managers, and scientists and research managers reporting the workshops to be useful tools for decision-making and determining research priorities (Schaefer & Bielak, 2006). Program and policy makers reported that these workshops were helpful in numerous aspects relevant to source water protection, including the development of provincial water strategies, best management practices, determining the best means to disseminate policy and technology information, and for the development of water-quality monitoring networks (Schaefer & Bielak, 2006).

The success of these workshops can be attributed to several factors. Firstly, workshop participants included people from a variety of backgrounds including policy and program members from senior levels of government, members from professional

organizations, federal, provincial, municipal, and local government officials, industry groups, and research experts (Schaefer & Bielak, 2006). Secondly, workshops were small enough (40-70 participants) to ensure successful dialogue and feedback. Thirdly, extensive resources were available for participants; presentation summaries, reference materials, related reports and initiatives, and contact information, and information to help promote and sustain dialogue between policy makers, policy managers, and researchers (Schaefer & Bielak, 2006). Finally, workshops were built on the discussions of the previous meetings, and were designed to be flexible in terms of discussion and participation. It was generally agreed that for the benefits of these workshops to be sustained, continued dialogue was necessary (Schaefer & Bielak, 2006).

Public interest research groups play a valuable role in promoting education, awareness, and dialogue of source water protection. Publications produced by Ecojustice, Water Matters, and Pollution Probe for example, provide a wealth of information that is both accessible to the public, and targeted towards policy makers.

#### **4. General Conclusions**

As initially dictated by the Constitution Act of 1867, water protection is largely under provincial and territorial jurisdiction. Only 3 pieces of Federal legislation play a role in source water protection. The Canada Water Act manages water quality, and arranges the management of water resources with provinces and territories. The Fisheries act contains a component that prohibits the deposition of deleterious substances into waters inhabited by fish. The most dominant piece of federal legislation that relates to source water protection is the Canadian Environmental Protection Act, which serves to identify, assess, regulate, and control toxic substances in Canada, including in the Canadian aquatic environment.

There are four pieces of provincial legislation that impact source water protection in Alberta. The Environmental Protection and Enhancement Act protects and enhances the environment through regulation of specific activities, including agriculture. However, this act primarily governs industrial and municipal point-source discharges into source waters. Alberta's Water Act serves as the policy for water management, through regulating the allocation surface water within the province. There exists significant criticism regarding the "first in time, first in right" water licensing system on which this act is based. Additionally criticized are the inadequacy of protection of the in-stream needs of aquatic ecosystems, and the lack of prioritizing water consumption. The Agricultural Operation Practices Act includes regulations that demand adherence to certain management practices, which limit the introduction of agricultural contaminants, such as livestock wastes, into source waters. This is the only piece of provincial legislation that addresses nonpoint sources of pollution. However, the protection of source waters from nonpoint agricultural sources of pollution appears to be more of a by-product of the act, rather than the impetus behind it. The recently passed Alberta Land Stewardship Act gives regulatory authority to the region-specific plans developed by seven identified land-use regions in Alberta. These plans address economic, social, and environmental needs, and thus have the potential to play a role in source water protection.

Generally, provincial regulations do little to protect source waters from nonpoint sources of pollution. There is a marked absence of legislation that directly addresses nonpoint sources of pollution, despite the severity of such threats to Alberta's source waters. For those regulations that do exist, there are concerns that the limited enforcement of these acts results in under-compliance. The Canadian Environment Protection Act includes a provision that allows for civil enforcement actions, which are hailed as a means to help encourage compliance. However, such civil enforcement

actions are not available in Alberta's provincial equivalent, the Environmental Protection and Enhancement Act, and their role in CEPA is believed to be extremely limited.

In 1987, a federal water policy was developed to protect and enhance water quality, and promote efficient water management practices. However, this policy was never fully implemented, if at all. Currently, there exists strong support for the development of an overarching Canadian National Water Strategy in its place, which would serve to streamline governance, integrate water management with related sectors, and provide a venue for policy innovation (deLoe, 2008). The Water for Life strategy represents Alberta's water policy; this strategy aims to provide Albertans with a safe and secure drinking water supply, healthy aquatic ecosystems, and a reliable, high quality, water supply to sustain Alberta's economy through knowledge and research, a variety of partnerships, and water conservation.

The Canadian Water Quality Guidelines also play a role in source water protection. These are nationally endorsed, scientifically backed guidelines for the protection of aquatic health, of water for agricultural uses, sediment quality, recreational water quality, and drinking water quality. These guidelines serve as benchmarks for provinces and territories, although their implementation and adherence is non-binding. This, combined with inadequate parameters of surface water quality (such as levels of protozoan parasites and a wide variety of chemicals), has led to strong criticism.

Source water protection is only as strong as the monitoring and surveillance programs available. Some of the Federal programs include the Federal Water Quality Monitoring and Reporting Program, which includes the National Automated Water Quality Program Network, that provides immediately accessible data via the internet, to expediently address issues of poor water quality. The Canadian Aquatic Biomonitoring

Network provides information regarding biological parameters important in assessing water quality. Specifically, this program aims to identify the biological parameters of control, or least-impacted, reference sites, to provide a baseline for aquatic ecosystem health. Alberta's monitoring programs include the Long-term River Network, and the River Water Quality Index. Additionally, Alberta Environment has developed initiatives to ensure quality control of water and ecosystem monitoring protocols.

Increasingly, Alberta is looking towards non-regulatory bodies to play a role in issues surrounding water management, including water quality, and environmental decision-making. The Alberta Water Council serves to advise regulatory authorities on the implementation of Alberta's Water for Life strategy, from the perspective of government, industry, and non-governmental organizations. Specifically, the council has called for action regarding nonpoint sources of pollution, which is, presently, a pertinent and overlooked aspect of source water protection. Watershed planning advisory councils, nonprofit organizations composed of individuals, groups, agencies, and Aboriginal and municipal governments, develop reports on the state of their watershed. Published reports produced by these councils include water-monitoring data, which is an essential component to source water protection. Watershed stewardship groups also play a role in protecting and enhancing water quality in Alberta. Alberta aims to develop environmental policy based on sound science, and thus scientists play an enormous role in source water protection.

Both regulatory and non-regulatory components play integral roles in source water protection in Alberta. Non-point sources of pollution are notoriously difficult to monitor and control. Thus, relying solely on a regulatory framework to confront this enormous threat to source waters is unfeasible. Although regulatory authorities play an important role in source water protection, in part through enforcement, the role of non-

regulatory bodies is an important complement to safeguarding Alberta's water resources. The increased use of partnerships and stewardship provides an opportunity for increased public input and perspective into protecting water resources, and can serve as an important venue for policy innovation.

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