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Comparative Perspectives on Mitigation Banking and Watershed Management: Illinois and Missouri, Nova Scotia and Alberta

Lars K. Hallstrom and Nicholas Guehlstorf

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Comparative Perspectives on Mitigation Banking and Watershed Management: Illinois and Missouri, Nova Scotia and Albertaⁱ

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Executive Summary

This paper examines the management and conservation of wetlands in North America. It provides an overview of the policy reforms and approaches toward water and wetland policy in three regions – two in Canada and one in the United States Midwest. Wetlands have numerous ecological benefits but often compete with other agricultural and industrial land space uses which threaten their existence or functions. Canada, though it is seen by the rest of the world as an ecologically-minded country, has not in reality made great strides with regard to ecosystem protection and preservation. Specifically the general absence of citizen input into risk management about wetlands speaks to the emerging reality of environmental politics in Canada. Wetland management and policy are an example of this, where emphasis on water markets has not produced extensive wetland conservation. In Southern Alberta, wetlands compete with land developed for agricultural use and have experienced a 60% loss. In the North, with recent increased industrial development and expansion, including oil, an additional 23,000 hectares are at risk. While current policies make the case that multi-stakeholder engagement is key to preservation, the absence of opportunities to participate and more broader citizen engagement is noticeable. In contrast, Nova Scotia has a unique, community-based approach to wetland conservation which combines with numerous regulatory tools and legislation in place for wetland conservation. Community-based management and monitoring is well-established. While acknowledging the challenges in effectiveness of this approach, this method can serve as a useful lesson for wetland management in Alberta and the United States. In the United States, conservation has been largely dismissed in favour of economic gains. In response to massive losses, such as those in a part of Missouri where 87% of 4.5 million acres has been lost in a particular area, mitigation banking has been established. The current practice of this law has some unintended problems in many American management schemes and should serve as a lesson not to be repeated by Alberta regulators.

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Introduction: Watershed Management and Regulatory Policy

Wetlands sustain thirty-one percent of North American plant species, provide breeding and wintering grounds for waterfowl and shore birds, provide spawning grounds for coastal fish, lessen flood damage, reduce erosion, recharge groundwater, filter sediment, and abate pollution (USEPA 2001). Despite these benefits, the United States has lost over half of its wetlands since colonization began in the 1600s (Dahl 1990; Dahl and Allord 1997). Although the wetland destruction in Canada is significantly less—with 1/7 of the total wetland base being drained or lost—the percentage of wetland loss is the highest ever recorded in both Ontario and Alberta (Government of Canada 1991).¹ Permitted wetland destruction still occurs in the United States today, but much of this ecologically necessary land is conserved by the process of banking mitigation. ²

This vulnerable balance is further compromised by the human fear of water scarcity and need for high water quality. While there are significant quantities of potable water available nationally and globally, there are significant asymmetries in its distribution. This is compounded by increases in demand and consumption due to urbanization and industrial development, and by public health concerns as a result of water contamination events. In turn, water is an increasingly political issue at all levels of governance (including international security – see Myers 1993). As a result, numerous and different approaches toward managing water consumption, conservation, quality and supply have emerged that recognize the importance of legal and regulatory reform, as well as different conceptions of the role and use of water and watersheds (Whiteley et al 2008).

There is still a significant “integrity gap” (Lee and Perl 2004) between the problems identified by the Canadian public and the efforts or decisions launched by policymakers to resolve those problems. While demands for public engagement in monitoring and policymaking have been made across Canada, institutional and socio-economic factors have limited the efficacy of the citizen engaged environmental policy suggested by public opinion. In fact, Canada’s international reputation as a normative ecological leader —based on a significant reliance upon natural resources as a social mythology of both abundance and perpetuity—is not supported by many empirical indicators (Boyd 2003).³ There is, therefore, a significant degree of constraint upon Canada’s capacity to deliver on the policy goals prioritized by the public. This is particularly true in the case of watershed and wetland policy. Although water is essential to human life; health and economic development has

had wide-reaching influence in the past 10 years and the practice of water policy in Canada has diverged from policy rhetoric and public opinion. Ergo, a consideration of the emerging nature of water policy in Canada is aided by a comparison with the lessons learned from policy and regulatory approaches used elsewhere, and in particular the USA. This project is, therefore, a comparative analysis of the regulatory regimes that have emerged around watersheds in Western Canada, Maritime Canada and the Mid-Western United States.

Watersheds and Wetland Functionality

The most significant environmental benefit of wetlands is their ability to filter groundwater and hold excess surface water. However, land use in the United States has dismissed these ecological benefits for economic gains as millions of acres of wetlands have been destroyed to create farms and develop cities. In order to address both the biological incentive to conserve and the economic appetite to progress, strict regulatory guidelines and volunteer programs with market-based incentives have been implemented by the United States government to preserve or conserve wetland acres. U.S. Federal wetland regulation began in 1972 with the Clean Water Act and now acts in conjunction with state incentive programs to mitigate wetland losses. For instance, all development projects within the U.S. since 1992 must mitigate on-site or compensate off-site for any wetland acres destroyed, and city developers or rural landowners are given economic incentives to return land to its original watershed. In comparison to the U.S. approach to wetland management, which is best understood with laws and practices, a large part of understanding Canadian watershed policy is about recognizing who and how private individuals and public institutions regulate this meritorious ecosystem.

In Canada, a state with the largest fresh-water reserves on the planet (approximately 20%)⁴ water policy has progressed through three phases of development: (1) pre-regulation; (2) public law; and (3) market-based, co-operative and comprehensive substance instruments (Brooks and Miljan 2003). A historical emphasis on ensuring economic and industrial development, as well as significant issues of enforcement and regulation, has caused Canada to move away from classic, top-down command and control approaches transferring the onus and burden for drinking water from the provinces to municipalities.⁵ The combination of private, public and shared or cooperative approaches toward water and watershed management, particularly as integrated and adaptive strategies are introduced, means that new and often highly politicized combinations of actors are engaging with water policy. This transformation has

been compounded as frequent challenges to the efficacy of conventional water management and policy continue to occur. Quite simply, trust in national or provincial enforcement and monitoring is quickly eroded by public health events, agricultural crises and heavily impacted vulnerable communities (such as the Kashechewan First Nation in 2005).

As a signatory nation of the Ramsar Convention, the federal government of Canada has been committed to the wise use of wetlands since 1987. In addition to sustainable utilization, the text to the Convention also calls for wetland conservation policies, monitoring and action plans, all of which have been implemented (to widely varying degrees) at the different levels of government (Government of Canada 1991, 1). Beginning in the early 1990s, the Canadian federal government began a series of dialogues and events to both develop partnerships between governmental and non-governmental organizations oriented toward wetland management and conservation, as well as to develop economically-based responses to the North American Waterfowl Management Plan. As a result of this and the eventual inclusion of wetland policy as part of the national Green Plan, national consultations across the country demonstrated significant public support for the conservation of Canadian wetlands, the reclamation of degraded sites and the importance of a cooperative and national approach. This, in turn, resulted in the 1991 Federal Policy on Wetland Conservation.

Couched in the objective of promoting the conservation of Canada's wetlands to sustain their ecological and socio-economic functions, now and in the future (Government of Canada 1991, 5), a number of goals and functions were identified that spoke to an early identification of the multiple functions and values that wetlands provide. Key amongst these is the no net loss of wetland functions on all federal lands and waters goal as applies to federal lands and waters and the delivery of federal programs, services and expenditures (Austen and Hanson 2007). As such the federal government explicitly identified the importance of wetlands to health, sustainable development, ecosystems functions and an integrated systems approach (Austen and Hanson 2007, 6). It also noted the importance of changing public perceptions and attitudes toward watersheds, finding mechanisms for cooperation between authorities, and the recognition of wetland functions in resource planning, management and economic decision-making with regard to all federal programs, policies and activities (Austen and Hanson 2007, 5 and 8). In many ways this reflects the broader constitutional and jurisdictional context of Canadian

water policy. The federal government derives its authority from a variety of legal sources that pre-date confederation (in 1867) and assorted statutes. It relies heavily on regulations from the Fisheries Act, the Environmental Protection Act, the Great Lakes Water Quality Agreement, the International Joint Commission and the Environmental Assessment Act, Canada Water Acts (the only federal legislation dealing explicitly with water resource management) and the Federal Water Policy noted above (Brooks and Miljan 2003).

In practice, however, most water resource management fall under provincial supervision. Section 92 of the Constitution Act (1867) gives provinces authority over water quality and water supply, including public health, municipal treatment, land-use planning, agricultural and industrial uses and pollution. This does not, however, imply mutual exclusivity across the multiple levels and jurisdictions involved in water policy. That said, as Hill et. al (2006) point out, there is a significant degree of inter-provincial variation in terms of the standards, norms, laws and history of water policy and management. Corresponding to this has been a gradual and inconsistent, yet important growth in the role and number of interest and community groups involved in partnerships and arrangements to manage water resources. Not only are industrial and agricultural organizations consistently important stakeholders (to the point of sometimes bordering on regulatory capture), but community, research and legally-based networks have also gained a significant policy impact.

While it is not possible to point to a true shift to community and integrated watershed management, there is no doubt that Canadian water policy has moved away from end of pipe and command-based models. The combinations of water quality crises, drought and urban development have brought both quality and supply concerns into sharp relief across multiple sectors. The limitations and uncertainties of the underlying science, risk management and regulatory frameworks have been increasingly contested. That said, while science and evidence-based natural resource management have been politicized, economic and market-based approaches have emerged as priorities in some regions. Still, others have emphasized the importance of more deliberative and participatory, community-based approaches to water policy, conservation and watershed management.

The primary objective of this study is to compare the regulatory regimes that have emerged within localized contexts relating

to: the Western province of Alberta, the Maritime province of Nova Scotia, and the St. Louis region in the United States. It is our argument that the practices and effects of watershed mitigation banking in the American Midwest should be taken into account in light of the proposal that Alberta adopt a similar approach, and be compared to the more participatory options pursued in Nova Scotia. In particular, we consider the potential of US-style mitigation banking in the Albertan context, and seek to place these implications within the larger context of the integrity gap derived from institutional and economic factors in Albertan, Canadian and American environmental policy.

Toward Watershed and Wetland Governance in Alberta

Although water policy in Alberta, like much of Canada, can be characterized as “command and control” with an emphasis upon the provision of licenses in order to facilitate a form of developmental equity, there are varying steps toward the “watershed governance” envisioned by Brooks and Miljan. While the province recognizes that water is often not located where it is most needed, there is a broader process of attempting to balance social, environmental and economic pressures that has driven some change in provincial policy.

Within the context of this paper, it is important to note that the Water for Life strategy was unable to produce a wetland policy. While the “Wetland Management in the Settled Areas of Alberta: An Interim Policy” (1993) still holds, the attempts to date to create a wetland policy stalled until the Spring of 2011, and progress remains slow, primarily as a result of opposition from industrial stakeholders. Since 2011, both a “Wetland Values” and “Mitigation” working group have attempted to restart the process, and at the time of writing (2013) a “New Wetland Policy” is scheduled to “be introduced...in the near future” (Alberta's Wetland Policy).

In 2003, the Water for Life strategy was released by the province in an attempt to both acknowledge and reconcile the pressures upon water in Alberta. Since then the strategy has been renewed in 2008 and upheld as a landmark approach toward environmental and natural resource, as well as population health protection. *Water for Life: Alberta's Strategy for Sustainability* (2003) was released after two years of engagement and consultation with water stakeholders and users. It focuses on three primary goals: (1) drinking water supplies; (2) healthy aquatic ecosystems; and (3) reliable, quality water supplies for a pros-

perous and sustainable economy. In keeping with this, many elements of the strategy are broadly consistent with watershed governance, including a focus on knowledge and research, and the benefits of partnership and water conservation. As a result, not only was the strategy renewed, but it led directly to the establishment of three public and private partnerships that are integral to the on-going implementation of the Strategy. These are: (1) The Alberta Water Council; (2) Watershed Planning and Advisory Councils (WPACS); (3) Watershed Stewardship Groups; and (4) The Alberta Water Research Institute (the research arm of the other three partnerships).

Taken together, the first three partnerships are responsible for the implementation of the short, medium and long terms goals of the Water for Life Strategy and Renewal, as well as the more localized planning, monitoring, stewardship, education and even advocacy of the different watersheds in the province. These activities are driven by not just the goals of the strategy, but also the explicit objective of ensuring that overall productivity and efficiency of water use in the province improve by 30% (from 2005 levels) by 2015. From a broad and “top-down” standpoint, Alberta has taken major steps in the direction of better water conservation and the overall management of its rivers, wetlands and watersheds. It is commonly acknowledged that public participation in the process to date has been relatively limited, with much of the focus (as demonstrated by the Alberta Water Research Institute) upon strongly technocratic, evidence-based water policy. Additionally, and as might be imagined, there is an emphasis upon the major rivers and watersheds in the province. This was supported in 2008 by a presentation from David Hill, Program Director of the Water Research Institute that emphasized “aquatic ecosystem/river health within a watershed context” (Slide 14, 2008).

However, what is largely absent in the last decade are the roles, policies and opportunities for (a) public participation and involvement in water policy and watershed management; and (b) the place of wetlands as an integral component of watersheds and watershed management. Thus, while water flow and license allocation are intimately connected to both rivers and watersheds, there is perhaps an over-emphasis upon water transfers and water markets in order to meet demand and conservation goals and less concern with wetland conservation, mitigation, ecosystemic function and policy. As others (see for example Guehlstorf and Lichtenberg (forthcoming)) have noted, the recognition of wetland services as part of a broader watershed management strategy is important to maintain ecosystemic

and environmental health functions. However, there is also a critical opportunity for public participation and engagement with wetlands as part of that watershed management strategy.

Although the province has publicly identified wetlands as critical to the overall health of watersheds, the 2008 report from the Alberta Economic Development Authority lumps wetlands into the broader water supply question. The report presents little content that speaks to the specific issues or questions raised by wetlands as an integral part of watershed management and services. Similarly, while both the 2003 strategy and its renewal addressed the importance of developing a wetlands policy to replace and supplement the 1993 Interim Policy, there is surprisingly little work on wetlands being conducted, supported or disseminated by the AWRI (only 1 of their 4 current initiatives focuses on wetlands, and little of their other work has a similar focus). This is despite the geographic and functional importance of wetlands in Alberta which cover over 16% of the province's land base, with as much as 65% of the northern land base being wetlands. In the south, where the majority of the province's agriculture takes place (the White Area) up to 64% of wetlands have been lost or impacted, while in the north (primarily the Green Area) the scope and scale of wetland loss and impact is not yet known, despite the significant industrial activity now taking place there (Alberta Wetland Policy 2009).

Thus, an important distinction is starting to emerge within the water policy landscape of Alberta. While wetlands are identified as important within the Water for Life strategy and a wetlands policy has been in the works for several years, much of the emphasis in terms of both the political discourse around water, as well as the broader issues of supply, demand and quality, are primarily oriented toward the rivers. The language of watersheds and watershed governance is increasingly used, however the emphasis in terms of reform, supply (based on snowpack and glacial melt) and overall assessment and allocations is oriented toward the flow of the primary river systems. Wetlands are recognized by the province as providing major ecological, cultural and filtering benefits, but the Wetland Policy in Alberta has been blocked and delayed since 2008. In the case of watershed management, as well as the wetland policy itself, there is also a pronounced lack of opportunities or emphasis upon public engagement or participation.

In the Spring of 2011, the province released a statement of policy intent regarding wetlands. This statement would be "provincial in scope, and cover natural wetlands in Alberta...(and

all restored natural wetlands, as well as wetlands constructed for the purposes of wetland compensation" (3). While mitigation banking is not mentioned explicitly in the statement of policy intent, the general structures proposed for wetland management do point to a similar process (5):

- 1) Avoidance: The primary and preferred response is avoiding impacts to wetlands;
- 2) Minimization: Proponents are expected to minimize impacts on wetlands;
- 3) Compensation: As a last resort, and where avoidance and minimization efforts not feasible or prove ineffective, compensation is required.

The statement of intent then goes on to say "Wetlands would be replaced type-for-type, where this is not possible, compensation would seek to replace wetland value" (5). Such activities might include restoration, creation or enhancement. Much like the draft policies in other provinces, the 2008 Alberta Policy and statement of intent is an attempt to redress the significant loss of wetlands and wetland functionality in the province. Importantly, in addition to the estimated 60% loss of wetlands in the south, an additional 23,000 hectares of wetlands may be impacted by petroleum development in the north, more specifically oil sands development. The primary goals are focused upon the ecological, social, and economic benefits of wetlands, primarily to ensure that the 3 over-arching goals of the Water for Life strategy are met.

A mitigation process has been recommended that emphasizes avoidance, minimization of disruption and compensation, and both are in keeping with the broader principle of "No Net Loss" put forward by the Federal Government. However, there are two key factors which will play into the efficacy and impacts of this policy: (1) the role and importance of oil and oil sands development; and (2) the recommendation that mitigation banking be explored as part of the Policy. Petroleum development has already played a role in delaying the adoption of the Policy due to objections to some of the requirements of the Policy. For example, both the Alberta Chamber of Resources and the Association of Petroleum Producers objected to the term "will" in areas of the Policy concerned with mitigation and compensation on the grounds that such a requirement would impede "sustainable development." This reflects the obvious costs of the adoption of the Policy given the nature and location of northern petroleum development (with estimates ranging from \$100 million to over 1 billion dollars in mitiga-

tion costs for some projects). However, beyond this, what is perhaps more interesting is the recommendation that a US-style approach toward mitigation banking be explored and adopted as a strategy.

The potential adoption of a mitigation banking scheme poses both problems, and potential solutions, to the issue of wetland loss and its broader role within water policy in Alberta. While space does not allow for a detailed overview of the original banking strategy here (see instead page 12 of the 2008 Implementation Plan) and there is no data yet available on the revised policy, there is evidence to suggest that the market-type incentives of mitigation banking can result in unanticipated consequences. They also hold the potential for changes in the structure and use of land and wetlands in other provinces.

Mitigation banking in the USA is historically a mechanism for removing urban or sub-urban wetlands in order to facilitate economic development and building or mitigating wetlands in rural or predominantly agricultural areas. However, the case in Alberta may be quite different. As noted above, there are up to 23,000 hectares of wetland that may be lost over the next few years as oil sands development continues. Ironically, a mitigation banking strategy could result in those wetlands being restored to the White Area of southern Alberta where most of the prior wetland loss has taken place. However, doing so would also remove almost 2500 square kilometers of agricultural land from the province. For most this is an outcome that is not desired economically or politically.

As work from the United States has demonstrated (see for example Guehlstorf and Hallstrom 2010; Guehlstorf and Lichtenberg - forthcoming), mitigation banking, at least as it has been implemented in the last decade can be described as an economic and political tool rather than a prescribed resource management tool. There is no formal provision for the maintenance of ecosystem function under the American mitigation banking process. This leads to a loss in filtering capacity as well as a decline in wetlands. The time frames under which the mitigation process functions (typically only a few years) means that while there is "no net loss" and possibly even a gain in wetlands and wetland function in the short term, within a few years mitigated or compensatory wetlands are often allowed to be developed, drained, or are simply no longer maintained.

This issue will present a major challenge for the implementation of this type of mitigation strategy in Alberta – like many

areas of the United States, the province has a major urban-industrial corridor (Calgary-Lethbridge-Edmonton) that is anticipated to almost double in population in the next 20 years (from approximately 2.5 to 5 million people or more). However, while much of this development, as well as agricultural demand, is situated in the south of the province, where wetland functionality is particularly necessary (and losses already high), the primary wetland losses to take place will most likely be in the north. As a result, there will be two distinct pressures on wetland functionality (industrial in the north, and urban in the south) as well as on compensation. In effect, while wetlands in the north could be compensated in the south, wetlands lost in the south (where their functional value is even higher) are unlikely to be compensated in the same region. This has significant potential to impact human and environmental health. Related factors also pose problems such as broader ecosystemic services, biodiversity and the maintenance of river flows.

An additional absence from the American model, which in turn may speak to the development of the Alberta Policy, lies in the question of public engagement and participatory democracy. There is significant literature pointing to not just the potential value of democratic participation for environmental politics (see for example Meadows et al. 1972; Lafferty and Meadowcroft 1996) but also the importance and possibilities of democratic engagement with science, risk and the environment. While it is doubtful that Habermas' (2003) "sleeping giant" of civil society will be awakened by an engaged discourse on water policy and supply, it is important to note that citizen-based engagement is both remarkably absent from the mitigation banking process in the USA. It should be noted, however, that participatory politics and/or lay policy implication is not explicitly articulated as an element of either the draft Albertan Wetland Policy as it pertains to mitigation banking, nor to the statement of policy intent.

In contrast to much of the emergent literature on integrative and adaptive watershed and resource management, opportunity structures for citizens to engage with the mitigation banking process are notably absent. In the Albertan case, while there is a new mention of wetland stewardship that would involve (1) education; (2) voluntary programs; and (3) incentives, there has not been any meaningful data that speak to the demand, benefits or process for citizen-based engagement. Similarly, the language of the mitigation banking strategy or compensation frameworks is composed overwhelmingly in scientific and "evidence-based" terms, and the allocation of scientifically-derived

value and function for social, environmental and economic benefits. From an Albertan standpoint, this is a particular weakness in light of the massive industrial development and environmental impacts of the Oil Sands. In fact, wetlands and water more generally are a key element of the provincial petroleum problematic – not only has the extraction of petroleum from the Sands left a mark that can (literally) be seen from space, but it has opened up for public discussion the question of acceptable risk.

While most of the province's citizens are generally in favour of continued oil and gas exploration and extraction, especially in the sparsely populated north, there is increasing media attention and knowledge that, no matter how "environmentally friendly" the development process is, it will result in massive environmental costs in terms of water consumption and quality, energy consumption, land use, wetland loss, eco-systemic functions, and quite possibly bio-diversity. As a result of the remote location of northern development, and the reliance upon arable land in the south, neither the broader risks of this pattern of development, nor the specific issue of wetland conservation, has received much public attention. In fact, the broader environmental implications of one of the largest industrial endeavours ever undertaken has received remarkably little citizen engagement and even less public debate.

This is problematic for more than just democratic reasons. When faced with risks of this magnitude, especially in addition to increasing vulnerability to energy shortages, water shortages and food security issues, a province such as Alberta must look to both the processes, and the lessons, that can guide its decision and policymaking. Specifically, when addressing such risks, as well as significant potential social, health and environmental equity issues, the absence of citizen input into risk management about wetlands speaks to the emerging reality of environmental politics in Canada. While citizens may be engaged in community-based monitoring and other piece-meal elements of the policy process, there is both a functional democratic deficit in water and wetland policy, as well as significant apathy from citizens. In fact, what is absent is, as Dryzek writes, "The kind of democracy I have been arguing for throughout is transitional and discursive...it is not electoral democracy, and is not institutionalized in formal organizations. Instead, it is to be sought in communicatively competent decentralized control...stressing action in the public sphere" (Dryzek 2006, 154).

Nova Scotia and Community-Based Regulations

As a result of the complexities generated by federal politics, re-

gional variation and increasing concern over both water quality and quantity, since 2001 Canada has started to move into a Watershed Governance in many parts of the country. This is a mixed approach toward water regulations and watersheds management including the recognition of multiple stakeholders, the identification of processes for more participatory groups in watershed inspection, and in some cases, a shift toward eco-systems-based and adaptive management of watershed points. For instance, water protection, stakeholder engagement, and citizen inputs are being integrated into both other policy domains (such as health), as well as the normal practices of watershed policy (Brandes, 2006). This shift reflects an increasing public, scientific and political recognition that, while Canada holds massive water reserves, the era of unlimited water supply is ending, if not over. This comes at a time when debates and policy around climate change, energy, agriculture, urbanization and health are increasingly pointing to, if not making demands on, Canadian water. Ergo, in terms of interest and policy regarding water since the 1980s Federal Water Review and the 1991 Policy on Wetland Conservation, serious policy windows have opened in the past decade that coincide with improved policy design, offering an appropriate scale and scope of watersheds programs and laws (Brandes 2006; Parkes, Morrison et al 2008).

Located on the Atlantic Coast of Canada, Nova Scotia is a relatively small province with a total population of less than one million residents. It has been subject to significant settlement since the 1600s, and while predominantly based in agriculture and natural resources (forestry and fisheries) is also home to significant industrial infrastructure and shipping via Halifax and other ports. Historically, water has not been considered a scarce resource in this region – mean annual total precipitation levels in counties such as Pictou between 1940 and 1970 were 31.9 inches of rain and 80.9 inches of snow. This is in addition to significant supplies of groundwater across the province (Nova Scotia Department of the Environment 1980). However, factors such as the very dry summers that took place during the end of the 1990s and into the 2000s increased public and legal attention to industrial contamination. In fact, in many parts of the provinces, water is still, or was until recently, treated as a free good. In turn, it is estimated that wetland loss to development in the province is equal to approximately 2.3 billion dollars in lost ecological services, and as climate change increases vulnerability of both coastal and inland areas significant impacts can be expected.

Despite this, there are numerous regulatory tools and legislation in place for wetland conservation in Nova Scotia. The Environment Act and Environmental Goals and Sustainable Prosperity Act (EGSPA, 2007) both contain provisions relevant to wetlands and respective authorities, while agricultural and municipal legislation also speak to wetland management. Within this regulatory and legislative context, the Nova Scotia Department of Natural Resources (NSDNR) has the primary responsibility of the management of wetland habitat. As such, based on a 2004 inventory, Nova Scotia exercises provincial authority over some 360,460 hectares of freshwater wetlands and approximately 17,000 hectares of salt marsh (NSDNR 2009). This is accomplished both through unilateral action and through a series of partnerships with other levels and sectors of provincial government, industry, non-governmental bodies and private land owners. This includes key regulations under the Environment Act (1994-95) for both provincial approval prior to the alteration of a wetland, as well as the requirement of an environmental assessment on any disruption of more than 2 hectares (in area or function). These requirements are complemented by the Agricultural Marshland Conservation Act, the Off-Highway Vehicle Act, the On-site Sewage Disposal Systems Regulations, and the Provincial Subdivision Regulations under the Municipal Government Act.

As public and policy awareness of the potential threats and challenges to regional water supplies grew as a result of industrial activity, agriculture and urbanization, beginning in 2000 both planners and policy-makers noted the need for more comprehensive and preventative methods. In keeping with this, key issue areas were identified that continue to resonate within provincial water policy: (1) improving water allocation between competing needs; (2) protecting water resource quality; (3) integrating the management of resources; and (4) developing partnerships in water resource stewardship (Atlantic Planners Institute, 2000). The latter two points are critical, not only because they demonstrate the emerging awareness of the benefits of geographical, rather than sectoral, based management, as well as the importance of both individual and community contributions for water. This is further reflected in the amendments to the Nova Scotia Environment Act (1994-95) in 2004 and 2006, which include ecological processes, as well as shared responsibility and stewardship, but also calls for the comprehensive integration of sustainable development principles in public policy making.

This broader set of principles has now found its way into the

most recent, and perhaps innovative, water policy in the province. The Nova Scotia Wetland Conservation Policy was released as a draft in the second half of 2009, and while still clearly framed in terms of sustainable development, attempts to recognize the importance of wetlands to the province. Additionally, it provides a degree of consistency to the existing legislation, regulations and operational policies already in place. The introduction notes that the Government realizes that effective wetland conservation and preventing net loss is unlikely to be achieved through policy alone and acknowledges the critical role of voluntary stewardship. The Nova Scotia draft Wetland Conservation Policy presents the newest step in attempting to manage the loss of wetlands in the province, and to present opportunities for public engagement and participation in the management/conservation process. That said, this policy does not apply to wetlands that have developed as a result of urban, commercial or industrial construction projects, or other similar human activities unless they are deemed ecologically significant (which includes compensation projects). Within this context, the Policy presents a clear objective of promoting wetland securement, stewardship and increased public awareness. Importantly, the Policy also attempts to comply with the federal commitment to no net loss of wetland functions on federal lands and waters by managing activity on Ecologically Significant Wetlands (ESWs) for no loss and other wetlands for no net loss. Specifically, any wetlands that have been enhanced, restored, created or protected as part of a compensation strategy for other wetlands are to be considered ESWs, and thus committed to a broader, no-loss strategy.

However, this strategy, and in fact the broader goals of stewardship, education and conservation presented by this new Policy are complicated by two key factors: (1) the overall devolution of authority to municipalities under the province's drinking water strategy; and (2) the preponderance of private ownership of the land base (approximately 75% of the land base in Nova Scotia is privately owned – this naturally includes many of the provinces watersheds). As a result, while there is a broad-based, top-down or technocratic element to the broader emergence of watershed governance and a demand-based focus for policy and decision-making (Brandes, 2006) driven by policy-makers and, increasingly, university-based researchers, there are also historical and economic drivers of, and barriers to, source protection, water and watershed management and more broad water conservation.

Despite the rhetoric of the recent 2009 Draft Policy, much of the last 15 years of watershed management and conservation in Nova Scotia has hinged on a withdrawal of the province from monitoring and overall management. Since the late 1990s, community-based engagement (particularly with monitoring) has grown rapidly. As Sharpe and Conrad (2006) note, this is the result of four factors: (1) reductions in funding for government agencies; (2) recognition of the need and benefits of engaging communities and stakeholders in watershed sustainability; (3) increasing mistrust of federal and provincial governments; and (4) a continuing rise in environmental awareness. While the scope of community engagement with water monitoring and protection has grown significantly, it has been disorganized and *ad hoc* (Conrad and Daoust 2008), and rarely extends to watershed management. Instead, and as might be expected, it remains focused on drinking water and ground/surface water quality. Within this context of water monitoring, protection and (potentially) watershed management, a key causal driver needs to be identified. While recent studies of community-based engagement with water resources have pointed to the dominance of advocacy, where most of their efforts are spent reacting to current problems and attempting to force action on an issue (Conrad and Daoust, 2008, 361). Additionally, universities are a key variable in the development of community-based monitoring capacity, communications and collaboration (CCC), as well as the broader engagement of rural and Aboriginal communities with both freshwater and coastal water issues. In addition to providing the foundation for initiatives such as the Community-Based Environmental Monitoring Network, post-secondary institutions such as Dalhousie University, St. Mary's University, and St. Francis Xavier University have all generated funding, collaboration and research, education, and evaluation/monitoring capacity for local and coastal watersheds. As such, while naturally key stakeholders in water management as a result of interested faculty and (sometimes) administration, the numerous universities in the province (Nova Scotia is home to 11 degree-granting institutions) have a strong and potentially vital role in fostering the engagement of both scientific and public communities in water policy and management, particularly as the new Policy moves toward revision and implementation.

In sum, Nova Scotia presents an interesting and perhaps unique case for watershed management research. Historically void of any over-arching or singular regulatory authority, water has traditionally been viewed as plentiful (if not too much so) and often a free public good. However, even as the provincial

government has rolled back its financial commitments to monitoring over the past few decades, community-based initiatives (often linked with, or driven by post-secondary institutions) have emerged to support watershed monitoring, conservation and management. Within that context, initiatives undertaken by Aboriginal communities in mainland Nova Scotia and Cape Breton were among the first to explicitly link environmental degradation and conservation with community development and population health. A primary question, therefore, remains – while community-based monitoring and assessment is well established, to what degree can community-based organizations make the shift both to watershed and wetland management, and what are the broader implications of such a shift? As Folke (2005) and Conrad and Daoust (2008) have noted, communities are often neglected but essential parts of ecosystem management (358).

Mitigation Banking in the Mississippi Watershed

Although strict regulatory guidelines and volunteer programs with market-based incentives have been implemented, wetland acres and functions are still lost. For instance, the Agricultural Reform Act of 2002 and the Congressionally-proposed 2008 Farm Bill include over a dozen conservation policies that offer approximately 10 million dollars of financial incentives for rural landowners to restore wetlands that were previously farmed or to stop agricultural producers from draining farmland (Yaich et. al. 2006). Nonetheless, the Federal Acts try to regulate private land developers because most state programs—like the ones highlighted in this analysis—are aimed at controlling misuse in practice. The result is that most cases offer a permit with little government support and demand a lot of work for private landowners (Zinn and Copeland 2001).

Due to the recent phenomenon of urban and suburban communities in the USA destroying more original wetlands than rural communities, some states are experiencing poor water quality while incorrectly using banking mitigation to compensate for lost wetlands. We focus here on wetland losses in the Army Corps of Engineers (USACE) District of St. Louis, Missouri, which has lost over 87% of its original 4.5 million wetland acres, thereby exceeding the national average for wetland losses (USDA 2007). Generally, wetland losses are occurring in rural Illinois, which supports more river wetland areas than any other state in the Union. Of course, Kansas City and Memphis Army Corps districts will be considered as they encompass some of the rural Mississippi and Missouri river watersheds

(Shiple 2003). Since wetlands have the ability to lower the concentrations of primary non-point source pollutants like residue from crop fields, an increased number of quality wetlands would address environmental and public health concerns in these areas. This is an essential problem in the mid-west but no real policy discourse is occurring on or about this situation. More importantly, the loss of wetlands and absence of monitored resource banks in rural areas warrants investigation as there seems to be some problems with the current voluntary market-based inducements.

The usual practice of rural wetland compensation is on-site mitigation where the developer must recreate the wetland at the same site where it is destroyed. Another option is in-lieu fees where developers pay fines that go towards wetland rehabilitation. Banking mitigation—the newest and most controversial—is a combination of the two previous options. It requires developers to purchase credits from a “bank,” which may be private, commercial, government sponsored, or a combination of the three. A mitigation bank is a functioning wetland—either created or purchased in a rural area—preserved for compensating urban developers whose projects require offsets for unavoidable impacts to regulated wetlands. Essentially, a contiguous area of wetland is preserved where developers may either build and maintain their replacement wetland or pay for someone else to do so. This monitored area is often in rural areas far away from the destroyed wetland in urban and suburban places. It is this political migration of natural resources that is the central problem of the U.S. regulatory regime, which needs to be understood and not repeated by Alberta regulators.

This phenomenon works in concert with the Clean Water Act to reach the goal of No-Net-Loss of wetland acres in the United States, but, according to many critics, results in function loss of wetland, decreased water quality, and increased urban sprawl. “Mitigation banking is an increasingly acceptable form of compensatory mitigation for both the regulatory and development communities, and therefore has enjoyed increasing usage in the past decade” (Lame 2007, 2). The Federal Guidance for the Establishment, Use and Operation of Mitigation Banks promotes the advantages of mitigation banks as providing large, consolidated wetland parcels that bring together financial resources, planning and expertise, streamlined permit processing, oversight and monitoring (Federal Register 1995). In contrast, banking mitigation, while potentially part of the federal mitigation sequence, is a policy tool that is less common for Canadian regulators as their provincial regimes emphasize in-

creased participation in areas with poor water quality and loss of wetland landscape, private-public partnerships, and a variety of “mixed methods.”

Deliberative Global Politics asserts that “decentralized control does not of itself signal democracy. Perfect markets are decentralized but not democratic, because they produce results based on the operation of economic mechanisms in which money alone matters, not political ones where public voice is possible” (Dryzek 2006, 155). Initial private sector investment in the bank eventually leading to an increase in preserved, often public wetland areas is an obvious benefit of mitigation banking. The quality of the compensatory mitigation and the decreased regulatory burden are also positive aspects of mitigation banking. Yet, the urban to rural shift of wetlands due to mitigation banking represents a flaw in the implementation of the program. The market for wetland credits would not exist without regulations that require compensatory mitigation, thus the mitigation bank market is a construct of federal and state regulatory programs (Ruhl and Salzman 2006).

The regulatory market within which mitigation banking operates does not account for the flood control and water cleansing benefits that wetlands provide nearby human communities. While there are many difficulties involved in placing an economic value on the ecosystem services of wetlands (Mitsch and Gosselink 2000), it would conceivably make the mitigation banking program more reflective of wetland's values to humans if it were attempted. That is:

The real estate market is the true driving force that guides mitigation bank location in the United States. The steering variables that influence the geographic placement of a mitigation bank are simply the price of land and the cost of developing the parcel. Those who own real estate could conceivably choose to preserve their tracts of land that contain wetlands, but there are no incentives to do so, especially when it is more lucrative to develop the land for economical not ecological uses. As such land that is the most difficult and expensive to develop is used for mitigation banking. Thus it is the unregulated environmentally bankrupt land market that offers the sole force for discerning bank location, not the bank credits established by environmental policy regulations. (Lame 2007, 83)

As mentioned by Ruhl and Salzman, state and federal agencies

must offer economic incentives for land to be used for banking mitigation in geographically accurate regions. Without such ecological engineering, current American wetland mitigation practices will always contribute to urban sprawl and result in the expansion of a city into the rural periphery which involves development of farmland, open space, and wetland (Kolankiewicz and Beck 2007). Sprawl contributes to degraded water quality from polluted runoff that accompanies the increased prevalence of impervious surfaces, and is a leading source of water quality impairment and reduced water table recharge (USEPA 2006). Wetland preservation in the continuing urban sprawling United States is a difficult legal situation because about 74% of the remaining acreage is located on private property (Zinn and Copeland 2004). In addition, there is a lack of positive incentives in urban areas to leave wetlands undeveloped (Lame 2007). With urbanization contributing to most of the current wetland acreage losses in the United States, an important component of urban sprawl initiatives lies in devising careful development strategies to prevent further losses of beneficial wetland ecosystems (Lame 2007).

The urban to rural shift of aquatic resources is characteristic of most banks in the United States. A map of the location of the Richland Creek Mitigation Bank and its associated projects in St. Clair County, Illinois in the St. Louis Corps District is displayed in Figure 3. The map also shows urbanized areas and urban clusters from the 2000 Census (U.S. Census Bureau 2007). An urbanized area contains at least 50,000 people, whereas an urban cluster contains between 2,500 and 50,000 people (Federal Register 2002). The majority of projects in the studied region for any natural resource bank lie within urban boundaries while the bank site lies outside of it. The urban to rural shift of aquatic resources facilitated by the current law and practice of banking mitigation are an environmentally unsound outcome of the wetland conservation implemented throughout the United States. In the most recent national wetland inventory—for the first time—researchers found that urban (and suburban) lands are now experiencing the highest levels of wetland losses.

Mitigation banking does not help to control these urban/suburban wetland losses. In fact, in the Mississippi river basin it appears to encourage such losses in urban areas. In the St. Louis area, efforts to buy out floodplain properties since the devastating flood of 1993 are being undermined by more development in the unprotected wetland floodplain (Pinter 2005). Since 1993, over 14,000 acres of floodplain and 2.2

billion dollars of new construction have been developed in the St. Louis area (Brandes 2006; Pinter 2005). In the Chesterfield Valley, an area to the west of St. Louis that was flooded by the Missouri River in 1993, development projects are supported by a Tax Increment Financing (TIF) scheme that funnels money into the area's \$58 million levee system through a community levee district (Heisler 2003). Thus, the community subsidizes development in the floodplain through the TIF, while at the same time encouraging the destruction of floodplain wetlands, which could lead to even more costs in the future in the event of another devastating flood (Lame 2007). Canadian regulators encouraging banking mitigation must be aware of the unintended consequence of transporting necessary wetland resources away from densely populated human communities to rural areas with fewer human health concerns for the quality and quantity of water.

Conclusion

While the adoption of a Wetland Policy in Alberta has yet to occur, there is little doubt that the province has expended significant resources and time in attempting to develop an overall management approach to the on-going, increasingly important, question of wetland management and restoration. Albertans have started to recognize, particularly since the late 1990s, that issues of supply, demand and quality are of increasing importance to political, economic, social and health policy domains. Crises such as Walkerton in Ontario certainly raised the national profile of water quality, but more localized events in both Alberta and Nova Scotia have also contributed to a heightened sensitivity to the vulnerability of human populations to changes in water. Many rural communities have faced frequent and recurring issues of water quality due to causes ranging from human error and negligence to natural contamination. In Alberta, the increasing severity and frequency of droughts, coupled with declining snowfall in the winter, have certainly raised the sensitivity of both the agricultural and rural population to water supply and conservation. At the same time there is limited public awareness or concern as to the underlying causes of water shortages, and to the benefits and values of wetlands and wetland functionality.

This paper has been an initial and, therefore, necessarily vague and general overview of the policy reforms and approaches toward water and wetland policy in these three regions. In a rudimentary sense, the comparison is mostly about proposed catchment initiatives for water in Alberta, community-based

approaches in Maritime Canada, and evaluative wetland policy for the United States. While draft water policies in Alberta make reference to the need for multi-stakeholder engagement and the inclusion of the voluntary sector, it is the absence of participatory opportunities and broader citizen engagement in both the implementation of water policy, and the Alberta Wetland Policy in particular, that is most noticeable. While this paper offers a descriptive examination of this dynamic, there are four factors that should be taken into consideration within the Albertan case as provincial regulators move toward a market-based approach for water policy: (1) regulatory capture is necessary and beneficial for the petroleum and mining industries, particularly in northern Alberta; (2) the energy sector and agriculture are major beneficiaries of the FITFIR system and the absence of a wetland policy; (3) mitigation banking and compensation strategies, as practiced in the USA, have proven to be a contributing factor to urban sprawl and reduced wetland ecosystem functionality, while in Alberta they compound the issues of growing urban spaces and intensive agriculture; and (4) water, wetlands and wetland policy will play an important role in the larger policy discourse surrounding the environmental and economic future of the province.

Ultimately, the shape of water and wetland policy in Alberta has yet to be fully determined. There are instances of citizen engagement and challenges to the developmental emphases of the provincial government, but also significant countermending forces and policy inertia. The Alberta Water for Life strategy presents a strong starting point for a comprehensive approach toward water that, at least on the surface, is consistent with “watershed governance.” Despite this promise, much of the work to date has focused on science, technocratic policy-making and the importance of evidence-based decisions based on monitoring and assessment data. Much of the emphasis within Alberta lies less toward the post-secondary research sector, and more toward the research capacity of the province itself. For example, the Alberta Water Research Institute and some post-secondary institutions (PSIs) in the province are being charged with more and more “regional stewardship” and capacity building. This is a significant challenge in rural Alberta as there are relatively few formal linkages between either wetland management, the WPACS and the PSIs. Such linkages have proven somewhat successful in terms of community-based monitoring and broader engagement with water management issues in the Maritimes, but have not followed the “top-down” approach that seems to characterize Albertan water policy.

There is no question that water is becoming the most important resource and, in some cases, commodity in the world. As the media attention given to recent documentaries such as *Food Inc. and Flow – For the Love of Water* has demonstrated, water is of very real concern not just to the billions of people living in the South, but increasingly to populations in North America raised and socialized to believe in the myths of both abundance and stability. For a province such as Alberta and a mid-Western region like St. Louis, with heavy economic and political reliance upon natural resources, a predictable and steady supply of water will be of the utmost importance to the politicians and citizenry. Similarly, if population growth in Alberta meets predictions many are concerned with how the province will deal with both increased demand and decreased supply. It should also be noted by Canadian researchers that despite the decade of third party market based banking in the United States, statutory alterations are still being proposed. For example, the Clean Water Restoration act is a legislative proposal that is in Congressional gridlock since mid-2009 because it controversially suggests that the legally debated word “navigable” be completely stricken from the Clean Water Act. Removing the environmentally unfriendly—albeit ecologically accurate—term will allow the U.S. federal government to force states to protect intermittent waters, seasonal wetland catchments, unattractive mudflats, hydrological meadows, and prairie potholes.

In the United States substantial amounts of wetlands are being lost because the U.S. Supreme Court has limited the administrative oversight of the Army Corp of Engineers in a couple of landmark cases: *Solid Wastes Agency of Northern Cook County v. U.S. Army Corps of Engineers and Rapanos v. U.S. and Carbell v. Corps of Engineers*. Sound wetland protection is not occurring in the United States because of the aforementioned flaws of banking mitigation but also the statutory definition and significant nexus test of delineating waters within their jurisdiction. Although the quantity and quality of remaining wetlands are still in jeopardy, the time-consuming permit process of mitigation will serve as a deterrent for environmentally reluctant developers and private-rights apologists who are told to progress with consultation from sustainability counselors and wetland legal advisers (Mayer Brown LLP, 2010). During this mitigation process active citizens in Canada and the United States alike can find evidence and argument for saving the tributary and buffer land between or adjacent to water in North America that is needed for sustainable agriculture, public health, and systematic ecological functions.

Ultimately, as this paper has demonstrated, there are multiple variants of the integrity gap present in both US and Canadian water policy. While Lee and Perl (2004) present the integrity gap largely in terms of the capacity of Canadian political institutions to transform public opinion and rhetoric into public policy and action, there are other ways in which to conceptualize such a gap. In terms of watershed policy and mitigation banking strategies specifically, there are integrity gaps present across a number of dimensions. Naturally there are difficulties for provincial public policy in meeting the challenges of the Alberta policy goals named in the Water for Life strategy, which reflect both regional and national concern with water safety and (to a lesser degree) supply. There are also significant gaps present between the goals and activities of industrial development, agricultural activity and population growth/urbanization. This gap is perhaps best explained, despite the recognition of public health and safety concerns in water and watershed policy, from an eco-health and eco-systemic services standpoint.

While water has proven an invaluable resource for Alberta, and the many Midwestern states, from the standpoint of agricultural production, the recent shift to heavy industrial energy production in northern Alberta (the Athabasca Oil Sands) has created a dramatic and competing draw upon water supply. The proposal for mitigation banking in Alberta presents a theoretical option that meets industrial demand for water in the north, as well as helping to promote an improved public image of the production in that area as “environmentally friendly.” However, what is especially absent is an integrated analysis or approach to watershed management and policy that explicitly recognizes the intersection and demands of health, industrial, agricultural and environmental policy domains. Thus, the integrity gap exists not only between policy goals and political action, but in a more nuanced way between policy domains across watershed policy in both Canada and the USA.

There is no question that industrial considerations have significant weight in the making of Albertan public policy, and in many ways the proposal to adopt mitigation banking supports that thesis. A policy of “no net loss” speaks to an attempt to limit the already substantial impact on wetlands in the provincial north, and to minimize the visual and conceivably eco-systemic effects of oil sand production. While a mitiga-

tion banking approach may fit the economic, political, and industrial needs of the province, it is less suited to the other sectors of the region.

Specifically, as the lessons from the USA demonstrate, while a mitigation banking approach has the theoretical potential to fit eco-systemic, health, industrial, and agricultural needs simultaneously, this is not the case in practice. Instead, an emphasis on meeting one set of goals (eg. urban development in the Midwest or energy production in the Albertan north) tends to remove the capacity and benefits of wetlands from the other sectors. Thus, mitigation banking in the north might retain eco-systemic functionality but return wetlands to the provincial south where they have not been utilized by the agricultural community. On the whole a “no net loss” approach of mitigation banking has greater potential to see: (1) lost eco-systemic and health functions in urban areas (where it is often most necessary); (2) diminished maintenance of wetlands in the short term assessment (a few years to perhaps a decade); (3) and a shift of wetland functionality from areas of higher population to more remote parts of the province. As discussed, these regulatory experiences have to some extent already occurred in the USA.

In conclusion, the practices of mitigation banking in the USA present a number of opportunities for Canadian policymakers and researchers to better understand the implications of wetland policy for watershed governance in Canada. While Canadian water policy has tended toward more community-based and participatory practices on the whole, the province of Alberta has seen both industrial and agricultural demand push such engagement in a different direction, with watershed planning advisory councils as the primary mechanism for such engagement to take place, within the context of a larger set of province-wide strategic priorities and documents. The proposal to adopt mitigation banking as part of these strategic priorities, while understandable, provides an opportunity to both examine the impacts of such activities elsewhere as in the USA but also to better explore the integrity gap so increasingly apparent in Canadian environmental policy.

As this paper demonstrates, the practices of mitigation banking in the US’ Midwest have environmental, health and population/developmental impacts. Like so many instances of environmental policy, the unanticipated consequences of mitigation banking in Illinois and Missouri demonstrate not only the complexities of water policy, but also the need for policy instru-

ments and models that explicitly acknowledge and link environmental concerns to other policy domains. Without doing so, and with a tendency to focus on meeting the demands of only one or two of the multiple sectors without concern for limitations may be problematic. For example, on provincial water supply and quality, the potential remains for Alberta to follow the American lead, and while attempting to preserve the total asset base of the province’s wetlands and watersheds, this will contribute to significant health and environmental costs. Perhaps, Dryzek eloquently states it best: “Perfect markets are decentralized but not democratic, because they produce results based on the operations of economic mechanisms in which money alone matters, not political ones where public voice is possible” (Dryzek 2006, 155). Alberta has the opportunity to discursively learn from the USA, but like any good history lesson the USA example raises more challenging questions and contradictory motives than concise directions. It is our implicit argument, however, that the unsustainable practices in the USA may subjectively offer theoretical insight into the ambiguity of decision making that is Alberta’s changing watershed and/or wetland policy.

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Endnotes

¹According to the North American Wetlands Conservation Council, an estimated 20 million hectares of Canada's total wetland base has been drained or converted to other uses. This equates to nearly 15% of all wetlands in the country. More specifically, this loss is comprised of 70% of central prairie sloughs, 65% of Atlantic salt marshes, 80% to 98% of urbanized regions, and 70% of Pacific estuarine marshes (North American, 2000). A vast contribution to Canadian wetland loss is observed in the province of Ontario. According to studies undertaken by Lands Directorate, under the Canada Land Use Monitoring Program, southern Ontario was once home to 2.38 million ha of wetlands (Environment Canada, 1986). Since settlement, however, wetland loss has resulted in only 0.93 million existing in 1982, which approximates a decline of 70% (Environment Canada, 1986). While other various studies propose a slightly lesser number, somewhere in the neighborhood of 60%, the general consensus leans towards the more striking figure that is comprehensively used today. Throughout the province of Alberta, wetland degradation and loss is similar, ranging from 66% to 93.2% (Sankowski et al., 1987).

²Generally, a watershed is a boundary of land that separates different drainage basins. In Canada it is specifically defined by the naturally occurring draining of water from the higher elevation of the land to the lower (Kwasniak 2001). To be considered a United States wetland, however, three characteristics are necessary: water, soil, and vegetation (Braddock 2007). While this definition appears straightforward, complications arise for U.S. regulators because water may only be present in the area seasonally.

³ When compared with other G8 states across 25 different environmental indicators, Canada falls into the bottom 10% on almost all indicators.

⁴It is important to note that only a relatively small portion of Canadian fresh water is renewable – the vast majority is held in Pleistocene ice shields (Brooks and Miljan 2003).

⁵In Canada, constitutional authority over the management of public lands and resources, non-renewable resources, and matters of "local or private nature" fall under provincial jurisdiction (Brooks and Miljan 2003).