

Exploring the Implementation Potential of a Proposed Water Ethic:
A Canadian Case Study into Underlying Ethical Considerations for
Water Resources Management

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

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Abstract

Ideas about water use and ethics have been linked for many thousands of years. In this millennium, water resources remain a primary area of concern throughout the world, including such issues as shortages, supply, flooding, quality, restoration, allocation and regulation. Today, electronic environmental news and specialty websites contain a breadth of information on current water resources conflicts and issues throughout the world. In many parts of the world, water quantity is decreasing and water quality is worsening, lack of access to improved water supplies is decreasing, as is access to basic sanitation. Water challenges relating to water quantity and water quality are increasingly common in Canada and the United States due to water resources being under increasing pressure from population growth, economic activity and intensifying competition for the water among users.

Faced with these challenges, humans are confronted with momentous decisions. Before making more decisions that will have an influence over water resources, and in response to repeated calls for a water ethic, this research takes the perspective that it is necessary to explore the ethical intentions of decision-makers with respect to water resources legislation and policy in Canada. The ultimate goal is to define a set of principles for a proposed water ethic that could and should be implemented at the municipal level of government in Canada.

A review of academic and professional literature and a mixed methods research approach comparing two case study areas was used to gain a baseline understanding of the potential influences of underlying ethical frameworks on policy makers in Calgary, Alberta and Guelph, Ontario. A proposed water ethic, containing a set of principles compiled from ethical considerations for water use in academic and professional literature, was also developed and presented to case study participants. Participants provided feedback on their strength of agreement with each principle, thoughts on modifications, improvements and/or deletions of any principle, and implementation considerations of the proposed water ethic at the municipal level of government.

The results indicate that case study participants in both areas apply a variety of ethical frameworks when making professional decisions about water resources management, and when preparing water legislation and policy. A review of relevant legislation, policies, documents and strategies in the case study areas

supports this conclusion. In particular, components of the Consequentialist ethical framework (a perspective that can be associated with sustainable development and sustainability) are most often acknowledged in the statements of intent of the participants and water resource legislation and policies. Respondents also indicated that value positions associated with the Intrinsic Value ethical framework influenced policy preparation and decision-making; however, the ethical considerations associated with this framework are not as obvious in the language and intent of relevant legislation, plans, documents, and strategies.

The case study participants in both areas supported all six proposed principles of the proposed water ethic and offered only minor modifications to the presented wording and intent. The endorsed principles of the proposed water ethic are: (1) allocate sufficient water to maintain and enhance ecosystem integrity; (2) establish conservation and efficiency measures as a priority over new supply initiatives in water resources planning; (3) meet basic human needs and enhance equity; (4) establish open and participative decision-making processes; (5) identify and seek to obtain multiple sustainability benefits from water-centered initiatives; and, (6) explicitly acknowledge system complexity and emphasize precaution. The feedback from the participants about the proposed water ethic, in association with the results of the ethical frameworks, informed the eight implementation recommendations, including: (1) entrench a water ethic vision in Provincial and municipal legislation; (2) work from within existing governance structures and institutional arrangements; (3) use an incremental model of decision-making; (4) provide specific policy examples for each principle within a water ethic; (5) include realistic and measurable targets within the policies; (6) accept that all six water ethic principles are unlikely to be accepted at once; (7) ensure the overall vision of the water ethic, principles, associated examples, and measurable targets, are defensible; and, (8) acknowledge the importance of strategy. The recommendations acknowledge that while the proposed water ethic is presented as a package and each principle is valuable, conflict and trade-offs may occur during the implementation process. The recommendations are therefore pragmatic and take into account the current governance structures and institutional arrangements.

There is a growing recognition that understanding the underlying ethical perspectives that influence decision-makers may contribute to more effective water resources management legislation and policy. This research adds to this body of knowledge by showing that it is possible to identify ethical frameworks, extract the defining characteristics associated with each framework, and use case studies to suggest which ethical

frameworks assert varying degrees of influence. This link between theory and practice may help organizations recognize what ethical considerations influence decision-making and identify the strengths and limitations of these ethical approaches to managing water resources. In addition, prior to this study, research had only been conducted into the identification of principles for the ethical use of water and not into the potential for implementation of a realistic and desirable water ethic that reflects sustainability and lasting well-being at the municipal level of government in Canada.

Several opportunities exist to build on this research. They include (1) investigate if the ethical intent of legislation and policy related to water resources management is put into practice, (2) identify other ethical frameworks that may apply to decision-making, (3) focus on political decision-makers and their claims and intentions about water use, (4) test the implementation of the water ethic proposed in this study, and (5) investigate how to integrate ethical considerations about water into checklists and protocols related to land use development, professional codes of conduct and standards, institutional and organizational training programs, performance measures for official plans, and as standard components for municipal council reports and ministerial presentations. This exploratory research concludes that policy makers are willing to become more aware of their underlying ethical underpinnings and to learn how ethical considerations embedded in legislation and policy have the potential to exert significant influence over the behaviour of current and future water users.

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List of Acronyms

ACA: Alberta Conservation Association
ALSA: Alberta Land Stewardship Act
AWC: Alberta Water Council
BRBC: Bow River Basin Council
CA: Conservation Authorities
CBC: Canadian Broadcasting Company
CCME: Canadian Council of Ministers of the Environment
CCPA: Canadian Centre for Policy Alternatives
CEAA: Canadian Environmental Assessment Act
CIELAP: Canadian Institute for Environment Law and Policy
CMP: Calgary Metropolitan Area
COAG: Council of Australian Governments
COMEST: Commission on Ethics, Scientific Knowledge and Technology
CRP: Calgary Regional Partnership
CTP: Calgary Transportation Plan
CWRA: Canadian Water Resources Association
EARP: Environmental Assessment Review Panel
EBR: Environmental Bill of Rights
ECO: Environmental Commissioner of Ontario
FAO: Food and Agriculture Organization (of the United Nations)
FCM: Federation of Canadian Municipalities
FITFIR: First in Time, First in Right
FOR: Friends of the Oldman River
GCL: Guelph Civic League
GLWQA: Great Lakes Water Quality Agreement
GRCA: Grand River Conservation Authority

GWP: Global Water Partnership
IAD: Institutional Analysis and Development
IFAD: International Fund on Agriculture and Development
IJC: International Joint Commission
INAC: Indian and Northern Affairs Canada
IRPP: Institute for Research and Public Policy
IUNC: International Union for Conservation of Nature
IWCE: International Conference on Water and the Environment
IWRM: Integrated Water Resources Management
LUF: Land Use Framework
MDP: Municipal Development Plan (Calgary)
MNR: Ministry of Natural Resources
MPIR: Ministry of Public Infrastructure and Renewal
MVA: Meewasin Valley Authority
MOE: Ministry of the Environment
NRCan: Natural Resources Canada
NRTEE: National Roundtable on the Environment and the Economy
NWCF: New Water Culture Foundation
NWT: Northwest Territories
PTTW: Permit To Take Water
SPP: Source Protection Plan
SWA: Saskatchewan Watershed Authority
UN: United Nations
UNCED: United Nations Conference on the Environment and Development
UNDP: United Nations Development Program
UNESCO: United Nations Education, Scientific and Cultural Organization
WCED: World Commission on Environment and Development
WC & ES: Water Conservation and Efficiency Strategy (Guelph)

WDM: Water Demand Management

WEP: Water Efficiency Plan (Calgary)

WHO: World Health Organization

WPAC: Watershed Planning and Advisory Council

WSMP: Water Supply Master Plan (Guelph)

WWMP: Waste Water Master Plan (Guelph)

WWW: Wellington Water Watchers

Chapter One: Introduction to the Research Problem, Objectives and Methods

1.1 Introduction

The purpose of this research is to explore the relationship between ethics and water resource management, specifically how ethics can or should affect decisions about water policy and its implementation at the municipal level of government in Canada. The dissertation begins with a review of high-profile and common water resource challenges, then moves to a broad overview of the research goals, objectives and approaches used in this research. An in-depth exploration of the concept of ethics and applications of various ethical frameworks to water and resource management follows. The research then identifies and critically assesses the main frameworks used to guide Canadian water resource management decision-making and continues with an examination of water conservation practices, noting key paradigms, frameworks, concepts and interpretations that have been applied or proposed. The ultimate goal is to define a set of principles for a proposed water ethic that could and should be implemented at the municipal level of government in Canada, recognizing that institutional arrangements may need to be modified in order to accommodate this ethical shift. Identifying the specific principles contained within the current ethic in Canadian water policy is not the focus of this research; however, exploring some of the underlying ethical perspectives that may influence current water policy is part of this research.

1.2 Contemporary Water Issues

Headlines, news reports, and feature articles over a number of years have portrayed water shortages and contamination as critical issues, even to the point of suggesting that water resources problems were the ‘energy crisis’ of the 1980s and 1990s. In this millennium, water resources continue to remain a primary area of concern throughout the world, including such issues as shortages, supply, flooding, quality, restoration, allocation and regulation. Popular periodicals such as *National Geographic*, *Newsweek*, and *U.S. News and World Report* have devoted cover stories to the North American and the world’s water resources problems, and endless news items report on water resources.

More recently, electronic environmental news and specialty websites are full of information on current water resources conflicts and issues throughout the world. Yet, most people continue to use water with little concern for possible consequences. At the same time, according to Druzik (2003, 1), “a growing number of public officials, private interests and various professionals are dealing with the issues involved in water resources management. Central to sound management is the planning function, which seeks to bring out rational decision-making with regard to future needs.”

In many parts of the world, water quantity is decreasing and quality is worsening (UNESCO 2006, 43). According to the United Nations (UN) World Water Development Report (2006), 1.1 billion people lack access to improved water supplies, while 2.6 billion people lack access to basic sanitation. People who live in the poorest countries of the world face the greatest challenges with respect to access to a basic quantity and quality of water (Selborne 2000; World Water Commission 2000; Priscoli et al. 2004; Vörösmarty et al. 2004; UN 2005; WWF 2010). However, the wealthier, industrialized nations also face growing water challenges. Water shortages are increasingly common in Canada and the United States (Sprague 2007; Clarke 2008; Brown and Schmidt 2010; Chretien 2011).

We see frequent conflicts over regulation, allocation and distribution of water. According to Annan (2002, 2), “the wars in the next century will revolve around water”, and that access to water will, in the 21st century, become the “political battle for the future balance of mankind”. Not only is there political friction regarding access to water, but this turmoil goes even deeper when we consider that wars are often starting over water merely as a “a pawn to carry out political projects” (Izquierdo 2004, 4). Others, such as Allan (2003) and Cooley et al. (2009), argue that while wars over water are unlikely, water and its use is often a cause of tension and conflict in areas all over the world.

Water is a critical resource for the preservation of human life. Although fresh water is so important, it is not readily available in every nation. For example, water accounts for 70% of the Earth’s surface. However, more than 97% of the Earth’s water is currently unusable (for most practical purposes) ocean/seawater, and most of the remaining 3% is found in glaciers and aquifers, making it very difficult to access (UN 2012). Water type and location is not the only problem; the world’s population has tripled and water demand has increased six-fold over the last century. Because of these water issues, water has become increasingly important to citizens, planners and lawmakers.

1.3 Implications and Ethics

A report prepared by UNESCO (2005) identifies several key trends and challenges concerning water. Water resources are increasingly under pressure from population growth, economic activity and intensifying competition for water among users. Global water withdrawals have increased more than twice as fast as population growth. Currently, one third of the world’s population lives in countries that experience medium to high water stress. Pollution is further exacerbating water scarcity by reducing water usability downstream. The UNESCO report also noted shortcomings in the management of water, a focus on developing new sources rather than on better managing existing sources, and top-down sector approaches to water management which often result in uncoordinated development and management of the resource. Furthermore, the report stressed that more development means greater, potentially detrimental, effects on the environment. Finally, there are increasing concerns about climate variability and climate change that demand improved management of water resources to cope with more intense floods and droughts.

In the twenty-first century, humans face environmental challenges that are unparalleled in the history of this planet. Natural resources are either being polluted or depleted at alarming rates, and human population growth is estimated to reach 10 billion by the year 2100. Compared with the 2011 population of approximately seven billion, this probable increase of three billion people within a 90 year timeframe is astonishing (UN Population Division 2011). This exponential increase in population growth and the growing overall consumption of resources leading to deepening social and economic inequalities further increases the risk of environmental depletion and degradation.

Faced with these imminent environmental challenges, humans are confronted with momentous decisions that involve “moral aspects (allocative questions, questions of sustainability and future generations, procedural issues, solving trade-offs, dealing with risks and uncertainties, etc.)” (Kowarsch and Schroer 2011, 1). Before making decisions that will influence humans and the environment we live in, “it seems only reasonable that we should step back and reflect on the decision-making itself” (Des Jardins 2001, 43). According to Kowasch and Schroer (2011, 4) these environmental challenges “cannot be solved merely by economic or technological arguments, but clearly point out the task for ethically reflecting” on how critically reviewed ethics can reasonably be inserted into decision-making about water management. Postel (2008, 22), reflecting on water management issues, thinks that there exists “a disconnection from nature’s web of life and from water’s most fundamental role as the basis of that life. In our technologically sophisticated world, we no longer grasp the need for the wild river, the backwater swamp, or even the diversity of species collectively performing nature’s work. By and large, society views water in a utilitarian fashion – as a ‘resource’ valued only when it is extracted from nature and put to use on a farm, in a factory, or in a home.” Postel (2008, 22) declares that, “what is needed is a set of guidelines and principles that stops us from chipping away at natural systems until nothing is left of their life-sustaining functions, which the marketplace fails to value adequately, if at all. In short, we need a water ethic – a guide to right conduct in the face of complex decisions about natural systems that we do not and cannot fully understand.”

The process of distancing oneself to examine the bigger picture is the essence of philosophical ethics. “Ethics involves a self-conscious stepping back from our lives to reflect on what we should do, how we should act, and what kind of people we should be” (Des Jardins 2001, 46). An ethic is “a set or system of moral principles and values that guides the actions or decisions of an individual or group” (Matthews et al. 2007, 336). Chapter Two of this dissertation provides a more comprehensive discussion about ethics. For the purpose of this study, an ethic is defined as a set of moral principles, rules, guidelines, or imperatives of conduct for deciding whether a decision is right or wrong. In this dissertation, the focus is on upon both the ethics of decision intent and the potential consequences of the decision. However, further study into the consequences of decision-making may be required in order to gain a deeper understanding of how influential intent is on consequences.

All evolved ethics have resulted from a single premise, as stated by Leopold (1949, 203-204) “that the individual is a member of a community of interdependent parts. His instincts prompt him to compete for his place in that community, but his ethics prompt him also to cooperate (perhaps in order that there may be a place to compete for).” Humans should consider ethics because our relationship with nature today influences the availability of Earth’s resources tomorrow.

1.4 Summary

Water and ethics deal with the moral obligations related to sharing the world’s limited water resources. Attaining fairness or equity in access to water for various human activities, while also preserving the natural environment, is a challenging goal. The vastness of scales, from global all the way to municipal, and the connectivity of these complex elements make it difficult to achieve this goal.

Water ethics has received increased attention in recent years. It is recognized that the UN Millennium Development Goals related to water and sanitation are not being attained, perhaps in part because the practical implementation of effective policy requires an understanding of ethical motivations. The UN Millennium Project Task Force (2005, 18) acknowledges that, “access to water and sanitation is a moral and ethical imperative rooted in the cultural and religious traditions of societies around the world and enshrined in international human rights. Human values and ethics also have a significant role to play in the achievement of the Millennium Development Goal targets.” The ability to meet the goals of fairness and equity in access to water by 2015 potentially hinges on understanding not only the underlying ethical frameworks that are “rooted in the cultural and religious” minds of policy-makers, but also on understanding the established institutional arrangements that ultimately define rights and access to water. Bringing these aspects to the forefront of discussions is essential if there is to be progress in the management of water resources on global through to municipal levels.

This introductory section has reviewed some contemporary water issues and noted that the goal of the research is to define a set of principles for a proposed water ethic that could and should be implemented at the municipal level of government in Canada. The following sections (Research Problem, Objectives and Methods), present the research question and subsequent objectives, and then explain how this research was conceived and conducted.

1.5 Research Objectives and Methods

This chapter provides an overview of the research goal and objectives, as well as how the research was conducted. A summary is provided regarding the case studies used to enhance and critically analyse information and insights from the literature on water resource management and ethics. This exploratory qualitative research examines the ethical foundations of decision-making based on a suggested set of principles with respect to water resources. In addition, the underlying ethical precepts of water policy are explored through two case studies. The goal is to present a well-considered water ethic that could be

implemented at the municipal level of government in Canada, with possible application in other nations that have a similar, democratically structured government.

Briefly, a literature review was conducted to explore the underlying ethical foundations of resource-based decision-making in general and to develop a set of principles (a proposed water ethic) to be used as an assessment tool in the case studies. Telephone and face-to-face interviews were conducted with targeted individuals in select case study areas so that local insight could be acquired about water policy development and implementation across Canada. Content analysis of specific water policy documents, legislation, and associated documents (e.g., Council Minutes) was also used to triangulate with the interviews.

The following sections provide details about the research goal, objectives, and methods used to gather the information to provide a solid foundation for the implementation of a proposed water ethic at the municipal level of government in Canada.

1.6 Research Overview

1.6.1 Research Goal

The goal is to answer four key research questions:

- (1) What major ethical frameworks have influenced decisions about natural resources?
- (2) How have these major ethical frameworks affected water policy creation and decision-making in two Canadian case study areas?
- (3) Based on the analysis conducted for research questions (1) and (2), what would be an appropriate set of principles to comprise a proposed water ethic that is realistic, desirable and reflects sustainability and lasting well-being?
- (4) Presuming general endorsement of the principles of the proposed water ethic, is it implementable at the municipal level of government in Canada?

1.6.2 Research Objectives

The identification of specific principles associated with the current ethic in Canadian water policy is not the focus of this research, but exploring some of the underlying ethical perspectives that may influence current water policy is part of the overall intent. In order to achieve the research goal, the following objectives, which map-out how the four key research questions will be answered, were addressed:

- (1) Identify the major ethical frameworks, provided in academic literature and professional writings, which have historically influenced decisions about natural resources in general, and water specifically. The sub-objectives for this question are:
 - (i) Organize the components of the major ethical frameworks found in the literature review such that they may be compared and contrasted; and,

- (ii) Clarify and confirm/refute the findings of the literature review through two in-depth case studies (Calgary, Alberta and Guelph, Ontario).
- (2) Identify the historical water management frameworks, in Canada, that have influenced water legislation and policy at the federal, provincial, and municipal levels of government. The sub-objectives for this question are:
- (i) Determine what the literature on water management experience identifies as the major systematic management strengths and weaknesses, and what these imply about the advantages and limitations of the underlying ethics; and,
 - (ii) Clarify and confirm/refute the conclusions of the literature review through two in-depth case studies (Calgary, Alberta and Guelph, Ontario).
- (3) Develop a proposed water ethic, based on a set of principles that are realistic, desirable and that reflect commitment to sustainability and lasting well-being. The sub-objectives for this question are:
- (i) Identify, through the literature, the shared principles in global declarations on water ethics and any significant points of divergence;
 - (ii) Determine whether and how the findings concerning the global declarations fit with the lessons from Canadian experience (findings related to objective 2);
 - (iii) Through interviews with case study participants, and a content analysis of relevant policies, legislation, guidelines, documents, and strategies, assess if the proposed set of principles is acceptable to key policy writers and those who implement policy, or if they require modification prior to possible implementation at the municipal level of government in Canada.
- (4) Provide a guide for implementation (see Chapter Eight) of the proposed water ethic at the municipal government level in Canada. The sub-objectives for this question are:
- (i) Draw out and substantiate findings from literature review, field trips to the in-depth case study areas, interviews, and content analysis of policies, legislation, guidelines, documents, and strategies;
 - (ii) Summarize the benefits and tensions of implementing the proposed water ethic within current institutional arrangements; and,
 - (iii) Document insights, issues, and opportunities for further study and implementation of a proposed water ethic.

1.6.3 Research Design and Methods

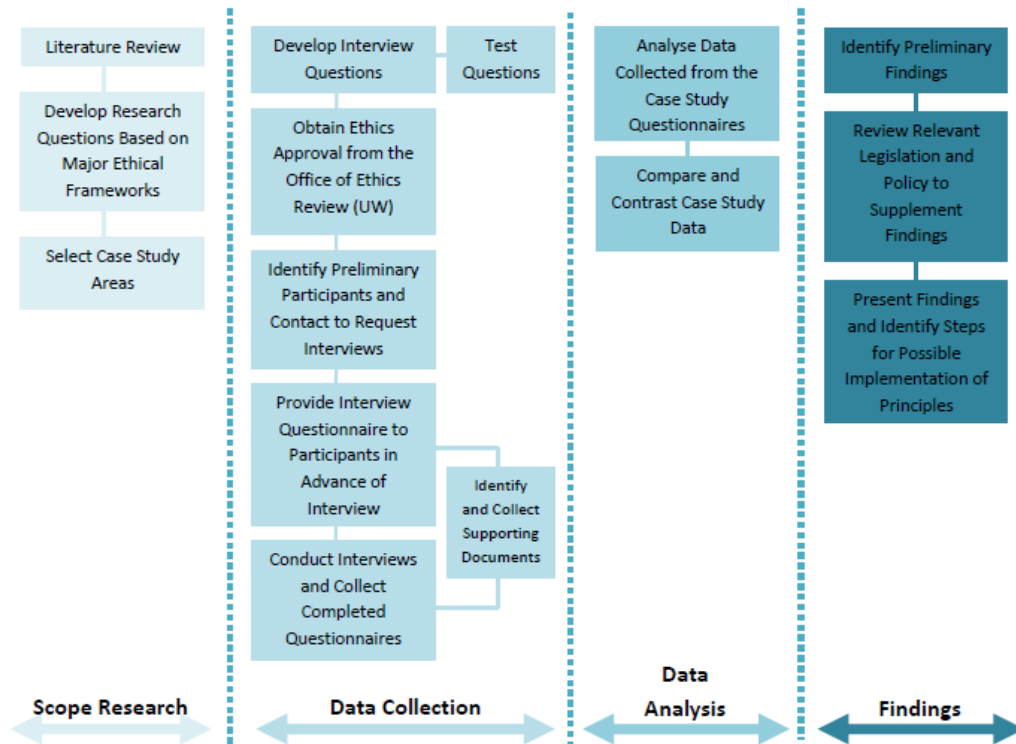
Three methods were used to fulfill the research goal and objectives:

- (1) A review of academic and professional literature regarding relevant theoretical, conceptual and practical contributions to the field of natural resources;
- (2) A content analysis of relevant policies, legislation, guidelines, documents, and strategies in the two case study areas (Guelph, Ontario and Calgary, Alberta);

(3) Telephone/personal interviews with key policy-writers and those who implement policy in the two in-depth case study areas.

Figure 1.1 provides an overview of the steps involved in the research design. The rationale for the choice of Guelph and Calgary is provided in section 1.6.

Figure 1.1: Research Design Stages



1.6.3.1 Literature Review

Ethics is a complicated field of study, fraught with confusion and conundrums. The literature review in this project covered fields of study from natural resource management, decision-making, governance, institutional arrangements, sustainable development, water policy, and finally, ethics. Each field of study provided a foundation upon which to define a proposed water ethic based on principles from the literature review. While many claims appear in the literature about the critical nature of the world’s water crisis and the urgent need for a more comprehensive and consistent ethical framework to guide our water management practice, locating a set of ethical principles or guidelines relating to water management that is realistic, desirable and that reflects sustainability and lasting well-being is not straightforward (Postel 1989; UN 1992c; Armstrong 2006; Brown and Schmidt 2010). There is a real lack of discourse in this area, in part because the study of water ethics is still in its infancy. In the academic field, literature on water and ethics in particular is

scarce, and, where it does exist, is very recent (Bakker 2007; Matthews et al. 2007; Llamas et al. 2009; Brown and Schmidt 2010).

The fields of academic and professional (e.g., policy documents, legislation, municipal master plans) literature that I have chosen to focus on in this research are the following:

- 1) the major ethical frameworks that have been discussed in the literature as actual and/or desirable influences in public policy decision-making;
- 2) water management frameworks historically used in a Canadian context that have had an influence on current public policy and legislation; and,
- 3) global water ethics and associated principles that have been explored in the literature to identify any shared principles and significant points of convergence or divergence.

There are other fields of academic and professional literature that could be reviewed in pursuit of the stated research statement, goals and objectives and other researchers may decide to explore such avenues in the future. Examples of these areas include political economy, deliberative democracy, and governance. I, however, have chosen to focus on the three fields above in order to design and carry out a manageable research program, and to build on the academic literature that currently exists (e.g., Postel 1992; Armstrong 2006). Tables 1.1 and 1.2 summarize the elements of the literature review for major ethical frameworks and water management frameworks. The information in this table was drawn from the literature review and analysis contained in Chapter Two and Chapter Three of this dissertation.

TABLE 1.1: SUMMARY OF THE FOUR MAJOR ETHICAL FRAMEWORKS

Utilitarianism	<ul style="list-style-type: none"> • Greatest good for greatest number • Water is an ends to a means • Protected purely out of need • Purely human perspective; extended to economic perspective
Consequentialism	<ul style="list-style-type: none"> • Responsible for actions, past, present and future • Core of sustainability argument/sustainability ethics
Intrinsic Value	<ul style="list-style-type: none"> • All elements of an ecosystem, animate and inanimate, have value in themselves • The environment not just an object for human exploitation
Theism	<ul style="list-style-type: none"> • The natural world is the creation of a divine being and humans have a responsibility to that god for their use of resources • Humans and nature are intimately linked and can be traced to indigenous thought about the environment •

TABLE 1.2: SUMMARY OF THE FOUR WATER MANAGEMENT FRAMEWORKS

Exploitation/Supply Management	<ul style="list-style-type: none"> • Resources are limitless • Technological fixes • Clear human gains
Demand Management	<ul style="list-style-type: none"> • Resources are finite • Recognition of limited resilience of ecological systems • Systems-oriented approach • Economic focus
Integrated Water Resources Management	<ul style="list-style-type: none"> • Value water resources simply because • Holistic, flexible • Reflects core values of some Aboriginal/First Nations people
Soft Path to Water	<ul style="list-style-type: none"> • Focuses on ‘why’ rather than “how” • View water as a means rather than an end (product) • Challenge the conventional decision- making models by ‘reversing the outlook’; still work within current institutional arrangements

1.6.3.2 Policy Content Analysis in Case Study Areas (Guelph, Ontario and Calgary, Alberta)

To help identify the relationship between ethics and the implementation of a proposed water ethic, modified latent and manifest content analyses were conducted on relevant policy documents as well as legislation and regulations in the case study areas, plus documents relating to significant decisions on particular water management issues. Manifest content analysis refers to identifying specific words in text (Weber 1990; Roberts 1997). Latent content analysis refers to interpreting ideas that are implied in text and therefore requires familiarity with the context in which the text is presented (Krippendorff 2004). Content analysis was used to identify and highlight key embedded ideas within policy documents and legislation. Often, the language used in these documents gives valuable clues as to the ethical orientation, implicit or explicit, that an institution (e.g., a municipal government) has towards water management. For example, policy documents at all levels of government are developed for a public audience and introduce a particular approach and specific actions required to address a resource management issue. The language that an institution uses may indicate something about the underlying ethics of that institution and may then allow comparison of the ethical underpinning of the documents.

In this research, words, terms or ideas associated with “sustainable”, “sustainability”, “sustainable development”, “future generations”, “intrinsic value”, and “common resources”, for example, were identified in the relevant policy documents and a judgment was made as to whether or not there was an ethical underpinning, based on the context in which these words, terms or ideas were presented. Modified manifest

and latent content analyses, in conjunction with the case study interviews, can help identify or clarify the underlying ethical approaches to water management and potentially provide the basis for the assertions made in the concluding chapters. The reason for the modification of the manifest and latent content analyses is that, typically, identified words and terms are coded or counted, and a higher frequency of similar words or terms in a particular text (e.g., a piece of legislation) can indicate the prevalence of a specific underlying ethical idea, for example. For this research, since it is exploratory, and the presence of a word, term or idea must be read in context, merely coding and/or counting does not give the researcher enough flexibility to use judgment and interpret the context.

For this research, the focus was on identifying ethical ideas that were present in the text of policy documents, laws, and regulations, and examining specific case assessment and decision documents, especially those in which alternatives are evaluated and preferred options are selected. Through the analysis of these policy documents, laws, and regulations, and the examination of specific case assessment and decision documents by way of a series of questions (provided in Appendix A) related to content, the ethical and non-ethical ideas and assumptions of the institution(s) (i.e., municipal government) emerged. This approach established a foundation for addressing the overall research focus and objectives and, more specifically, for answering the question of how selected policy statements compare to the specifics of a proposed water ethic.

1.6.3.3 Interviews in Case Study Areas (Guelph, Ontario and Calgary, Alberta)

The influence of ethics on water policy decision-making and the possibility of implementing a proposed water ethic were investigated further through in-depth interviews with those involved in developing, promoting, or implementing water policy at the municipal level of government. The purpose of these focused interviews was to determine what influence the identified major ethical frameworks had on particular decisions regarding water resource management and to shed light on the key implementation challenges and needs associated with the proposed water ethic.

The following section of the chapter provides a summary of the methodology used to examine the underlying ethical frameworks that provincial and municipal policy-makers may use when developing and writing the legislation, policies, strategies and other documents. The results of the research for each case study area are presented in Chapters Six and Seven, and compared and contrasted in Chapter Eight.

One purpose of this research is to use the self-reported perspectives of key policy-makers and to explore whether they may apply (consciously or unconsciously) the identified major ethical frameworks when creating and implementing policy regarding the use of water resources. Therefore, it was important that only those who had a direct influence (i.e., those accountable, front-line professionals who prepare, write, edit, present policy to the public and various levels of government, and/or implement policy) on the outcome of water policy at the provincial and municipal level of government were interviewed. According to Gustafson (2009, 7) and based on the work of Grindle and Thomas (1990), “policy elites are the main actors who have degrees for choice making but, at the same time, are embedded in political and social networks that shape

their preferences and policy horizons. The decision process needs to be envisaged as a series of formal and informal stages, with numerous actors who hold distinct interests and concerns. Whereas several issues receive active consideration by policy-makers, the point of actual decision is difficult to determine precisely.” The target audience for this research then includes policy-makers at the provincial and municipal levels of government and/or those who sit on the advisory boards when developing water policy (for example, the *Water for Life Strategy* Advisory Board).

I am aware of the complex nature of policy development and that many stakeholders, participants, organizations and members of the public participate meaningfully in the formation of water policy. Ultimately, however, they are not the professionals who write and implement policy, and they are not held accountable should policy fail to accomplish its goals. As such, there is a relatively small pool of potential interviewees. In the future, widening the pool of interviewees to include more peripheral participants, such as non-governmental organizations, neighbourhood associations, the development industry, consultants, and politicians could provide a more comprehensive picture of how a proposed water ethic could be integrated into policy making. In addition, the decision to focus on the implementation potential of the proposed water ethic at the municipal level of government is based on the idea, supported by Christian-Smith et al. (2011), that many water challenges, particularly in a North American context, are at a municipal scale and must be resolved at the municipal level of government. While general direction is provided by federal and provincial legislation, regulation and policy, it is the responsibility of municipal governments to interpret and implement the direction from upper levels of government.

1.6.4 Interview Questions

Using a set of questions created to explore underlying ethical influences, I first determined the role the interviewee plays in water management and the amount of experience related to their professional tasks. I then assessed the major ethical framework(s) to which the interviewee indicates adherence, based on answers to questions related to several identified and well-acknowledged ethical frameworks described in Chapter Two. These questions included how institutional, legislative and professional knowledge influences policy-making and the decisions made within their specific institutional arrangement(s). The analysis was framed within three sections: (1) major ethical framework(s) in which the interviewee falls; (2) the legislative constraints that influence what can and cannot be accomplished regarding water management; and (3) whether the proposed water ethic, (established in Chapter Four), could be implemented at the municipal level of government in the case study area.

Thirty interviews were completed in the provinces of Alberta (16) and Ontario (14). The interviewees were typically employed by either the provincial or municipal level of government and, as previously mentioned, had a direct role in preparing water policy. Albertan interviewees included members of Alberta’s *Water for Life* Advisory board (Alberta Water Council); water policy writers at the provincial level of government; and, municipal professionals from water services and/or planning departments.

I was successful in interviewing all but one policy director in the Calgary, Alberta case study area. Of all the professionals I approached in the two study areas, no one declined my request to participate. These 30 interviewees are representative of all (but one) current water policy-makers within the two case study areas; this was confirmed through follow-up questions during the interviews (i.e., “is there anyone else who you can think of who is directly involved in the writing or implementation of water policy at the municipal or provincial level who may be interested in participating in this research?”).

These interviews provided additional context used to triangulate with the policy analysis and literature data. Each interview was designed using semi-structured discussion questions. My questionnaire served as an interview guide only. Four sets of questions related to the broad categories of:

1. Professional – Role in water management and policy making
2. Professional – Years of experience
3. Personal/Professional – Major ethical frameworks and the role they play in personal and/or professional decision-making
4. Personal/Professional – Thoughts on the proposed principles of a water ethic and its implementation at the municipal level of government.

The ‘professional’ questions were used to understand the participant’s institutional arrangements (e.g., the organization in which the participant works and the legislative and potential corporate rules to which they may adhere). The questions related to their years of experience, job responsibility, and informal and formal training also provided context for the individual’s perspective regarding their professional environment.

Questions related to the legislative context provided more information about how the individual functioned and also shed insight on how a proposed water ethic could be implemented within current institutional arrangements. A question was posed so that the interviewee had to rank in order of importance, five of eleven statements that “most defined how you make decisions in your professional life.” The ranking was organized using a traditional five-point ranking system (Iarossi 2006). Each statement corresponded to the four major ethical frameworks described in Chapter Two, and the ranking provided a quantifiable indication about what major ethical framework the interviewee indicated adherence to when making decisions about water resources. The interviews ranged from forty-five minutes to two hours. While conscious of the participant’s time constraints, I did not try to limit the length of the interviews because it was important to develop participant-interviewer rapport.

The cities of Guelph, Ontario and Calgary, Alberta were chosen for these case studies because they each have shown an awareness of water supply issues, have water supply management plans which have been implemented, and are experiencing population pressures which could precipitate changes to the current water supply master plans. In addition, while each case study has a defined provincial approach to water rights (Alberta’s Doctrine of Prior Allocation and Ontario’s Riparian Rights Doctrine), the specifics of these

approaches, as discussed in Chapters Six and Seven, may result in different ethical perspectives. A total of 30 face-to-face and telephone interviews was conducted between September 2009 and January 2011 with individuals involved, to varying degrees, in the creation and/or implementation of water policy. There were some substantial legislative and policy changes over the interview period, including the introduction of the *Water Conservation and Water Opportunities Act* (2010) in Ontario and the *Land Stewardship Act* (2009) in Alberta. These changes are reflected in the case study chapters. Events since January 2011 that might affect responses include various appeals to, and decisions by, the Ontario Municipal Board regarding land development applications and Official Plans, the controversy over the proposed plans for the Keystone XL oil pipeline in Alberta, and the introduction of a draft update to the Ontario Provincial Policy Statement (PPS) (2012). These interviewees included senior/intermediate staff in the municipal planning and engineering departments; staff at the local Conservation Authority (or equivalent); members of local organizations who worked directly with municipal staff developing and writing policy (Wellington Water Watchers; Chair of the Canada West Foundation); members of the Bow River Basin Council; provincial staff members responsible for water policy framework; and, experts/academics familiar with the state of municipal water management. When face-to-face interviews were not possible, telephone interviews were conducted. Table 1.3 provides a summary of the dates and locations of the interviews and indicates where the interviewee is employed.

TABLE 1.3: INTERVIEW DATES AND LOCATIONS

Interviewee	Date	Location/Affiliation
A	September 7, 2009	Calgary/Provincial
B	September 7, 2009	Calgary/Provincial
C	September 8, 2009	Calgary/Municipal
D	September 8, 2009	Calgary/Municipal
E	September 8, 2009	Calgary/Municipal
F	September 9, 2009	Calgary/Municipal
G	September 9, 2009	Calgary/Municipal
H	September 9, 2009	Calgary/Provincial
I	September 10, 2009	Calgary/Provincial
J	September 10, 2009	Calgary/Alberta Water Council
K	September 10, 2009	Calgary/Alberta Water Council
L	September 10, 2009	Calgary/Alberta Water Council
M	September 13, 2009	Calgary/Provincial
N	September 13, 2009	Calgary/Provincial
O	September 14, 2009	Calgary/Provincial
P	September 14, 2009	Calgary/Provincial

* follow-up telephone calls were made between November 2010 and January 2011 to confirm responses

A	September 29, 2009	Guelph/Municipal
B	September 30, 2009	Guelph/Municipal
C	October 3, 2009	Guelph/Municipal
D	October 5, 2009	Guelph/Municipal
E	October 7, 2009	Guelph/Municipal
F	October 8, 2009	Guelph/Municipal
G	October 10, 2009	Guelph/Municipal
H	October 11, 2009	Guelph/Provincial
I	October 11, 2009	Guelph/Provincial
J	October 14, 2009	Guelph/Municipal
K	October 17, 2009	Guelph/Provincial
L	November 3, 2009	Guelph/Provincial
M	November 5, 2009	Guelph/Provincial
N	November 7, 2009	Guelph/Provincial
* follow-up telephone calls were made to Guelph participants between December 2010-January 2011 to confirm responses		

All interviews were audio-recorded with the agreement that each respondent would later have the opportunity to review material should it be quoted. Interviewees were also given the option of never being directly quoted or identified, unless they agreed, by way of signed consent. There were benefits and limitations with recording the interviews. The primary benefit was that I could jog my memory during the analysis of the data and in order to improve the accuracy of the results. The primary drawback was that an interviewee could feel uncomfortable and awkward while being recorded. Each participant was given the opportunity to decline being recorded – no one chose this option.

The questions for the interview questions were closed and/or open-ended. During the phone or face-to-face interviews with participants in Guelph, and Calgary, I was able to interject related or probing questions in order to obtain more detailed information on related topics as well to confirm or reject conclusions reached during the policy content analysis. According to Palys (2003), open-ended interview questions, used in this research, are best used for exploratory purposes. The closed interview questions were used to obtain specific information about the respondents' thoughts on how they make decisions about water resources from an ethical perspective.

The interview questions were designed to be specific and to first address the four ethical frameworks analysed in the literature review (Utilitarianism, Consequentialism, Intrinsic Values, Theism). The open-ended questions in Part B were devised to test the internal consistency of current water policy based on these ethical foundations. Part C questions explored the principles of the proposed water ethic and asked the respondents to either agree or disagree with the inclusion of each principle, as well as asked about their

thoughts on the challenges of implementing the proposed water ethic at the municipal level of government in Canada. This section provided the opportunity for the participants to provide more personal views of how a water ethic should be defined, and for them to offer suggestions for what other principles or topics that should be considered in the ethics of water issues.

1.6.5 Evaluation of Interview Questions

The interview questions (Appendix A) were purposely created to connect with the major ethical frameworks identified in the literature review. In Part B of the questionnaire, the respondents were first asked to choose and rank, in order of most to least important, the top five ethical statements from a list of eleven that best represented their decision-making process, in general (Waddington 2000; University of Reading 2001; Iarossi 2006). Since the ethical statements always related back to one of the four major ethical frameworks presented in Chapter Two, exploring the underlying ethical values that respondents may hold was thus achieved in a relatively systematic manner for such qualitative, value-laden and perception-based research. In order to present some finding regarding what ethical framework influences legislation and/or policy the most, the responses were given a point value (one through five, with five corresponding to the response ranked first and each subsequent response give one less point) (University of Reading 2001, 15). The values were then summed. The ethical framework with the most points has the highest overall rank (Waddington 2000; Iarossi 2006). For example, Interviewee X may have his or her first ranked response corresponding to a statement from the Consequentialist ethical framework. This response would then receive five points. The subsequent ranked response may have corresponded to a Theistic perspective and was therefore given four points; ranked response three may apply an Intrinsic Value perspective and was therefore given three points. The results of the interviews are provided in Tables 6.5, 7.3, and 8.1.

The respondents were not aware of the major ethical frameworks used in this research, and they were therefore not aware of which ethical statements corresponded with which ethical framework. Evaluating the responses to this question involved determining if the respondent was consistent in how he or she ranked the ethical statements based on a particular ethical framework. The overall goal was to, based on self-reporting, capture the major ethical framework(s) that may influence decision-makers in their professional life to determine (1) if there is a consistency of thought across institutional arrangements (e.g., provincial or municipal governments in either case study area) and (2) if the major ethical framework(s) that these decision-makers express are reflected in the water resource policies they help create.

Subsequent questions in Part B explored each major ethical framework further by providing a statement that linked ethical thought and water resources management (e.g., “some research suggests that water should be managed as a finite resource”) and then asking, by way of a “yes” or “no” answer, if the relevant legislation, policies or documents recognized that element and if the provincial government effectively implemented policies relating to the statement. Evaluation of these questions was, again, relatively basic since it involved determining whether the relevant policies addressed the ethical thought in policy

language. The goal of these questions was to see if what the policy decision-makers thought corresponds to the findings from the policy content analysis (i.e., whether their statements about their underlying ethical positions match the positions that evidently underlie the policy documents they have produced). Part C of the questionnaire focused on defining the principles of a proposed water ethic and its potential for implementation. Six principles of a proposed water ethic were identified from the literature review (Chapter Four) and listed for the respondents. They were asked to rate the principles (using a five-point Likert scale) according to their strength of agreement or disagreement regarding whether each principle should be included in a proposed water ethic. In order to evaluate and determine the importance of each proposed principle of a water ethic, the scores for each principle were then summed and averaged according to the number of interviewees in the case study area.

Follow-up questions asked if the principles were interdependent and if any principles should be deleted or added. The goal was to determine how strongly the respondents identified with the proposed water ethic principles. Further qualitative evaluation of these questions involved reviewing the work already completed on developing principles of a water ethic, reviewing the literature regarding the four ethical frameworks discussed in Chapter Two and then making an informed decision on which of the suggested principles in the questionnaire should be altered and which should remain the same.

1.7 Research Limitations

All research has inherent challenges and, thus, limitations, and this is certainly the case with qualitative research. By using methods such as a literature review, policy content analysis, survey and interview analyses, and document comparison, varying degrees of subjectivity are inserted into the process. Policy content analysis, as a method, relies upon the researcher's ability to perceive and infer connections (Fairclough 1989), thus increasing subjectivity regarding which data sources are used (Hesmondhalgh 2006). The tempering factor, however, is that the inferences can be corroborated by key informant interviews and theoretical literature. Furthermore, by grounding the analysis in the literature, particularly with respect to the underlying ethical frameworks and the suggested principles of a proposed water ethic, some personal bias can be removed from the interpretation of the data.¹

¹ There is a debate in the literature surrounding the practice of creating interval data (i.e., averages) from ordinal data (i.e., ratings). Ordinal data was collected in this research, and this type of data describes order, but does not explore the relative size or degree of difference between the items being measured (von Eye 2005). The central tendency of a group can be determined with ordinal data; however, the mean (average) cannot be determined with any certainty. Stevens (1946) found that ordinal scales are most relevant in psychological studies and studies that involve measuring opinion (such is the case with this exploratory research into underlying ethical frameworks). Useful and fruitful information can be found with ordinal data but caution should always be taken when drawing conclusions (von Eye 2005).

An inherent limitation with any research involving interviews is whether there are enough respondents and whether the correct participants were included in the research. Also, it is only after an analysis and review of the results that the researcher is able to reflect on the adequacy of the chosen case studies and their ability to illustrate the goals and objectives of the research. These, however, are the risks with all types of research. During this research process, the type and number of respondents, while not quantitatively large, met the objective of interviewing those who have a direct influence on policy-making and policy implementation. It may be surprising to note that while the number of people involved in the direction and discussions about water policy can be large, the actual number of professionals involved in drafting and implementing water policy is normally much smaller. This statement should not be interpreted to mean that professionals are the only ones qualified or capable of influencing public policy; in fact, it is quite the opposite and a large number of individuals do help shape how water resources are managed. However, in an effort to scope this research into a manageable project, the decision was made to explore the underlying ethical motivations of these specific professionals.

The foundation of this research assumes that all approaches to resource management policy creation and implementation, including policy associated with water, are based on a set of values and adhere to some version(s) of an ethical framework(s). This set of values may be inconsistent, as it should also be assumed that individuals may be ethically inconsistent and consequently, the decisions made by the organizations for which they work may be based on ethical inconsistencies. This research recognizes the potential for inconsistencies but expects that exploring ethical underpinnings through document analysis and interviews should reveal the dominant ethical positions in water policy making in the cases areas. This research is designed to be normative in order to question these sets of values and ethical frameworks, and the methodology assumes the ability to infer ethical principles from policy documents. To that end, institutional arrangements are necessary to enact the changes and create an enabling political framework and implementation atmosphere.

1.8 Chapter Position

This chapter provides an introduction to the research, which is to explore the relationship between ethics and water resource management, specifically how ethics can or should affect decisions about water policy and its implementation at the municipal level of government in Canada. An outline of the research goal, objectives, design and methodology is then presented. Collecting data on values, perceptions and underlying ethical thought is challenging because they are generally not quantifiable beyond a nominal or ordinal scale. Interval or ratio numerical values cannot be assigned to how ethical a respondent is when he or she drafts water resource policy. Nor is it possible to quantify how ethical a municipal government must be in order to properly implement a proposed water ethic.

What this research does try to do, however, is identify information using a questionnaire grounded in a thorough literature review of major ethical frameworks, historical water management frameworks, institutional arrangements and the history of water policy in Canada. Teasing out the underlying ethical framework that key water policy decision-makers may apply when doing their job is critical to this research and to presenting a water ethic that can be implemented at the municipal level of government in Canada.

The following three chapters, Chapters Two through Four, provide a more substantial examination of the relevant literature related to ethical frameworks, water resources management, institutional arrangements, and water policy in Canada. Chapter Five provides an overview of applicable water legislation in Canada. Chapters Six and Seven present two case studies (Calgary, Alberta and Guelph, Ontario) to help determine what proposed water ethic would best be implemented at the municipal level of government in Canada. Chapter Eight elaborates further on these case study chapters by presenting the comparisons and contrasting elements between Calgary, Alberta and Guelph, Ontario in order to present an implementation plan for the proposed water ethic. Chapter Nine concludes the dissertation by reviewing the scholarly contributions of this work, the strengths and weaknesses of this research and some suggestions for further study.

Chapter Two: An Overview of Ethical Theory and Frameworks

2.1 Introduction

This chapter focuses on ethical theory, in general, by briefly examining past and current ethical frameworks with a significant influence on the formation of public policy regarding natural resources management in the West. This field of study is extremely large and varied; an entire dissertation could be devoted to exploring the intricacies of arguments for or against the use of these frameworks in guiding public policy. I have limited my investigation to four major ethical frameworks (influenced by the work of Armstrong 2006), but I do recognize that other ethical frameworks may apply to this research and their applicability could be examined in the future. The findings from the four major ethical frameworks will be applied to developing a rationale for the questions in the interview component of this research. Throughout this dissertation, the term “major” is used to describe the ethical frameworks that are used in the case study areas; “major”, in this case, refers to ethical frameworks that have been well acknowledged in the literature.

In this research, I do not aim to provide a comparative study of global ethics because this would result in an epic dissertation. Instead, I chose to identify selected and well-acknowledged ethical frameworks to create a vision for an implementable water ethic. Such an ethic would ultimately serve to guide water policy and practice both at the individual and institutional levels. The purpose of identifying a water ethic is not to create one world order nor to diminish diversity, but rather to find some common ethical ground. Furthermore, I understand there is the possibility that a number of ethically-oriented positions that show promise or widespread support may be introduced through the research of others, such as Schmidt (2012). While I am working within a Western philosophical tradition, I recognize that ethics reflecting alternative perspectives such as indigenous or spiritual values have been developed in response to the particularities of specific cultural and ecological regions. It is for this reason that the proposed water ethic identified through this research must be sensitive to context and also to be flexible enough to accommodate these particularities.

In order to identify this water ethic, however, it is first necessary to explore some of the well-acknowledged ethical frameworks associated with resource management and to provide a summary of these perspectives. This objective is critical in understanding how decisions have been made regarding water resource policy creation and implementation. Furthermore, these generalizations are essential for the development of the interview questions.

2.2 An Introduction to Ethical Frameworks

Throughout history, humans have given significant consideration to the ethics of natural resource management. Since the seventeenth century, it has been recognized in many industrialized societies that we “hold Earth as a trust, and [we are] not only responsible for its care, but also answerable for the delivery of [our] role as stewards or trustees” (Attfield 2003, 21). These beliefs stem primarily from Christianity. The Bible, for example, denotes that Earth belongs to God, and humans simply maintain the lands as leasehold

(West 2006). Therefore, even though there are those who believe humans have dominion over all of Earth's resources, this dominion is to be limited by ethical guidelines.

Other faiths, such as Islam and Aboriginal faiths, have ideas different from those contained in Western-held beliefs. For example, in many indigenous societies, the natural, spiritual connections linking humans, water, fish and the river itself preclude the option of placing human desires ahead of nature's needs (UNESCO 2006). The introductory words of the Indigenous Peoples' Kyoto Water Declaration, drafted at the 3rd World Water Forum in Kyoto Japan in March 2003, highlights the connection between people and nature:

“We, the Indigenous Peoples from all parts of the world assembled here, reaffirm our relationship to Mother Earth and responsibility to future generations to raise our voices in solidarity to speak for the protection of water. We were placed in a sacred manner on this earth, each in our own sacred and traditional lands and territories to care for all of creation and to care for water. We recognize, honor, and respect water as sacred and sustains all life. Our traditional knowledge, laws and ways of life teach us to be responsible in caring for this sacred gift that connects all life. Our relationship with our lands, territories and water is the fundamental physical cultural and spiritual basis for our existence. This relationship to our Mother Earth requires us to conserve our freshwaters and oceans for the survival of present and future generations” (UNESCO 2006, 1).

Based on the indigenous perspective described above, it is clear that water is a major component of the indigenous spiritual world and is, therefore, examined from a spiritual and not an economic lens. This begs the question, then, about how decisions should be made about water development projects if indigenous people view water as such an important spiritual aspect of life? When money is at stake, are these spiritual values strong enough to override the monetary values? Does water development within indigenous territories normally reflect values articulated in the Indigenous Declaration on Water? These questions rarely attract much influential attention, since indigenous societies do not generally have much political leverage against a dominant political system which seeks to impose, even if with good intentions, its Western-based value system (Groenfeldt 2003). While these alternative faiths are relevant to discussions about resource management decision-making, it is beyond the scope of this research to explore these influences further. This is not to say, however, that the principles of the proposed water ethic in this research could not include and respect Aboriginal ethical traditions. In order to accommodate Aboriginal ethical traditions, an overall criterion for the proposed water ethic is that it be flexible enough to respect the cultural and religious contexts when implemented.

The following sections will provide a summary of the historical approaches to ethical frameworks, explore some of the considerations applied to environmental ethics, and introduce the concept of sustainable development, sustainability, and lasting well-being as they may relate to the proposed water ethic.

2.2.1 Approaches to Ethical Frameworks

To date, a majority of the research on water resource management has clustered around environmental and economic themes, with much attention devoted to environmental science and ecosystems management. Forays into the ethical management of water have been, for the most part, limited to the establishment of property rights and effective water pricing mechanisms. For example, the ethical issues surrounding the commodification of water have generated some heated debate (see Gleick et al., 2002; Barlow and Clarke, 2003; Bakker 2004; Bond 2004; Bakker 2005; Durant et al., 2004; Roberts 2008). Rooted generally in Marxist political theory, commodification means placing an economic value on water and turning this natural, “common good” resource into a tradable commodity with the hope that water will be managed in a more efficient and environmentally-sound manner, resulting in greater water conservation (McDonald and Ruiters 2005). *The Economist* (1992, 11) offered the following sentiment of water as an economic good by stating “only by accepting water as a tradable commodity will sensible decisions be possible.” Barlow, a vocal opponent of commodification of water, states that this perspective is “ethically, environmentally, and socially wrong. It would ensure that decisions regarding the allocation of water are based on commercial, not environmental or social-justice considerations ... Privatization [commodification] of water means that the management of water resources is based on the principles of scarcity and profit maximization rather than long-term sustainability” (Barlow and Myers 2002, 148). Indeed, those who do not agree with commodification point to the “apparent paradox of how conservation can be promoted by an entity whose purpose is to profit from the selling of a scarce resource” (Price 2008, 50). In this research, I outline the broader range of ethical underpinnings relating to resource management, but do not delve any further into the tensions that are created by the capitalistic treatment of water resources since this topic is beyond the focus of this dissertation.

Before examining the specific characteristics of water ethics (as discussed in Chapter Four), there should be some recognition that even where ethics become enshrined in law or policy, the decision to respect an ethic is still voluntary. So why develop ethical frameworks? According to Callicott (1994, 5) “ethics exert palpable influence on human behaviour because they exist as ideals or shared norms of human behaviour. They serve as standards or benchmarks of practice that show us how we ought to live.” Given this role, ethics are normative rather than descriptive. While social ethics prescribe limitations or recommendations for human interaction, environmental ethics are concerned with human behaviour in relation to nature. As Fox (2004, 4) states when discussing ethics in natural resources management, “ethics are about relationships – relationships with ourselves, other individual human beings, our community and its institutions, other living beings, perhaps with a believed higher power, and as more recently recognized, with our social and biological environment.”

Another important point is that ethical frameworks reflect the history of moral ideals and values of the cultural tradition in which they are created. Ethics therefore must necessarily be embedded and understood within the broader social context. Thus, a proposed water ethic would need to be a recognizable and rational development of existing ethics already held. In the context of developing a water ethic by which we might identify our moral principles for guiding the way we use and manage water resources, I draw on several ethical frameworks. First, however, ethics must be defined.

Ethics, in philosophy, is generally defined as the study and evaluation of human conduct in light of moral principles. Moral principles may be viewed as either the standard of conduct that individuals construct for themselves (deontological), or as the body of obligations and duties that a particular society requires of its members (teleological). An ethic is therefore “a set or system of moral principles and values that guides the actions or decisions of an individual or group” (Matthews et al. 2007, 336). For the purpose of this study, an ethic is defined as a set of moral principles, rules, guidelines, or imperatives of conduct for deciding whether a decision is right or wrong. The application is water use (particularly, whether to exploit or to protect water) and as stated earlier in Chapter One, the focus is on the ethics of decision intent, rather than the consequences of decisions.

Ethics has developed as people have reflected on the intentions and consequences of their actions. From this reflection on the nature of human behavior, frameworks of conscience have developed, giving direction to much ethical thinking. There is a divergence between those who write about an innate moral sense that guides ethical decisions (e.g., Chudworth, Clarke, Hutcheson, Rousseau, Ballanche), and others (e.g., Locke, Helvetius, Mill) who deny the presence of an innate moral sense.

Particularly vexing is the question of absolute as opposed to relative good. Philosophers have long sought a universal ethic. Frequently, moral codes have been based on religious absolutes (e.g., the Ten Commandments). Immanuel Kant attempted to establish an ethical criterion independent of theological or religious considerations. Rationalists (Plato, Spinoza, Royce) based their ethics on ideas of logic and fact (Singer 1986).

Among ethical frameworks debated in the first half of the 20th century were instrumentalism (John Dewey), for which morality lies within the individual and is relative to the individual’s experience; emotivism (Sir Alfred J. Ayer), wherein ethical considerations are expressions of the desires of the individual; and intuitionism (G. E. Moore), where morality is gained through intuition. Deontological intuitionists (H. A. Prichard, W. D. Ross) distinguish between good and right, and argue that moral obligations are intrinsically compelling, whether or not their fulfillment results in some greater good (MacIntyre 1965; Singer 1986; Goodpaster 1996).

Since the mid-20th century, important ethical frameworks have included the prescriptivism of R. M. Hare, who has compared moral principles to commands, arguing that moral principles can be universally applied. Thomas Nagel has held that, in moral decision-making, reason supersedes desire, so it is rational to choose altruism over a narrowly defined self-interest (Singer 1986).

This brief summary of ethical frameworks over the last several centuries helped identify a definition for an “ethic” that will be used throughout this dissertation. The following section focuses more specifically on ethics in environmental thought and will start to explore the criteria for what should be considered in a water ethic.

2.2.2 Ethics in Environmental Thought

Environmental ethics was accepted as an area of philosophical investigation in the early 1970s (Attfield 2003), though ethical positions and approaches focused on environmental matters stretch back into the far reaches of prehistory from aboriginal traditions to Aldo Leopold’s *Sand County Almanac* (1949), Rachel Carson’s *Silent Spring* (1962), White’s *The Historical Roots of Our Ecological Crisis* (1967), and Hardin’s *The Tragedy of the Commons* (1968). Aldo Leopold’s seminal work and the introduction of an essay called *The Land Ethic* (1949, 262), which states “a thing is right when it tends to preserve the integrity, stability, and beauty of the biotic community. It is wrong when it tends otherwise” may have started the journey, in Western ethical tradition, towards the field of study known as environmental ethics (Fox 2004, 5). Leopold advocated a more inclusive perspective of human interest that included the biotic community (or ecosystem). Krutch (1961, 448) expanded on the spirit of Leopold’s *Land Ethic* by stating that, “[C]onservation is not enough.... To live healthily and successfully, on the land we must also live with it. We must be part not only of the human community, but of the whole community... It is not a sentimental but a grimly literal fact that unless we share this terrestrial globe with creatures other than ourselves, we shall not be able to live on it for long... You may if you like, think of this as a moral law. ...If we do not permit the earth to produce beauty and joy, it will in the end not produce food either.”

In the early 1970s, when environmental ethics became a more recognized area of study, the public started paying more attention to the environment for a variety of reasons, including concerns about the effects of chemical pesticides, the nuclear arms race of the 1960s, and the ethical issues spurred by toxin usage in the Vietnam War (Callicott 1994). Issues that currently affect the public’s interest in the environment include increasing pollution levels, dwindling natural resources, and an overall decline in the quantity and quality of natural resources, such as groundwater, surface water, wildlife habitat and agricultural soils. The public seeks possible solutions to these global issues, and ethics is part of this discussion.

While a single ethical framework may not provide all the answers, four basic principles are relevant to the discussion of environmental ethics, and by extension, to any discussion about a water ethic. These four principles concern (1) autonomy; (2) beneficence; (3) malfeasance; and, (4) justice (Beauchamp and Childless 2001; Peterson 2001).

Autonomy is the notion that people have the right to make decisions about their own courses of action and decisions that directly affect their own lives. This principle is fundamental in Western culture, and in most developed nations and civil societies. The second basic principle is *beneficence*, which means the obligation to do ‘good’ (bene). Closely connected with doing ‘good’ on behalf of or for others is the third principle, *nonmaleficence*, meaning we shall not do or allow harm to come to others. Malfesance or harm would include a broad spectrum of phenomena, not only obvious bodily or physical harm, but also harm to a person’s reputation, property, or liberty (Beauchamp and Chidless 2001). The fourth principle is *justice*. Many definitions exist for justice, but justice may be explained as a sense of what is fair or equitable. Alternatively, justice can be defined as that which is reasonable, something that rational people would agree upon if they had a choice about how their lives would be governed. Individuals, social sub-groups, and whole societies which have the right to self-determination—because they are autonomous – are also due justice (the right not to be treated unfairly, unless they should freely agree to it) (Cotgrove 1982; Jacobs 1999; Dryzek et al. 2003).

Given these four principles and their place in the study of ethics, the following sections focus on specific ethical frameworks that relate to the environment. Specifically, the following paragraphs will establish the context of sustainability and environmental ethics debate that will be used to present and assess the four major ethical frameworks in recent Western tradition (Utilitarianism, Consequentialism, Intrinsic Value thinking, and Theism). The four major ethical frameworks will be assessed in light of the findings from the context of the sustainability needs and environmental ethics debate and the results will be used to develop conclusions to help guide the explorations in the following chapters.

2.2.2.1 Sustainability, Sustainable Development, Sustainability Ethics, and Lasting Well-Being

Sustainability ethics is a branch of environmental ethics that has resulted from the merging of sustainability concepts and environmental ethics (Becker 2010). Sustainability has become a prominent term in academic and public discussions and there are several generalities within these discussions. First, there is broad agreement in both public and academic debates that sustainability is an important issue that belongs to the foremost challenges of the 21st century. Second, in spite of the agreement on its crucial relevance, there is not much agreement on the exact definition of sustainability (Jaeger 1995; Thompson 1997; Lackey 1998; Sneddon 2000; Hecht 2004; Ozkaynak et al. 2004; Gibson et al. 2005; Welker 2005; Kemp and Martens 2007; Becker 2010). Definitions of this relatively newly coined term are numerous, and attempts to explain the ramifications of sustainability are still the subject of ongoing debates. The concept of sustainability denotes a seemingly important, but rather vague, recent issue of our times. In addition to these two generalities and relevant to this discussion on ethics, is Becker’s (2010) perspective that sustainability has an inherently complex ethical dimension and that the term ‘sustainability’ should be considered within the context of harmony between current and future generations, and nature.

A review of some of the academic literature and public discussions on sustainability and sustainable development identified three specific ideas that are common in the sustainable development definitions: (1) defining and living within our natural limits; (2) being aware of how the economy, society, and the environment interrelate; and, (3) recognizing an equitable distribution of resources for current and future generations (Jaeger 1995; Thompson 1997; Lackey 1998; Sneddon 2000; Hecht 2004; Ozkaynak et al. 2004; Gibson et al. 2005; Welker 2005; Kemp and Martens 2007; Becker 2010). These common ideas can be useful when developing principles that may be used in a water ethic since the concept of sustainability also involves an ethical dimension.

The term sustainable development emerged in the 1980's by its prominent place in important statements of the United Nations such as the *Brundtland Report* (WCED 1987) or the *Agenda 21* (UN 1992b). The *Brundtland Report* defined sustainable development as human development that “meets the needs of the present generation without compromising the ability of future generations to meet their own needs” (WCED 1987, 8). *Agenda 21* complemented the *Brundtland Report* by clearly acknowledging the dependent relationship that humans have with the natural environment and further establishing that it is crucial to live within the environment's natural limits in order to sustain current and future generations. *Agenda 21* and a suite of other international agreements and conventions (Convention on the Protection and Use of Transboundary Watercourses and International Lakes 1992; the Kyoto Protocol 1997; Johannesburg Declaration on Sustainable Development 2002) strengthened the commitment to sustainable development and required that moral considerations were extended to future generations of resource users. The impetus for these early statements on sustainable development was to address and connect the initially separate issues of increased global ecological degradation and the persistence of poverty. These statements indicated that attempting to solve one issue relied on the solving the other since it is the interaction and interrelations among environmental, social and economic elements that was causing the problems in the first place.

In recent years, definitions of sustainable development have been expanded to identify requirements for moving towards sustainability. According to Gibson et al. (2005), socio-ecological system integrity, livelihood sufficiency and opportunity, intra-generational equity, resource maintenance and efficiency, socio-ecological civility and democratic governance, precaution and adaptation, and intermediate and long-term integration are necessary. Despite “the fact that in the real world, compromises and trade-offs are rarely avoidable” and this suite of requirements “demands more sophistication than we normally demonstrate” (Gibson et al. 2005, 119), these conditions for achieving sustainability may help define the principles of a water ethic.

There have also been various sustainability models conceptualized by researchers and practitioners alike that have built on the initial definitions of sustainable development. Examples of more traditional models of sustainability, such as an equilateral triangle (Munasinghe 1993), “three pillars” (Annan 2002), a

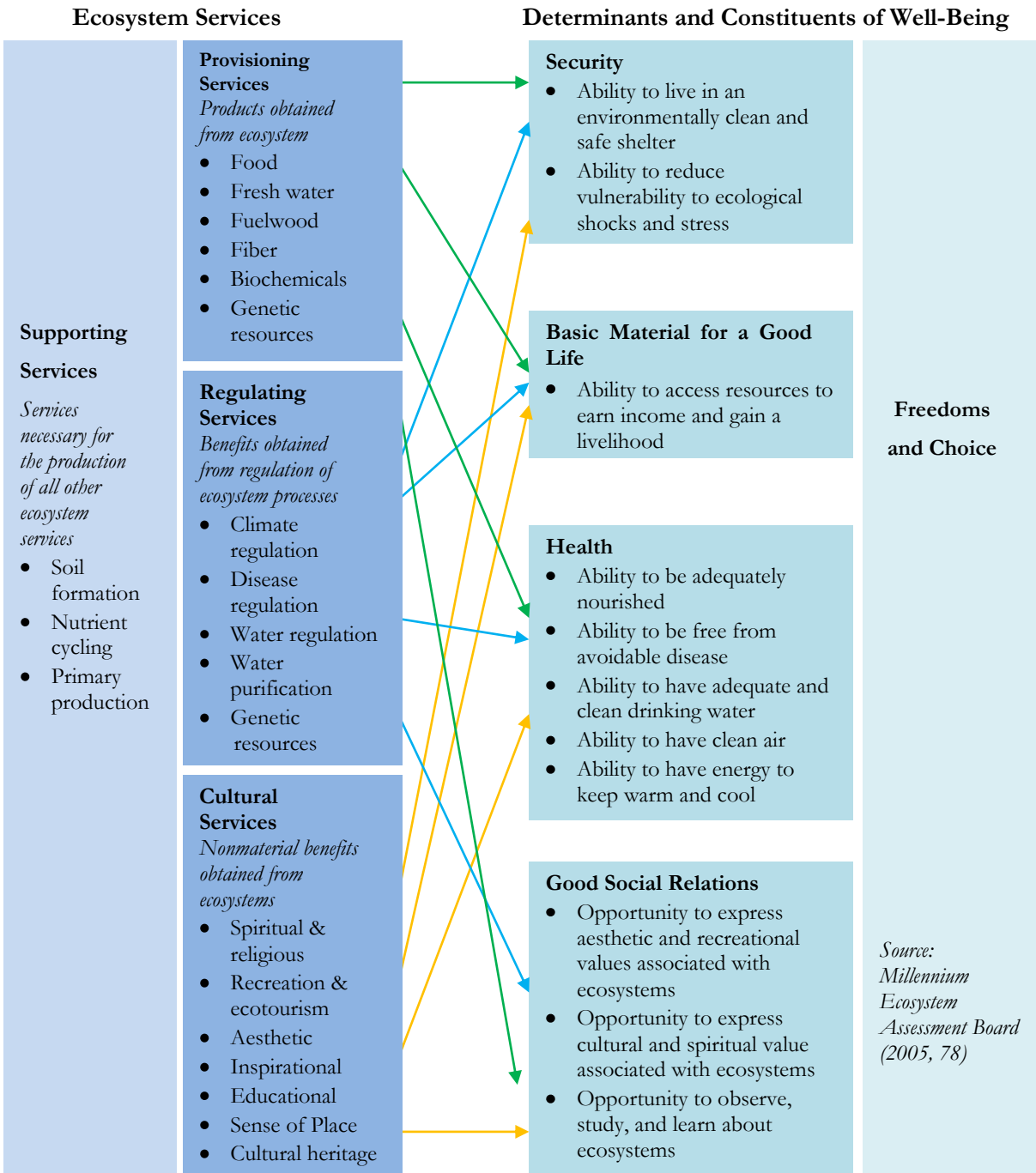
“three-legged stool”, modified to four legs (Dawe and Ryan 2002), or an intersecting Venn diagram (Flint 2004), all attempted to explore the links among the three major considerations of sustainable development – economy, environment and social qualities. More recently, and in order to overcome examining the three sustainable development considerations in isolation, alternative conceptualizations, such as the PRISM model (Spangenberg and Bonniot 1998; Valentin and Spangenberg 1999) and the egg of sustainability (IUCN 1997), attempted to shift focus back onto the interconnection and interactions that are the strength of this concept. The PRISM model introduces a fourth institutional component as one of the interconnections, and the egg of sustainability illustrates the relationship between human socio-economic activity and the ecosystem as one circle inside another, like the white and yolk of an egg. Each element is entirely dependent on the other for its well-being. Regardless of these traditional and alternative models of sustainability, it is always possible to reject every one of them and focus solely on the interactions and interconnections towards achieving sustainability.

As identified in Chapter One and mentioned earlier in this chapter, a proposed water ethic should reflect not only sustainability, but also lasting well-being. As with the closely linked concepts of sustainable development and sustainability, lasting well-being must also consider social, economic, and ecological items. As Gibson (2001, 3) implies when discussing sustainability-based environmental assessment, lasting well-being involves working towards “greater community and ecological sustainability, towards a future that is more viable, pleasant, and secure.” The 2005 Millennium Ecosystem Assessment Board’s report (2005, V) defines well-being as having “multiple constituents, including basic material for a good life, freedom and choice, health, good social relations, and security. Wellbeing is at the opposite end of a continuum from poverty, which has been defined as a ‘pronounced deprivation in well-being.’ The constituents of well-being, as experienced and perceived by people, are situation-dependent, reflecting local geography, culture, and ecological circumstances.” Levy et al. (2005) suggest that lasting human well-being is dependent on having adequate access to food, water, shelter, income, and household assets, and points to measurement techniques such as detailed household surveys that provide information on these “basic materials” (Levy et al. 2005, 125). Levy et al. (2005, 125) recognize, however that “although great effort goes into these measurement efforts, they do not provide a complete enough picture to support a full understanding of the nature and distribution of well-being and its relationship to ecosystem services. Comparable measures of water and sanitation access, for example, are scarce, because terminologies, methodologies, and measurement priorities differ from place to place.”

The emphasis on human well-being is evident in the literature on this topic (see Micklin 1993; Prescott-Allen 2001; Balmford 2002; Emerton and Bos 2004; UN Environment Management Group 2011). Also evident in the literature on sustainability, sustainable development, and sustainability assessment is that humans and ecosystems are interdependent. As Gibson (2001, 11) states, “[I]ncreases to human and ecological well-being are woven together in mutually reinforcing ways” and “given the huge role humans now play in

manipulating biospheric conditions, there is no serious strategy for preserving and enhancing ecosystem integrity that does not involve improving human well-being” (Gibson 2001, 10). Thus, lasting well-being must encompass both human and ecological perspectives. The Millennium Ecosystem Assessment Board (2005, 5), in Figure 2.1, shows the interdependencies between ecological services, and determinants and constituents of human well-being.

Figure 2.1: The Interdependencies between Ecological Services and Determinants and Constituents of Human Well-Being



In the next section, and building on the three common ideas identified within the concept of sustainability that could be applied to the principles of a water ethic, an overview of four long-established ethical frameworks will be provided. Elements of these ethical frameworks date back to the 1700s and ostensibly provided some insights into how and why decisions have been made, particularly as these decisions relate to historical use of natural resources.

2.3 Introduction of the Four Major Ethical Frameworks

The previous sections established the definition of an ethic and reflected on how ethics have been applied to environmental thought. Implied within the definition of an ethic suggests what an ethic is not – it is not a feeling, a religion, does not always involve following the law, is not necessarily based exclusively on cultural norms, and is not deemed a science. Given that an ethic is not any of these things, a variety of ethical frameworks are used to identify what ethical standards must be applied in any given situation. One consequence of having multiple ethical frameworks suggesting a variety of ethical standards is conflict. According to Valesquez et al. (2011, 3), “different approaches [ethical frameworks] may not answer the question “what is ethical?” in the same way. Nonetheless, each approach gives us important information with which to determine what is ethical in a particular circumstance. And much more often than not, the different approaches do lead to similar answers.”

Regarding environmental concerns, conflicts occur when one group views the natural world as beyond value, while another group puts monetary values on ecological services and a third (much more numerous and powerful) group pays little or no attention to ecological considerations. While these groups approach the natural world using particular values, their ethical perspectives differ. Given the variety of cultures and beliefs, how can ethics be justified in a way valid for all? One of the questions I have set out to answer is what major ethical frameworks may influence decisions about natural resources, and whether a set of principles that are realistic, desirable and that reflect sustainability and lasting well-being could comprise an implementable water ethic at the municipal level of government in Canada.

To help answer this question, an exploration of how major ethical frameworks play a role in defining one’s water ethic is necessary. Armstrong (2006) provides a framework on which to examine this question by using a combination of Utilitarianism, the closely-related Consequentialism, Intrinsic thought, and Theistic thought. Healey and Shaw (1993) identified their own version of environmental discourses related specifically to Britain (welfarist Utilitarianism from the 1940s; growth management from the 1960s; environmental care management from the 1970s; environment as asset in the 1980s; and now sustainable development). Dunlap et al. (2000), based on the original work of Dunlap and Van Liere (1978), attempt to elicit ethical positions related to the environment by measuring the endorsement of a new ecological paradigm using a set of 15 statements. The 15 items are designed to measure the respondents’ strength of agreement related to statements about the relationship between humans and the environment. Of the few researchers (Feldman

1995; Selborne 2000; Rahaman and Varis 2005; Armstrong 2006, 2009; Postel 2008; Gerlakiet et al. 2011; Liu et al. 2011; Schmidt 2012) who are examining the issue of managing water resources from an ethical perspective, Armstrong's work is most closely linked to this research. Armstrong's work is more recent than the work by Healey and Shaw (1993), the UN, or others, and may offer different insights and perspectives than the scale developed by Dunlap et al. (2000). In addition, Armstrong's framework identifies specific ethical positions, while Rahman and Varis (2005), Postel (2008) and UNESCO (2011) offer only broad references to ethics. For these reasons, I have chosen to incorporate a modified version of Armstrong's framework into this research. Armstrong (2006, 11) states that, "...it may seem that in ethics, the way to proceed is to follow the old adage: 'you pays your money you takes your pick.' The objective... is not to convince the reader to follow any one particular way of doing ethics, but to recognize the (often only implicit) ethical components of their own position, and those of their opponents. Frequently, the conflict over environmental issues is between those with different ethical bases, and it is important to be able to identify these conflicts, and develop methods of entering debates with holders of other viewpoints."

Three types of ethical frameworks are rooted in the literature that links ethics and environmental issues relating to the protection, conservation, use, and extraction of natural resources, including water: Utilitarianism/Consequentialist-thinking, Intrinsic-value thinking, and Theistic thinking (Eckersley 1992; Taylor 1996a; Mills 1996; Cruz 1999; Miles et al. 2001; Harremoes 2002; Harremoes et al. 2002). A brief description of each ethical framework is provided in the following sections. Also, a comparison of the ethical frameworks is provided in Table 2.1, towards the end of this section. As previously noted, because there is a significant gap in the literature with respect to decision-making based on ethical criteria, very few examples were found regarding the explicit and systematic application of these positions. Nevertheless, it is through these descriptions that the research goal of generalizing the theories will be fulfilled and the information can then be applied to developing a rationale for the interview questions.

2.3.1 Utilitarianism

Although many different Utilitarian approaches exist, all are based upon the writings of Jeremy Bentham (1748-1832) and John Stuart Mill (1806-1873), often referred to as the founding fathers of the Utilitarian movement. As described by Bentham (1789) and elaborated upon by Mill (1861), Utilitarianism is an ethical doctrine that states the moral worth of an action is based solely on its contribution to overall human utility, often referred to as the principle of utility. The crux is the greatest happiness principle: the greatest good is whatever action brings the greatest happiness to the greatest number of people. In other words, it focuses upon how ends justify means (or on the actual effects, not the intended benefits), an essential relationship upon which this ethical perspective is based.

The relationship between means and ends is of deep historical, ethical and political significance. The means is the activity in which a subject engages with the intention of bringing about a certain end. The end, or the greatest happiness, has initially only an ideal existence, while the actual outcome of the means may be

quite different from the idealized end for which the means was adopted in the first place. According to the Utilitarian framework, several ‘bad’ actions (or means) could result in a positive outcome (or end) that would therefore constitute a morally good result, despite the fact that all actions leading to the result may not have been morally good. However, the idea that some means (e.g., the use of violence against political opponents) are inconsistent with the end (e.g., world peace) can in some way serve that end is untenable because one could do wrong and yet end up with a right consequence (Cornman et al. 1992; Harwood 2003). There is always some tension between ends and means, which is why other ethical underpinnings to decision-making are examined later in this section.

To determine whether the outcomes of our actions will result in an appropriate balance of good over evil for all involved, a Utilitarian would say that we need to engage in a ‘Utilitarian calculus’ (Bentham 1789). We begin by weighing the positive and negative consequences of an action. If the act produces a greater amount of good than evil for all those who are affected by the act, then the act is good; if not, the act is bad.

As a normative theory, or a theory based on what we ought to do, Utilitarianism offers a test which can be used to decide whether or not an action is right (Armstrong 2006). Utilitarianism is primarily concerned with providing a mechanism for deciding what to do in given situations and as such, Utilitarianism usually takes two major forms. *Act Utilitarianism* maintains that for each individual act we are about to perform, we need to appeal directly to the principle of utility. In each instance we must ask ourselves whether a specific act will produce the greatest amount of good over evil. There are, however, moral rules that are commonly accepted, such as ‘don’t lie’ that could be used as a guide. According to John Stuart Mill (1863), such rules, while in general appropriate to follow, cannot be used as an absolute guide in moral decision-making. There are many instances when lying, in fact, may be perfectly acceptable — for example, when telling the truth will subject an innocent to a greater evil. Mill’s point is that while relying on moral rules may be helpful at times, when following those rules causes more harm than good, we should not hesitate to discard them.

Due to the impractical nature of some aspects of adhering to *Act Utilitarianism*, the alternative of *Rule Utilitarianism* was developed. According to this interpretation, certain moral rules, if followed, will always produce the greatest amount of good over evil. A Rule Utilitarian maintains that everyone should follow those rules that will result in the greatest amount of good. For example, instead of wondering in each and every situation whether or not one ought to tell the truth, one would establish a rule such as the following: one should always tell the truth because doing so will produce the greater good. There are specific situations when a positive result may not occur when telling the truth (for example, telling people with mental health issues that they have a terminal disease). However, the Rule Utilitarian would argue that it is generally in the best interest of society if everyone tells the truth (Urmson 1953; Brandt 1959, 1979; Hooker 2000).

From a resource management perspective, Utilitarianism identifies the environment as being useful to us. Therefore, by extension, water is valuable because we need it and should protect it purely out of necessity. In terms of this major ethical position, there is some disagreement concerning how to define ‘us’ (Singer 1986; Zimmerman et al. 1996; Whitworth 2001). Is it our personal needs, our family, our neighbours, or, does it mean our political allegiance, to a city, a state or a supranational organization such as the European Union, or does it simply refer to humans? The Utilitarian perspective regarding the use and protection of natural resources relies purely on a human perspective and, as such, incorporates the ‘rights argument’. This argument follows the logic that humans completely depend on water and no other good fits this description. While food is necessary for human life, there is no one single food that cannot be substituted for by other foods. As such, water has a special place in the lives of humans. It is not like other commodities. The right to life and all other rights that depend on life depend on access to water. Water, therefore, must be enshrined as a right (United Nations Universal Declaration of Human Rights 1948; Gleick 1999). When applied to water use, one would adopt an economic perspective of utility in order to allocate scarce water resources between competing demands (Armstrong 2006).

There are positive elements to using a Utilitarian approach to decision-making. First, Utilitarianism considers the pleasure and pain of every individual affected by an action. Second, Utilitarianism considers everyone to be equal and does not permit an individual to put his or her interest or relationships first. Third, a Utilitarian form of decision-making attempts to provide a quantitative (Utilitarian calculus) method for making moral decisions.

Other elements make this method of ethical decision-making problematic. First, not all pleasures and pains can be assigned a quantitative value nor does Utilitarianism address the issue of some pleasures and pains that cannot or should not be measured, such as human life or human suffering. Second, Utilitarianism is based on the premise that the ends justify the means. However, would lying or cheating always be considered ethical even if the end result is positive? Third, this type of decision-making emphasizes the amount of pain an action causes but it does not address to whom. What if the harm is to an animal or to the ecosystem? Fourth, taking a Utilitarian approach makes it difficult to compare short and long-term effects of a decision, and, what constitutes the measure of a ‘good’ result, particularly as it may relate to material versus intangible benefits? Finally, Utilitarianism assumes outcomes can always be determined before an action is taken. However, outcomes are often unpredictable, which is why Consequentialism offers a modified perspective relative to the shortcomings of Utilitarianism.

2.3.2 Consequentialism

The Utilitarianism of Bentham and Mill influenced the development of the broader concept of Consequentialism, which states that we are responsible for our actions, both present and future. Growing up, most of us are taught to think in a Consequentialist manner. Therefore, this ethical approach may make the most intuitive sense. Perhaps you behaved poorly towards one of your playmates and your parents

admonished you by asking, “did you stop and think of how your actions may have affected anyone else?” This method of questioning behaviour is, in fact, a Consequentialist approach. It is not surprising, then, that given this fairly common approach to child rearing, public policy in Canada and the United States also tends, for the most part, to be Consequentialist. Whether examining the issue of legalizing the use of marijuana or banning the use of cellphones while driving, the common question that elected officials usually raise is, “what will the effects of this policy be on the average citizen?”

Prior to the 1960s, Utilitarianism was the term commonly used for Consequentialism, and that use remains; but many philosophers now use the term ‘Utilitarianism’ to designate a specific kind of Consequentialism. As a result, some philosophers reserve the term Utilitarianism for the view that combines Consequentialism with the assumption that pleasure alone has intrinsic value (MacIntyre 1965; Singer 1986). Others reserve the term for the view that combines Consequentialism with the assumption that happiness (welfare, well-being) alone has intrinsic value (Warnock 1979; Singer 1986). These two views are not always clearly distinguished. Another group of philosophers interpret Utilitarianism as a kind of Consequentialism that takes preference-satisfaction alone to have intrinsic value (Warnock 1979). The terminological distinction between Utilitarianism and other kinds of Consequentialism can be made by reserving the label Utilitarianism for those Consequentialist frameworks that include the maximising assumption that only the best is good enough (Sidgwick 1902).

In general, Consequentialism holds that morality should guide conduct in such a way that the outcome is best for society as a whole. *Act Consequentialism* is the view that we ought always to act to maximize good consequences. In other words, one ought always to choose an act, among the available alternatives, that would produce an outcome no worse than the outcome of any other act one might choose. For example, we might identify good consequences with non-violation of a set of individual rights. This ‘rights’ version of Consequentialism then directs us to minimize the violation of individual rights.

Another version of Consequentialism holds that good consequences consist not just in maximizing utility but also in distributing utility fairly. We might, for instance, regard it as a better state of affairs when people get what they deserve according to our notions of justice. The versions just mentioned are (like Utilitarianism) members of the family of Consequentialist views. The question arises whether some or any of the difficulties and objections that plague Utilitarianism also attach to the more general and abstract idea of Consequentialism.

In management of water resources, resources are protected because they may be of value to humans either now or in the future. This major ethical framework relates directly to sustainability ethics. Consequentialism was a term first used to refer to a framework concerning responsibility, but is now commonly used to refer to a framework concerning right and wrong. Anscombe (1959) used the term Consequentialism to argue that an action is right if its total outcome is the best possible. There are, however, many varieties, a few of which are noted below. In each case, it is argued that consequences alone should be

taken into account when making judgments about right and wrong. For the purpose of this research, Consequentialism is defined as taking responsibility for our actions, particularly with respect to how we protect natural resources (which may be of value to us now or in the future).

2.3.3 Intrinsic Value

Many governments recognize that nature has value to humans, and that destroying nature is unwise and against the interests of humanity, but nevertheless look only at the economic value of an aspect of the environment when making policy decisions because it can be difficult to comprehend why an ecosystem should have rights (Armstrong 2006). However, others argue that every part of the ecosystem has intrinsic value. This means that although living things may have no monetary value to human beings, they still have significant worth in other ways (Whitworth 2001).

The basic philosophy underlying the Intrinsic Value ethical framework is that the environment has value in itself, not just as an object for human exploitation or enjoyment. For almost three decades, many in the field of environmental ethics have been preoccupied with establishing that nature has intrinsic value as a way of placing nature on the moral playing-field. The idea that an environmental ethic must establish the intrinsic value of nature emerged in part as a response to worries that traditional ethical frameworks were unable to provide sufficient guidance in dealing with environmental crises. The groundbreaking discussion of this concern is in an early article by Routley (1973) that criticized the predominant Western view of nature as relying on what he called “human species chauvinism”.

Routley (1973) argued that the core principles of Western ethical traditions are entirely inadequate, as they cannot account for the wrongness of certain actions when the wrong occurs to non-human beings. Contrary to Utilitarian arguments that only humans or only sentient beings deserve moral consideration, several schools of environmental philosophers have argued that these views are inappropriately limited. Some environmental philosophers (e.g., Naess 1973, Brennan 2010, Singer 2011, Rolston 2012) have attempted to establish that nature has intrinsically valuable characteristics that deserve to be promoted and protected. This assertion reflects and supports the Land Ethic (Leopold 1949). The biggest problem lies in articulating this value, which needs to be distinguished from the value to humans typically used in Utilitarian arguments.

Debate over the importance of attributing intrinsic value to nature, whether focused on non-human beings or ecosystems, has animated the field of environmental ethics since the 1970s. Recent attempts (for instance, by Agar (2001)) at defending the idea of intrinsic value have renewed the debate. Norton (1984), a central detractor, denies the need for intrinsic value, arguing from a Utilitarian perspective that environmental protection is better served by a careful consideration of preferences. Other Utilitarians (e.g., Baxter 1995) argue for strategies of optimal pollution and use of non-human species as the best way to protect the environment, partly on the grounds that people simply think and value this way; humans cannot, practically speaking, think in terms or act in accordance with the intrinsic value of nature.

The ethical framework of Intrinsic Value contradicts some versions of Utilitarianism. Some Utilitarian philosophers argue that only humanity's happiness should be regarded in ethical decisions. In contrast, those who believe in the Intrinsic Value ethical framework argue that although an endangered species or a rainforest may not provide any immediate use or value for people, they have inherent worth nonetheless. There are others who see the value of debating the framework of Intrinsic Value but would like to shed its use in future ethical debates. For example, Gruen (2010 and 2011), while proposing two different definitions of intrinsic value, argues against further development of the Intrinsic Value ethical framework because it forecloses the opportunity of exploring other ways of placing value. Gruen (2011) argues that environmental ethics should focus on developing coherent principles or guidelines for regulating human action and valuation towards the non-human world.

There are several suggestions for alternatives to thinking from within an Intrinsic Value ethical framework, such as Aboriginal thought, which identifies all beings, including inanimate ones, as members of a moral community. For example, many of the Dene (Athapascan) peoples of the North American subarctic consider that some non-living parts of the environment (including rivers and mountains), as well as all living beings, have spirit and are therefore part of a moral community (Berkes 2002). There are also Buddhist philosophies, which might help articulate possibilities regarding how to make moral decisions. In Buddhist thinking, the primary ethical task is to determine how (not whether) individuals of all sorts are to be recognized as members of a moral community and how community is necessary to individual freedom, integrity, and autonomy, without having to appeal to moral absolutes.

Adopting an Intrinsic Value ethical framework offers a number of pros and cons. Regardless of the advantages or disadvantages, though, is the point that intrinsic value discussions play a useful role at least in drawing attention to the range of potential beneficiaries of ethical decisions and that this is important in a world where decisions made about water use have real consequences for both human and non-human lives.

2.3.4 Theistic Value

Theism, generally refers to the idea that there is a single perfect divinity or the idea that it includes one or more imperfect divinities. This conception of a deity (or deities) can be found in Christianity, Islam, Judaism, Sikhism, and in some forms of Hinduism. Theists generally hold that there is a divine being or beings more powerful than humans and capable of contravening at least occasionally some of the laws of nature.

One interpretation of Theistic Value is that the natural world was created by a divine being and that humans have a responsibility to that divinity for their use of creation. This type of thinking underlies much of the language of stewardship and supports a view similar to that of the Intrinsic Value ethical framework, in that the world has value because it is created by, and loved by, God. However, a Theistic framework adds that the value of nature is neither merely intrinsic nor instrumental, but derives from the value accorded to it by its Creator, who, in seeing it function, declares it good. The command 'to care for' allows for sustainable

conservation and human use rather than ‘mere’ preservation (Williams 1985; Whitworth 2001; Armstrong 2006).

In contemporary academic literature (Lacey 2007; Velasquez et al. 2009; Rolston 2011; Schmidt 2012), environmental ethics typically proceeds on assumptions that are not Theistic – this is not surprising since there is often a need to separate one’s own personal religious beliefs from research, for example, in order to give credibility to the work. This practice might tempt us to think that Theism and religion have little to do with environmental ethics. However, based on further examination, it seems plausible that one’s religious background would influence decision-making, on a subconscious level at the very least.

Generally, economic and philosophical conflicts seem to occur when some think of the natural world as beyond value (in economic terms), while others try to put monetary values on ecological services. While both groups approach the natural world using particular values, each approaches the problem from a different ethical perspective. Lynn White, Jr., (1967) in his seminal article, *The Historical Roots of Our Ecological Crisis* provided an interpretation of the Judaeo-Christian position and a resulting historical cause-and-effect relationship between belief and environmental degradation. White alleged that the biblical view of God as owner of nature, and humans as its divinely appointed managers, led Jews and Christians to adopt an environmental attitude similar to that found in the ‘God as nature’s enemy’ camp. White pointed to the first chapters of Genesis as the biblical basis of this problem in which God, exercising the right to ultimate authority, gives humans dominion over nature, permitting them to eat plants and name animals. After expulsion from the Garden of Eden and survival of the Flood, humans are also given animals to eat.

If God gives humans dominion over the contents of the Earth, there can be little argument against humans exploiting nature to satisfy their desires so long as they do not transgress the bounds of the contractual agreement. The ownership model that White (1967) describes divorces humans from nature, separating them from creation. Whereas pre-Christian pagans lived in harmony with the land because they believed there were spirits inhabiting the wolves and trees and brooks, White alleged Christians came to regard wild animals as machines and the entire organic and plant world as inert.

White’s piece generated critical debate within the academic and religious communities and some disagreed with his analysis. For example, Livingstone (1994) and Minter and Manning (2005) state that the causes of environmental degradation are more complex than White allowed, and that the evolution towards the current state of the environment was influenced by many factors other than a central Judaeo-Christian belief that humans have dominion over nature. These factors include colonialism, urbanization, growth of the economy, increasing democratization, and consumerism (Moncrief 1970, 510). Despite these disagreements, however, White succeeded in arguing that, “no new set of basic values has been accepted in our society to displace those of Christianity. Hence, we shall continue to have a worsening ecological crisis until we reject the Christian axiom that nature has no reason for existence save to serve man” (White 1967, 1207).

There are several reasons why Theistic Value could best apply to decision-making about resource management. First, there are theoretical difficulties with the Intrinsic Value ethical framework. Pragmatic ethicists such as Norton (2003), Morito (2003) Westen (1996), and Gruen (2010 and 2011) call into question the importance of concepts like Intrinsic Value, suggesting that normative discussion about actions and attitudes is more useful since this avoids putting intellectual energy into the "albatross" of intrinsic value (Morito 2003, 1). Applying a Theistic perspective to decision-making is one such way of having these normative discussions and maintaining that divinity's creation is broadly consistent with belief in a god; Theism clearly defines for whom one is "doing good" (although understandings of the divine being and divine preferences vary widely), and therefore possibly ensuring natural resources are being used to perpetuate sustainability and lasting well-being. Second, in the Christian tradition, some scholars have argued that the Scriptures, correctly interpreted, do not justify human exploitation of the environment (Barbour, 1973; Attfield 1983; Hargrove, 1992a and 1992b; Hessel and Reuther, 2000). They maintain that humans are God's environmental stewards and, as such, their task is to preserve the Earth in order to satisfy human interests and desires not only for the present but also for future generations. Some interpreters of this way of thinking say that "humanity is answerable to God, both for the use and for the care of nature" (Attfield 2006, 76) and that the consequences of how nature is cared for and used are the subject of ethical constraints.

The stewardship model contained within Theistic thought is not without its dissenters (Passmore 1974; Fox 1988; Palmer 2006), who have criticized the framework as being "objectionably anthropocentric, managerial, aloof from nature, and thus no useful guide in environmental ethics" (Attfield 2006, 76). Palmer (2006, 74) states that, "although the concept of stewardship of the natural world originated in religious discourse, it has been abstracted into international political discussion, usually losing its ultimate religious referent, God." Maybey (1990, in Palmer 2006) addresses the interpretation of the term "steward", and suggests that its definition implies that someone else's possessions are being guarded. Maybey asked, "on whose behalf are we stewards of the planet? Not presumably its literal owners. God then, or Gaia? I suspect that most of us who see the word might answer 'the planet itself' which is, at best, a piece of sophistry, and at worst, a reworking of the patronizing view that nature needs to be in human custody for its own good. This is asking for a warder, not a steward" (in Palmer 2006, 74).

To summarize the usefulness of this major ethical framework, Theism adds potentially powerful encouragement for broader thinking and stewardship, with effects that could also educate and inspire those who do not subscribe to religious traditions. However, Theism has limited appeal for non-believers, and the believers evidently do not agree on key points of interpretation, particularly of the concept of stewardship.

2.3.5 Summary of Ethical Frameworks

Table 2.1, below, provides a summary of each of the four major ethical frameworks discussed in the previous section. Each major ethical framework is briefly described according to its overall philosophy, the basic approach, the fundamental question and its application to a proposed water ethic. This table provides

the reader with a quick reference guide for the following chapters, specifically the case study chapters (Six and Seven). This table provided the foundation for the development of the questionnaire and interpretation of the results from the interviews and content in the case study areas.

Reiterating what Valesquez et al. (2009) suggested earlier about different ethical frameworks leading to similar answers, devising principles for a proposed water ethic that is desirable, implementable, and encourages progress towards lasting well-being and sustainability, may involve incorporating aspects from each framework and acknowledging that despite the frameworks' differences, they may be largely compatible. In terms of each ethical framework's potential application to a proposed water ethic, several key implications are evident.

When applying a Utilitarian perspective, particularly as it relates to the prioritization of competing human demands for water resources and in light of this research's goal to propose a water ethic that is realistic, desirable, and reflects a commitment to sustainability and lasting well-being considerations, this framework's defining characteristic is that it places the greatest priority on maximizing human happiness. A Utilitarian water ethic would attempt to satisfy as many competing human demands for the resource as possible, if this would fulfill the fundamental objective of achieving the "greatest good for the greatest number of people." This anthropocentric ethical framework offers very little, if any, recognition of an ecological component beyond an ecosystem's usefulness for human benefits. This aspect speaks to the fundamental limitation of this particular major ethical framework in that it does not incorporate the concepts of sustainability, particularly integration and interaction, crucial to a comprehensive proposed water ethic. Another limitation is that there is scarcely a word about timeframe in the literature about Utilitarianism. When applying such an ethical framework to water policy and management, recognition of the short-, medium- and long-term implications of a decision is essential.

The defining characteristic of the Consequentialist ethical framework is that the right thing to do in every case is to choose the action that maximizes net benefits over drawbacks. The key difference between the Utilitarian and the Consequentialist framework is that the latter requires one to assess the broader consequences of an action. In the case of water policy, Consequentialism would encourage consideration of environmental, economic and social effects, focus on interactive effects and sustainability demands, attend to the degree as well as the number of concerns, and attend to the mutually reinforcing steps in all the interrelated aspects of devising a proposed water ethic. Consequentialism takes into account the current and future interests and consequences rather than trying to assign these interests with economic value. Perhaps Consequentialism's greatest usefulness to public policy lies in its strong encouragement towards always finding the best possible solution among competing interests and needs.

Similar to one of the drawbacks of Utilitarianism, a significant challenge of Consequentialism is that the intermediate and long-term consequences of a decision based on this ethical framework are not easily quantified. As a result, this characteristic can cause practical problems when evaluating policy options, and

more importantly to this research, in choosing what principles are best-suited for a proposed water ethic. Another concern is that this major ethical framework is presented from a dominantly human perspective. So, while Consequentialism encourages the consideration of environmental, economic and social effects, the ultimate goal still remains to find the best outcome for humans. This perspective is not an appealing quality when exploring a proposed water ethic that must integrate both human and ecological considerations.

The Intrinsic Value ethical framework is helpful because it encourages one to reflect on the interrelationship between nature and humans. The defining characteristic of this ethical framework is that it advances the perspective that all elements of an ecosystem, animate or not, have value within themselves. A drawback is that the value cannot be determined exclusively from a human interests' perspective, which is essentially why this ethical framework is particularly difficult to use. Further, it is extremely difficult in the dominant Canadian culture to articulate intrinsic value exclusive of economic ideas. It is also hard to know what is good for an ecosystem, or a meadow, etc., but it is appropriate to think about such things. One key implication is that this ethical framework requires policy makers to reflect on how human-nature relationships are perceived. The way people relate to nature is not only reflected by their actions, but also by the rules (i.e., laws and/or policies) they apply to articulate values for nature. Therefore, acknowledging the intrinsic values of nature (e.g., an ecosystem) acknowledges that people are part of that ecosystem and this conclusion then determines the choices regarding how to manage an ecosystem (Gatzweiler 2008). Despite these difficulties, however, when applying this ethical framework to a proposed water ethic, the preservation and protection of water resources is necessary simply because the resource exists. Therefore, this major ethical framework requires modification of self-interested behaviour towards water consumption.

**TABLE 2.1: ESSENTIAL CONSIDERATIONS AND
DEFINING CHARACTERISTICS OF THE FOUR MAJOR ETHICAL FRAMEWORKS**

Ethical Framework	Utilitarianism	Consequentialism	Intrinsic Value	Theism
Ethical Position	Originally proposed by Bentham (1789) and furthered by Mill (1861), it is the ethical doctrine that states the greatest good is whatever action brings the greatest happiness to the greatest number of people.	The moral tenet by which an action is deemed right or wrong depending on whether the outcome is good or bad. We should judge the rightness of an action by the desirability of its consequences and not to its conformity with some vague concept of virtue or honour	The theory, predominant in some schools of environmental ethics, that all elements of an ecosystem animate or not, have value within themselves, exclusive of any human value.	The natural world is the creation of a divine being and humans have a responsibility to that god for their use of creation
Basic Approach	<ul style="list-style-type: none"> - Identifies the environment as being useful to humans, therefore, water is valuable because we need it - Water is protected purely out of necessity - Relies purely on a human perspective - Incorporates the rights argument (Gleick 1999; UN Universal Declaration of Human Rights) 	<ul style="list-style-type: none"> - We are responsible for our actions, both present and future, therefore, we protect resources because they may be of value to our fellow human beings elsewhere or in the future - Core of sustainability/sustainability ethics - Difficult to define for whom we are responsible and once defined, how is this responsibility articulated? - Difficulties in defining what sort of responsibilities we might have to non-human creatures, or even to inanimate nature. 	<ul style="list-style-type: none"> - The environment has value of itself, not just as an object for human exploitation - Underlies the Land Ethic (Leopold 1949) - Biggest problem lies in articulating this value, which needs to be distinguished from the economic value often used in utilitarian arguments. - Difficult to see how the value of a concept as vague as an ecosystem can have rights 	<ul style="list-style-type: none"> - By adopting some of god's power over nature comes god's responsibility to care for nature – the beginnings of stewardship language - Supports a view similar to that of the intrinsic stance, in that the world is valued because it is created by, and loved, by god. - Humans and nature are intimately linked and this can be traced to indigenous thought about the environment.
Fundamental Question	How can we achieve the greatest good for the greatest number of people?	How do we assess the consequences of the action?	What good is it for nature/ environment/ ecosystems?	How can we protect and enhance our environment in order to 'serve' god?

The Theistic ethical framework's defining characteristic is that all elements of the natural world are created by a divine being and therefore, humans have a responsibility to this divine being when using, or engaging in activities that affect, natural resources. This framework forces one to determine methods of protecting and enhancing the natural world in order to 'serve' god. While not everyone may believe in the concept of god, this is the ethical framework that may have the most application to a proposed water ethic only insofar as it appeals most to the non-economic structure of society and therefore, to a higher moral purpose. While this application compares to and is generally compatible with the Intrinsic Value ethical framework, Theistic application goes beyond appealing to making a decision based on nature having value in itself by declaring the preservation and natural functioning of the environment as "good" (Williams 1985; Whitworth 2001).

2.4 Chapter Position

The purpose of this chapter is to fulfill an overall goal of this research to identify the major ethical frameworks upon which an implementable water ethic that integrates realistic and desirable principles, including considerations of sustainability and lasting well-being can be based, and that are likely to underlie or influence current decisions about natural resources, and more specifically, water allocation and water conservation. Moreover, an objective of this research is to summarize these major ethical frameworks to better organize and understand the responses given during the interview sections of this study.

Based on an identification of the defining characteristics of the four major ethical frameworks as well as a summary of their usefulness and limitations to the formulation of a proposed water ethic, I conclude that some aspects of each ethical framework have more application than others. The Utilitarian framework is useful insofar as it requires one always to seek the greatest amount of happiness (or potentially "good") for the greatest number of people. This can speak to elements of trade-offs, compromise and realism for the potential water ethic principles. The Consequentialist framework allows for the incorporation of concepts such as sustainability and lasting well-being into a proposed water ethic. The Intrinsic Value ethical framework can introduce elements of ecosystem health, well-being and multiple benefits into potential principles, while Theism extends these elements to stewardship and using resources based on a higher moral or divine responsibility. Analysis of four major ethical frameworks also reveals that decision-making can be influenced to varying degrees by either a combination of perspectives or by one in particular. However, until further research, through interviews, has been conducted about how these ethical frameworks influence water policy, it is not possible to determine if a shared water ethic can be implemented at the municipal level of government in Canada.

The various ethics of the Western tradition reviewed in this chapter reflect the history of moral ideals and values of the cultural tradition in which they are created. Ethics must necessarily be embedded within the broader social context. Thus, a proposed water ethic would need to be based upon (or at least start with) an acknowledgement of ethics already in place. There is a need to develop a clearer understanding of the underpinnings of current decision-making to help reveal current influences and inconsistencies. Through this process, it is then possible to clarify the criteria for a water ethic.

Understanding the nature of current ethics, implicit or explicit, that guide water policy and decisions is the purpose of the following chapters and also addresses the first research objective. Chapter Three builds on the knowledge accumulated in Chapter Two by exploring the literature on the history of water resource management and the frameworks that have been used over the years to define policy.

Chapter Three: Water Resources Management Frameworks, Governance, and Institutional Arrangements

3.1 Introduction

Historically, water has been consumed as a renewable natural resource, with little concern for costs, pollution, and development of further resource bases, purification, or transport of water. The purpose of this chapter is to provide an overview of the approaches to water resources management in order to build the case that there is not yet a strategy that effectively and ethically defines and meets ecological and human needs. Then, building on the idea that an ethically-focused water resources management strategy (a water ethic, for example) may be needed, the second part of this chapter will review definitions and characteristics of governance and institutional arrangements to explore how, generally, it may be possible to implement such a strategy.

Water resources management has been practiced since antiquity; it can be traced back more than nine thousand years to development along the Indus River and the Tigris and Euphrates Rivers. Irrigation for agriculture was recorded for Jericho in 7000 B.C. Recorded history covering several thousand years documents various forms of water management and engineered water systems in Egypt, Iraq and China. The recorded histories portray a relatively sound system of planning and engineering based on scientific principles of hydrology and hydraulics. Work by the Chinese in the seventh century A.D. produced a sophisticated system of engineering structures for irrigation using both ground and surface water. Associated with this was a highly organized system of administration and maintenance of these structures and for development of optimal land use patterns. Many of these ancient, large-scale water projects came about with the use of massive, involuntary manpower. As authoritarian sociopolitical systems declined, however, the corresponding water systems slowly deteriorated (Cosgrove 2003; UNDP 2006).

The more recent history of water resources planning in North America dates back to the early nineteenth century and the major effort to develop canals. Water resources activity in Canada and the United States has gone through a period of major change in the past quarter-century as these nations have shifted from large-scale water resources development to greater emphasis on water quality and environmental protection. To provide an understanding of why this shift has occurred, it is first necessary to highlight some of the private and public interests that now play an important part in water resources planning.

3.2 Water Interests

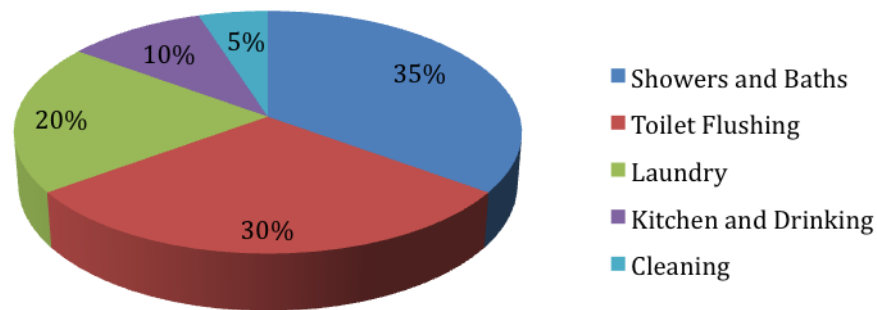
The role that private and public interests have in water policy decisions is crucial when examining water ethics. The following interests all influence decision-making with respect to water: (1) human preservation; (2) manufacturing and industrial water uses, including hydropower generation; (3) agricultural water use; (4) the sale of water; (5) navigation interests; (6) individual property rights; and (7) ecological

preservation. In addition, water policy is influenced by international borders and by the composition of the water – for example, whether it is surface or ground water. The following sections introduce these water interests and provide examples of how the interests can support legislators’ international and national water policy decisions.

3.2.1 Human Preservation

Water’s most important use is arguably to preserve human life. In developed countries such as Canada, household water is commonly used by humans for drinking and food preparation (10%), bathroom appliances (30%), hygiene and cleaning (40%), laundry (20%), and other purposes (22%) (Figure 3.1) (Environment Canada 2011). In addition to individual water uses, household water uses – primarily for sanitation – play important roles in society.

Figure 3.1: Household Water Use in Canada, 2011



Source: Environment Canada, 2011

Household water use is primarily determined by availability and cost, and there are vast differences in regional water consumption statistics worldwide. For example, the average domestic water withdrawal per person per day in 2006 was 47 litres in parts of Africa, 85 litres in China, 150 litres in the United Kingdom, 550 litres in Canada, and 578 litres in the United States (UNDP 2006).

Developed countries such as France, Spain, the United States and Canada experience issues that predominantly relate to water quality and water distribution. Conversely, in many developing countries, accessibility to safe water for consumption can be a challenge. In fact, it is common for average water consumption in poor countries to be as low as 20 litres per person per day (UNDP 2006). Specifically,

almost one billion people worldwide do not have available sources of clean drinking water, causing significant health issues and in many cases, death. This problem, coupled with the fact that more than two billion people lack access to basic and safe sanitation, is causing deaths and diseases throughout the world (UN 2012). Governments of developing countries when designing and enacting water policies often do not have the resources or experience to adequately provide and preserve clean drinking water for all citizens.

3.2.2 Manufacturing and Industrial Water Uses

Manufacturing and industrial interests often compete with citizens' drinking water requirements, consequently influencing policy development. In developed nations, most industrial water use is for cooling thermal-electric power plants, generating hydropower, chemical production, petroleum refining, pulp and paper production and food processing. Cleanup, sanitary and fire protection account for most of the balance of industrial water uses. The challenge with industrial uses is that not only do they use a significant amount of water, they often then discharge effluents into freshwater systems. Thus, governments must consider industrial uses and needs when designing water policies. However, agricultural needs generally take priority over industrial needs in most developed and underdeveloped countries.

3.2.3 Agricultural Water Use

Agriculture consumes approximately 70% of fresh water consumption worldwide (Environment Canada 2011). Much agricultural water use stems from outdated irrigation techniques or from outdated pricing schemes. While only 17% of the world's cropland is irrigated, these lands produce one-third of the world's total food supply (UNESCO 2008). According to Hunt (2004, 68), if agricultural water use is "carried out correctly, and with adequate drainage, irrigation can provide farmers with the control of water applications necessary to grow modern, high-yielding crop varieties and increase the number of annual harvests from one to two or three". However, outdated irrigation techniques have caused a reduction in average crop yields worldwide due to waterlogged and salinized farmland, declining and contaminated aquifers, shrinking lakes and inland seas, and severe detrimental effects to the aquatic ecosystem.

3.2.4 The Sale of Water

Bulk water sales have been increasing worldwide since 2000 and governments have been considering water-marketing issues in national water policies. International sales of bottled water have increased. For example, between 2002 and 2007, world consumption of bottled water rose 7.6%, with the United States showing the greatest total consumption and the United Arab Emirates having the greatest per capita consumption (CBC 2008). Bottling companies are capitalizing on these increased sales, often consolidating with small companies to tighten holds on key markets. Proposals call for the transfer of fresh water across international borders, including oceans. Proponents of water trade assert that other natural resources, such as minerals, fossil fuels, timber, and agricultural goods, are exported daily without generating nationalistic anti-export sentiment. Therefore, why should water sales by pipelines, barges, bags or bottles be any different?

Tanker and pipeline sales, often intertwined, are the prevailing methods of water transfer. In 2000, for example, “Israel began negotiations to buy over 13 billion gallons of water a year from Turkey” (Barlow and Clarke 2003, 32). Although the price of bottled water far exceeds that of tap water throughout the world, consumers seem willing to pay this increased price for convenience and a perceived increase in quality. Water used in bottling and bulk sales operations has to come from somewhere. Often, companies withdraw water from aquifers to supply needs. Since groundwater withdrawals often cause reductions in rechargeable and non-rechargeable aquifer levels, legislators must consider water-marketing issues in water policy decisions.

3.2.5 Navigation Interests

Records indicate that the first boat sailed before 4000 B.C. on the Mesopotamian, Euphrates and Tigris Rivers, and before 2000 B.C., on Egypt’s Nile River (Leick 2010). In Egypt and Mesopotamia, pharaohs and rulers monopolized navigational movement and trade. Over time, navigational rights on rivers evolved from total state control to inter-state agreements that allowed citizens to move freely between neighbouring nations. For example, in 1792, the French Executive Council claimed that all riparian residents were entitled to freedom of navigation. That same year, US President Jefferson declared that the Mississippi River should be open to all of its inhabitants. Throughout the twentieth century, the Rhine, Danube, Niger, Congo and Senegal Rivers were all subject to agreements allowing for partial or full riparian movement (Censer and Hunt 2004).

Teclaff (1991), however, believes that governments eased up on water movement restrictions too slowly. He asserts that the persistent control by riparian states over who could and could not navigate the water within their territories disrupted freedom of navigation. Individual state controls also create problems for legislators tasked with designing water policies because policies must consider how river trade and movement restrictions influence citizens and foreign relations.

3.2.6 Individual Property Rights

Historically, in most societies, individuals’ rights to use water and land have been closely linked. Specifically, the “right to use water depended on the uses or ownership of land or structures built on such land” (Teclaff 1985, 26). The approach, which stemmed from Roman law, gave land owners adjacent to watercourses privileged right regarding water and had a major influence on water policies in later European countries.

The Food and Agriculture Organization for the United Nations (2004, 13) states that, “modern water rights regimes tend to be fully divorced from landed property and, as a direct result, represent a sophisticated response to the growing pressures on water resources”. Such regimes enable legislators to make rational choices about water permitting while still being flexible to meet future water requirements. Legislators designing water policy must consider river basin plans, priorities, minimum flow requirements, and many

other public and private water interests. As seen in the next section, both private and public interests often compete with ecological preservation interests, causing problems for policy-making.

3.2.7 Ecological Preservation

Until this point, water interests discussed have been entirely anthropocentric. Yet, water also plays an essential role in the Earth's ecological preservation, and altering water resources can influence animals, humans, industry, and future natural resources. Human and ecosystem needs often, if not always, intersect and the effects of placing priority on 'ecological preservation' will result in social and economic ramifications. Only in the past few decades have people started to recognize themselves as ecosystem participants and more aware of the enormous range of values provided by ecosystems, including their irreplaceable services, their monetary value, and their role in sustaining human and other life on the planet.

An example of how drastic water reductions can affect all of the interests/rights mentioned above is the Aral Sea's gradual drop in water levels. The shrinking Aral Sea, located in central Asia, symbolizes "much of what has gone wrong with water management" (Postel 1989, 61). From 1960 to 1991, Soviet planners diverted central Asian rivers for irrigation, consequently preventing most water from reaching the Aral Sea. These diversions reduced the volume of the Aral Sea by 60%, tripling salinity levels and causing massive toxic dust storms that negatively affected local crop production (Postel 1989, 61-62). Water for fish was also negatively affected to the point where all native fish species have disappeared. This resulted in fish catches dropping to zero, causing job losses for upwards of 60,000 people. Abandoned fishing villages now dot the sea's former coastline. Furthermore, human activity caused a lowering of the Aral Sea's water level, which meant increased concentrations of salts and toxic chemicals, making water supplies hazardous to drink. This concentration of minerals, coupled with heavy pesticide use and poor sanitary conditions, led to rampant disease.

The Aral Sea illustrates how water policies lacking ecological protections can harm human health and agricultural and fishing industries. The implication is that governments wanting to protect resources for the future must consider ecological repercussions in their policy decisions. There are many examples of jurisdictions (watersheds, counties, provinces, municipalities) that pay significant attention to ecological concerns when managing water (see Lubell et al. 2002, Karageorgis et al. 2005; Veale 2010). Examples of countries that have formally recognized ecological services in legislation include South Africa and Australia. Principle 9 in South Africa's 1997 *White Paper on Water Policy* recognizes the rights of the environment by stating that, "[T]he quantity, quality and reliability of water required to maintain the ecological functions on which humans depend shall be reserved so that the human use of water does not individually or cumulatively compromise the long term sustainability of aquatic and associated ecosystems." Victoria, Australia's water policy advances the status of water resources by recognizing the limits of an ecosystem and therefore affording legal rights to the environment (State of Victoria 2004).

3.3 Approaches to Water Resources Management

The derivative of the word ‘management’ stems from the Latin word ‘manus’, meaning to manipulate. In the Canadian Oxford Dictionary (2012) ‘management’ is defined as “the process or an instance of managing or being managed” and manage is defined as “organize; regulate; be in charge of.” It follows that water management involves planning, implementing and monitoring to achieve policy objectives defined by decision-makers. In the context of this research, management will refer to administrative actions taken by the public and private sectors to implement policy directives. Water resources management involves a complex web of inter-jurisdictional, economic and environmental policies and priorities. Thus, the significant challenges for many Canadian water managers are policy-related rather than technology-related and thus correlate directly with the effectiveness of institutional arrangements (as defined and discussed later in this chapter) related to watersheds. “In many instances, managers’ greatest difficulties are identifying clear policy goals for the watershed and having the mandate to take action” (Conference Board of Canada, 2007, 3-4).

3.3.1 Historical Water Management Frameworks - Past, Present and Emerging

Various water resource management frameworks have been used to deliver water supplies to the public. This evolution of approaches to manage water resources can be divided into five distinct aspects: exploitation/supply management, demand management, integrated water resources management, soft path, and finally, the proposed “water ethic”. The first four water management frameworks will be discussed below, while the fifth water management framework, the proposed water ethic, will be explored in Chapter Four. Each successive framework draws some elements from its predecessors while responding to the predecessors’ deficiencies. Gleick (2000a, 127) has described these paradigm shifts in the following way, “[A] shift away from sole, or even primary, reliance on finding new sources of water supply to address perceived new demands; a growing emphasis on incorporating ecological values into water policy; a re-emphasis on meeting basic human needs for water services; and a conscious breaking of the ties between economic growth and water use. The evidence of a true change in the way we think about water continues to accumulate.”

The broad change in perception regarding water resources and the consequent changes in behaviour that Gleick (2000) describes in the quotation above, define the fifth and proposed framework, discussed in Chapter Four, the water ethic. In general, the first three frameworks are all still practiced on a global scale, while in Canada, demand management and Integrated Water Resources Management (IWRM) are the dominant water conservation techniques with associated tools used widely in policy documents and plans. Refer to Table 3.1 for a summary of the approaches to water resources management, to be discussed below.

3.3.1.1 Development Exploitation/Supply Management

The premise of the supply management philosophy is that water resources, particularly freshwater, are practically limitless. Moreover, there is generally a technological solution available to provide further water supplies to meet human needs (Gleick 2000b; Brandes and Brooks 2005; Armstrong 2006; Linkov et al. 2006). This approach to resource management, dominant for most of the twentieth century, was based on the idea that humans can control nature, and in so doing, reap the benefits for the common good (FAO 2005). What could be better than using human ingenuity to access resources, particularly water, and in the process, create monuments such as massive dams to demonstrate this ingenuity?

In its time, supply management proved to be powerful, and in some ways an effective means of dominating something that was not completely understood – the environment and the ecological processes associated with water resources (Brooks 2005). However, the consequences were environmental degradation, the beginning of widespread water scarcity despite advancing technology, and an overall decline in ecological health (Gleick 2000). In response, a different kind of thinking emerged, one that tried to focus more on understanding nature, working with the environment, and recognition that despite the resilience of ecological systems, humans could no longer harness the forces of nature without generating negative effects (FAO 2005; Linkov et al. 2006). Subsequent and more progressive environmental thinking led to the demand management framework.

3.3.1.2 Demand Management

In contrast to supply management, demand management regards water resources as limited and rejects the idea that technology is the only solution to increasing supply. The emphasis shifts to improving the efficiency of use through water conservation programs at all levels of government, and water pricing. Furthermore, there is an understanding that it is often more cost-effective to influence consumer behaviour than to develop technological schemes to deliver new sources of water supply (Tate 1984, 1990; Gleick 2000; Brooks 2005).

In more general terms, demand management refers to actions taken to affect the amount, type, or timing of the use of a good or service. When speaking about water, particularly as it relates to scarcity, demand management aims to reduce use rather than supply more water (Tate 1990). In the context of a growing population within an urban setting, water demand management increases per capita water-use efficiency. In agriculture, demand management requires incorporating the motto ‘more crop per drop’ to decrease the amount of water being used per unit of production (Hanna et al. 1996).

Demand management tools have been implemented through various technological, behavioural, economic, and institutional measures (Cortner and Moote 1994; Bryant and Wilson 1998; McDonald and Jehls 2003). Retrofitting, metering, pressure management and the provision of efficient irrigation systems and industrial processes are all examples of technological measures (Brandes and Brooks 2005). Behavioural measures involve trying to alter society’s habits through education programs and awareness-raising practices. Economic

measures, often some of the more controversial, involve pricing policies and cost incentives with the intention of reducing demand (Foster and Sewell 1981; Hanna et al. 1996; Clark et al. 2000). For example, the notion of water as an economic good and its tradability across borders generates all sorts of debates and emotions among water users as and experts (Horbulyk 2005). Finally, institutional measures focus on policy, legislative and regulatory frameworks and supportive programmes aimed at reducing water use and increasing efficiency

When thinking about demand management within a culture of conservation, then non-market tools, such as policy restrictions and behavioural changes, become increasingly interesting. This realization means the values and attitudes of consumers and decision-makers must be changed or actions based on currently desirable values and attitudes must be facilitated (de Young and Robinson 1984; Aitken et al. 1994; Rothert 2000; Buckle 2004). Nevertheless, a demand management framework is often resisted, even when the majority support water conservation, when punitive measures are put in place that produce only short-term results (Aitken et al. 1994; de Oliver 1999; Syme et al. 1991; Syme et al. 2000). Demand management is even less acceptable to consumers if existing service provision is considered to be inadequate, as it often is in developing economies (Brooks and Peters 1988; Syme et al. 2000; Rothert 2000; McDonald and Jehls 2003). Demand management strategies are often considered simply public relations exercises in an attempt to “try to avert or delay restrictions, increases in price, or the implementation of other administrative devices to curb demand in the short term” (Syme et al. 2000, 540). When policy-makers, policy-implementers, and/or decision-makers within an organization recognize the value of ecological services and the environment, this can influence policy creation and the relative success of policy implementation.

Research has determined that policy-makers and policy-implementers can be critical gate-keepers of resource management innovation (or lack thereof) and have possibly contributed to society’s inefficient use of, and resistance to, conservation because of the “prevalence of old thinking among water planners and managers” Gleick (2000, 136). Schilling and Stakhiv (1998, 4) have argued that these individuals “tend to be reactive, not proactive...technical and empirical pragmatists. They are trained to react to real events, and their tools of choice are physical rather than economic or institutional.” Research suggests that the power of these individuals, along with an organizational capacity that is weak and possibly corrupted by strong internal political or private-sector interests, may continue to undermine efforts to implement demand management policies effectively and equitably (Cortner and Moote 1994; Michael 1995; Bryant and Wilson 1998; Saleth and Dinar 2000; McDonald and Jehls 2003).

TABLE 3.1: A SUMMARY OF WATER MANAGEMENT FRAMEWORKS

Characteristic	Supply-Side Approach	Demand Management	Integrated Water Resources Management	“Soft path” for water
Position	Water resources are viewed as virtually limitless. The primary constraint is our capacity to access new sources or store larger volumes of water	Water resources are viewed as finite and to be used efficiently. Conservation is key and economic cost-benefit analysis guides development strategies	Integrated management attempts to respect the full value of ecological services delivered by whole catchments. Rather than focusing only on particular water problems and sites, integrated approaches incorporate efforts to rehabilitate and preserve linked land and water systems throughout catchments to maintain important services such as free flood protection.	Water resources are viewed as finite and driven by ecological processes. The focus is on a fundamental re-evaluation of the way we develop, manage and use water
Basic Approach	REACTIVE Currently, the dominant, status quo approach – developing resources according to human needs and wants	INCREMENTAL Generally used as a secondary approach, complementing and deferring supply-side options or until future supplies are secured. However, when used in a comprehensive, integrated and long-term fashion, represents an incremental step towards a broader “soft path” approach	LONG-TERM SYSTEMS APPROACH In the integrated management approach, the relevant factors include the full range of ecological, economic, social, cultural and technological considerations, and their interrelationships, plus the great diversity of interests that may be affected in some way and may have useful information and important perspectives to share.	PROACTIVE Long-term with potential for fundamental change in societal attitudes and resource use
Fundamental Question	How can we meet the future projected needs for water given current trends in water use and population growth?	How can we reduce current and future needs for water to conserve the resource, save money, and reduce environmental impacts?	How can we reduce current and future needs for water to conserve the resource while incorporating and serving at the same time the social, environmental and economic goals of society?	How can we deliver the services currently provided by water in the most sustainable way?
Primary Tools and Examples	Typically large-scale, centralized, expensive engineering solutions Examples include dams, reservoirs, treatment plants, pumping stations and distribution systems	Innovative engineering and economically-based solutions focused on any measure that increases the efficiency and/or timing of water use Examples include low-flow technologies, drip irrigation, conservation-based pricing, education, and policies and incentives to reduce use	Greater collaboration is required among experts in different fields as is greater acceptance of information from unconventional sources including Aboriginal and other long-time residents Full-cost pricing complemented by targeted subsidies (due to the recognition of water as an economic good) Regulatory restrictions Educational tools	Encompasses the full suite of social sciences and generally relies on decentralized distribution coupled with management strategies aimed at ultra-efficient ways of meeting end-use demand. The focus is on any measure that can deliver the services provided by the resource taking full costs (including environmental and social) into account and identifying new options to provide services associated with water use

Source: Adapted from Brandes and Brooks, 2005

Much of the demand management research has focused on the public's responses to regulations and pricing changes (de Young and Robinson 1984; Little and Moreau 1991; Aitken et al. 1994; Shrubsole and Tate 1994; Winpenny 1994; Renwich and Archibald 1998; Rogers et al. 2002; Krause et al. 2003; Brandes and Ferguson 2004). Fewer studies have examined decision-makers' ability and willingness to adopt, implement and sustain these types of demand management initiatives (Sawyer 1983; Westcoat 1986; Westcoat 1987; de Young and Robinson 1984; de Loë et al. 2001). There has been some notable work on this type of resource management, in general, in previous decades (e.g., Sewell and Burton 1972), but the entrenched obstacles to demand management – despite three decades of research and international recognition of water scarcity – suggest that a new perspective would be beneficial. As described by one demand management advocate, alternative research is required to, “bust open the WDM rhetoric to some new ideas” (Forster 2004). Hence, the next framework, Integrated Water Resources Management, tries to ‘bust open’ the predominant way of thinking to this point.

3.3.1.3 Integrated Water Resources Management

Integrated Water Resources Management (IWRM) has evolved from experience showing that focusing on one form of management was not successful in meeting short- or long-term goals. IWRM is a relatively recent approach to water resources planning, but receiving increased attention as a modified form of older planning approaches, such as the rational planning model. IWRM looks comprehensively at water and related resources of a water resource system in efforts to manage the system for broad, long-term objectives. In IWRM, considerations include the full range of ecological, economic, social, cultural and technological priorities and their interrelationships, in addition to other interests that may be affected in some way and that may have useful information and important perspectives to share (Lang 1986; Mitchell 1990; Hartig and Zarull 1992; MacKenzie 1996; Heathcote 1998; Shrubsole 2004; Wolfe and Elton 2009).

Integrated Water Resource Management has become widely accepted today and reflects the core values of some Aboriginal peoples (Matthews et al. 2007). There has been an adherence to the principles of IWRM, specifically when it comes to advocating managing resources holistically (de Loë et al. 2005; de Loë and Kreutzwiser 2006). Adherence to IWRM also appears in several of the guiding policy documents related to water resources management in Canada (see, for example, the now defunct 1987 Canada *Federal Water Policy* (Pearse et al. 1985; Pearse and Quinn 1996) or the newest legislation in Ontario, the *Water Opportunities and Water Conservation Act*, (2010).

IWRM, as known today, is based on the Dublin Principles (see Chapter Four) drafted in 1992. Several months later, IWRM was proposed as a specific program for the freshwater sector in Chapter 18 of *Agenda 21* (UNCED 1992). In that document, IWRM is based on the belief that water is natural resource, and is both a social and economic good. Therefore, it is asserted that, “in developing and using water resources, priority has to be given to the satisfaction of basic needs and the safeguarding of ecosystems” (Rio Earth Summit 1992). Although there are many definitions of IWRM, the one proposed by the Global Water

Partnership (GWP) is most frequently cited, and is therefore used in this research (GWP 2000, 22), "IWRM is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize the resultant economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems."

There are many benefits of IWRM: (1) long-term protection of the resource; (2) enhanced potential for non-deleterious multiple use; (3) reduced expenditure of energy and money on conflicts over competing uses and the possibility of redirecting these energies and funds to environmental management; (4) more rapid and effective rehabilitation of damaged ecosystems to a more useable condition (more ecosystem services provided); and, (5) cost effectiveness.

Benefits of IWRM must be considered in terms of the difficulties inherent in managing water resources comprehensively. Although IWRM considers the interrelationships between a mix of variables such as ensuring adequate supply, moderating demand, motivating efficiency, and combating inequalities, attention is usually directed toward a smaller number of variables believed to account for a substantial portion of the management problems. However, when the scope of IWRM is broadened to account for many variables, such an approach can result in greater complexity and uncertainty (Biswas 2004; Blomquists and Schlager 2005). Greater collaboration is required among experts in different fields, as is greater acceptance of information from unconventional sources, including Aboriginal and other long-time residents. But even with all available knowledge sources at the table, the inherent uncertainties of complex systems prevail. This reality encourages the adoption of cautious approaches that favour low-risk, reversible, and diverse options. Nevertheless, the precautionary principle, endorsed at the Earth Summit in Rio de Janeiro in 1992, advances the idea that in the face of possible environmental damage, even without full scientific data or knowledge concerning the extent of the environmental risk, preventative measures shall not be abandoned.

In addition to greater uncertainty and complexity, institutional problems associated with managing natural resources are invariably more aggravating and intractable than the technical and scientific problems (Dzurik 1996). Many existing institutions are charged with some fragment of resource use or management, but they typically fail to integrate system management responsibilities. Therefore, there is a need to enhance the capacity of institutional arrangements for practical implementation of a proposed water ethic at the municipal level of government in Canada. However, rather than focus on the degree of fragmentation that may exist in current institutional arrangements, it might be more productive to assess the adequacy of these current arrangements and how to best address or work around the most serious limitations.

Vital to IWRM is the identification of the role of sustainability and of the benefits this concept has to offer. Sustainability, as defined earlier, is based on the integration of social, economic and environmental priorities into decision-making by using a common language (Mackenzie 1996; Dearden and Mitchell 2012). However, this integration has proven difficult to operationalize in everyday decision-making because society's perception and understanding of the value of environmental services often conflicts with economic needs.

There is a general acceptance of the concept of IWRM, but “progress in adopting an integrated approach has been hesitant and unsystematic, in part because of the absence of suitable models for implementation” (Mitchell 2002).

Integrated Water Resources Management (IWRM) is also based on the notion that water allocation and management are intensely political processes (Hooper et al. 1999; Biswas 2004; Blomquist and Schlager 2005). IWRM demands much more than the recognition of the environmental and economic value of water and planning engineering and economic interventions; IWRM is intensely political because water users have interests and they do not want them to be diminished by water management interventions (Lang 1986; Koremenos et al. 2001). This framework involves bringing forward approaches that include participation, consultation and inclusive political institutions to enable the mediation of conflicting interests of water users and the agencies that manage water (Loucks 2000; Loucks et al. 2000; Kranz et al. 2004).

3.3.1.4 Soft Path for Water

Brandes and Brooks (2005) introduced the soft path framework (based on Lovins’ 1970’s introduction of the energy soft path concept) as a new approach to manage water based on first asking questions relating to ‘why’ rather than the ‘how’, posed by demand management approaches. For example, examining why a society uses such a large amount of water for use on lawns and in gardens when there are other less wasteful options, such as water recycling, reflects the soft path water approach. As Brandes and Brooks (2005, 1) state, “[t]he ‘soft path’ is a planning approach for fresh water that differs fundamentally from conventional, supply-focused water planning. It starts by changing the conception of water demand. Instead of viewing water as an end product, the soft path views water as the means to accomplish certain tasks.”

The four main principles of this approach are:

1. treat water as a service rather than an end in itself;
2. make ecological sustainability a fundamental criterion;
3. match the quality of water delivered to that needed by the end-use; and,
4. plan from the future back to the present (Brooks and Brandes 2005).

Essential to this concept is the practice of backcasting, whereby the water management participants define the desirable sustainable future and then develop policies and programs that lead to the successful transition to this future (Brandes and Brooks 2005). While this approach is contrary to more traditional planning models, backcasting seeks to work within the conventional planning system by almost turning the way one plans on its head. The question, however, is whether or not the conventional planning institutional arrangements are able and willing to change to such a large degree.

Currently, no community or nation has yet fully instituted a soft-path approach to water, but its key elements are becoming clear. A case study in the City of Guelph (Ontario) was conducted by the Canadian Institute for Environmental Law and Policy (Binstock 2010), to determine if the soft path approach could be

fully implemented in a municipal environment. The results of this study concluded that while some components of the soft path framework could be implemented, the institutional arrangements and governmental acceptance levels are not yet in place to achieve full implementation (Binstock 2010). Also, as mentioned earlier, the soft path is based on Lovins' (1977) soft energy work and there has been limited success in implementing specific components of this framework. While "no nation or state wholeheartedly accepted soft path conclusions as guiding principles, their impact was quite evident in policies that began to lean toward soft technologies and in results that showed more 'new' energy coming from gains in energy efficiency than from all new sources of supply together" (Brandes and Brooks 2006, 11). This type of limited success can be viewed as encouraging, particularly as researchers apply this concept to a soft path for water and potentially, to a water ethic.

3.4 Summary of Water Resources Management Frameworks

The initial sections of this chapter examined a set of successive water management frameworks in order to establish some grounds for considering the potential value of a proposed water ethic. Moving from exploitation and supply management towards the soft path, the water management frameworks presented in this chapter were presented in order from the least to the most critical of conventional growth assumptions, from the narrowest to the broadest potential options for water allocation, from the least to the most comprehensive set of factors to consider during the decision-making process, and from the least to the most acknowledgement that ecological services should at the very least be given the same priority as human needs for water.

There is an emergent way of thinking about water management decision-making that is accepting a wider agenda of issues for consideration, as well as setting the stage for a more participative process. Broader consideration of issues and enhanced participation are essential components of water management frameworks. Including these components within the described water management frameworks has, however, resulted in greater difficulties in integrating these considerations into implementable water policy and conflict resolution. In addition, the fragmentation of responsibilities for water resources has become more pronounced.

The fragmentation of responsibilities for water resources management is a reality in a Canadian context and could help explain why it is challenging to devise and apply a more comprehensive, integrated and implementable method for ethical water use. There are many reasons why each framework may not be the ideal ethical solution. The barriers to implementation for all the water management frameworks are: (1) insufficient money and time; (2) jurisdictional wrestling within implementing organizations; (3) inability to compromise; (4) resistance to changes in lifestyle required by individuals and institutions; (5) political processes that emphasize the polarization rather than integration of issues; (6) the attractions of short-term

economic growth; and (7) an entrenched reluctance to change ways of doing things (Dzurik 2003; Daigger 2009; Glennon 2009).

There is a group of researchers (for example, UN 2000; Armstrong 2006; Postel 2008; Schmidt 2012) who contemplate the need for a water ethic because, “something is missing” (Postel 2008, 22) in the way decisions are currently being made about complex natural systems that are not yet fully understood. As Biswas (2004, 2008) reports, water resources management is an ideally comprehensive and unavoidably political process of integration and conflict resolution. Debates about integrative concepts such as sustainability (as discussed in Chapter Two) and complex systems have highlighted some of the benefits of integration. Conflict resolution also benefits from such integration and inclusiveness, particularly as insights from developments in citizen participation, multi-stakeholder consultation, and the use of mediation and other mechanisms to resolve conflicts among relevant interests and agencies are accepted in practice. While there has been some progress in overcoming the challenges of integration and conflict resolution without sacrificing the comprehensive scope of integrative philosophy, additional work is needed to encourage, facilitate and support, “practical changes within institutional arrangements, stakeholder behaviours and the planning process” (Matthews et al. 2007, 350). Developing and implementing “a proposed water ethic with a similarly broad agenda might be one such means of accomplishing this task” (Matthews et al. 2007, 350). The following sections of this chapter start to explore some of the governance structures and institutional arrangements that may lead to implementing a proposed water ethic. The following sections of this chapter focus on governance structures and institutional arrangements in order to provide some additional context for the implementation of a proposed water ethic.

3.5 Introduction to Governance and Institutional Arrangements

When developing and implementing water policy, consideration must be given to multiple objectives, including economic development, social well-being, environmental quality, water security, and political acceptability of policies and plans. Some water resources experts (Loucks and Beek 2005; Gleick 2006; Armstrong 2009) maintain that most water problems are not primarily due to physical constraints or technical inabilities, but rather to a lack of consensus on objectives or on methods of achieving those that have been set. According to the UNESCO (2006, 3), water crises are not necessarily due to the lack of water resources, but rather due to inequities in power distribution, poorly defined roles and responsibilities, and overall weak governance structures.

Governance, and its subset category that includes institutional arrangements, can play a significant role in the successful implementation of water policy. For example, according to the 2nd World Water Development Report (2006), water scarcity is not always due to a lack of water resources and policy to manage these resources, but to their mismanagement and bad governance. Governance is the process through which collective decisions are made and implementation of these decisions is achieved, typically

through regulating and sanctioning, while an institutional arrangement affects whether and how multiple stakeholders interact in complex situations, prescribing what actions are allowed, required, or forbidden in given situations (Crawford and Ostrom, 1995). The evolutionary nature of the policy process, as it moves from development to implementation, requires coordination, compromise and trade-offs within institutional arrangements. Given the organizational complexity involved in creating and implementing policy, coordinated behaviour by a variety of institutions, government or otherwise, is required.

Implementing any kind of decision/agreement/policy is not done in a vacuum; it is conducted under a particular governance structure and within a specific institutional arrangement, whether at the global, national, regional and/or municipal level. The following sections examine the different roles governance and institutional arrangements play related to making decisions about water resources management, and developing and implementing water resource policies, specifically. The primary goal of the following sections is to provide insight about the complex nature of water resource management policy creation and implementation within the context of governance and institutional arrangements. Governance, as an overarching concept, will be further defined and discussed since it lays the foundation for institutional arrangements. Institutional arrangements, as a narrower concept, will then be discussed. The characteristics of good governance and a set of evaluative criteria used for determining the elements of an effective institutional arrangement will be presented. This information will then be used to create a guide for establishing possible means of implementing the proposed water ethic in Chapter Eight.

3.6 Defining Governance

Governance is at the heart of discussions about sustainability and related responses to the escalation of global environmental, economic and social issues (Graham et al. 2003; UNESCO 2006; Fried 2008). Governments, international to municipal, corporations, international development agencies, and organizations need to examine how governance can help address concerns over declining environmental conditions, increasing poverty, the inequitable distribution of resources, and gender inequity (Haas et al. 1993; Young 1996, 1997). The need for a water ethic is tangentially related to the ideas of Dietz et al. (2003) which suggest natural resources could face dramatic rates of depletion or degradation in the absence of effective governance structures (at the appropriate spatial scale), because of the rapidly expanding population, the voracious consumption of natural resources, and the technology used to gain unprecedented access to these resources. According to Fried (2008, 5), “twenty-six countries totaling more than 350 million people suffer from severe water scarcity, in spite of an adequate water supply, because of mismanagement and bad governance.”

The literature on governance is uneven, and there is not a common definition for the concept. Nonetheless, several definitions provide insight into this concept. The term ‘governance’ emerged within international relations studies in the 1990s and has become increasingly popular. Governance is defined

broadly by the Commission on Global Governance (1995, 2) as, “[T]he sum of the many ways individuals and institutions, public and private, manage their common affairs. It is a continuing process through which conflicting or diverse interests may be accommodated and co-operative action may be taken. It includes formal institutions and regimes empowered to enforce compliance, as well as informal arrangements that people and institutions either have agreed to or perceive to be their interest.”

According to Imperial (2009, 2), governance is “the means for achieving direction, control and coordination of individuals and organizations with varying degrees of autonomy.” Governance is exercised at various interacting scales, including global, provincial and local scales, and involves a diversity of actors (e.g., government ministers and policy advisors, mayors, municipal councils and business associations) and mechanisms (e.g., federal and/or provincial policy, regional and municipal official plans, zoning bylaws). Global governance refers to “the formal and informal bundle of rules, roles and relationships that define and regulate the social practices of states and non-state actors in international affairs” (Slaughter et al. 1998, 371). While in definitional terms many scholars agree on such a broad understanding of the concept (see Rosenau 1992), in practice, international or global governance is often used as if it were synonymous with the narrower notion of formal institutional arrangements, such as governments (Young 1997, 5-6; Smouts 1998). Since this research focuses on municipal decision-making, it is important to give particular attention to governance at this level. The UNDP (2011, 1) defines this type of governance as, “a set of institutions, mechanisms and processes, through which citizens and their groups can articulate their interests and needs, mediate their differences and exercise their rights and obligations at the local level.” Market instruments/market structure, customary behaviours, and individual choice are all included in the literature on governance.

Since this dissertation focuses on water resources management, definitions for water governance have different but closely related definitions relative to traditional governance (i.e., government). The Global Water Project (2000) includes the variety of political, social, economic, and administrative systems in place to develop, allocate, and manage water resources at different levels within its definition of water governance, which is a, “range of political, social, economic and administrative systems that are in place to develop and manage water resources and the delivery of water services, at different levels of society” (Rogers and Hall 2003, 7). Bakker (2003, 4) has adapted the Commission on Global Governance’s definition, and interprets governance to mean, “the process by which stakeholders articulate their interests, their input is absorbed, decisions are taken and implemented, and decision-makers are held accountable.” Roger and Hall (2003, 4) have stated that water governance “encompasses laws, regulations, and institutions but it also relates to government policies and actions, to domestic activities, and to networks of influence, including international market forces, the private sector and civil society. These, in turn, are affected by the political systems within which they function.”

Governance is inherently political and can involve bargaining, negotiation, conflict, and compromise (Imperial 2009). Recent attention has focused on governance regimes that are polycentric and in which multiple authorities serve overlapping jurisdictions (Andersson and Ostrom 2008; Neef 2009; McGinnis 2011). The use of terms such as integration, decentralization and devolution all illustrate this movement towards polycentric governance regimes and away from a single centre of power (Blomquist and Schlager 2005). Lafferty (2004) has suggested that the traditional idea of governance – the process of regulating and sanctioning – has been expanded to include modern theories on public administration and policy implementation that include the use of a variety of institutions, mechanisms and instruments to influence social change in a predetermined direction. Lafferty goes on to suggest that governance bodies, addressing many issues in the social sciences, and interestingly within the United Nations/European Union, continue to operate under an updated version of “social engineering for sustainable development” (Lafferty 2004, 5). Governance, whether it is at a global or municipal level or even at the corporate level, is a process that can facilitate (or impede) implementation of effective water management or a proposed water ethic. The characteristics of good governance are described in the next section.

3.6.1 Characteristics of Good Governance

In Chapter Two, there was a discussion regarding the requirements for sustainability that included “internalising external costs and ensuring integration of policy considerations, evaluation of options and dealing with trade-offs” (Kemp et al. 2005, 8). A similar discussion is needed regarding the components of good governance, as a “prerequisite for, and probably also a product of, steps towards sustainability” (Kemp et al. 2005, 18) and therefore, towards the implementation of a proposed water ethic.

In 1997, the UNDP articulated nine characteristics of good governance. The characteristics are collapsed into six principles by Graham et al. (2003), while Costanza et al. (1998) developed five principles of governance for sustainability. Each set of principles highlights the importance of an inclusive, participatory approach, combined with transparency of decision-making, the ability to be responsive and flexible (i.e., adaptive) when creating and implementing decisions, as well as the need to be responsible and accountable for actions taken. The biggest difference between these two versions of governance is that Graham et al. (2003) promote the necessity for a clear vision, while Costanza et al. (1998) are silent on this point. Trachtenber and Focht (2005) approached the notion of political legitimacy when discussing the morality of watershed policy development within governance structures. These authors offered criteria from the perspective that perception of legitimacy, specifically with respect to meaningful participation in the complex world of policy development, is fundamental to any effective decision-making process. Legitimacy in collaborative and participatory decision-making efforts requires a full range of stakeholder representation, genuine consideration of stakeholder needs, and broad consent to policy decisions by all actors involved (Trachtenberg and Focht 2005). Graham et al.’s (2003), Costanza et al.’s (1998), and Trachtenber and Focht’s (2005) characteristics are outlined in Table 3.2, and these characteristics may be

drawn upon when presenting the principles of the proposed water ethic.

TABLE 3.2 CHARACTERISTICS OF GOOD GOVERNANCE
Principles of Good Governance (Graham, Amos, and Plumtre 2003)
Strategic vision – leaders and the public have a broad and long-term perspective on good governance and human development along with a sense of what is needed for such development. There is also an understanding of the historical, cultural, and social complexities on which that perspective should be grounded.
Participation – all men and women should have a voice in decision-making, either directly through legitimate intermediate institutions that represent their intention, or indirectly. Such broad participation is built on freedom of association and speech, as well as capacities to participate constructively.
Consensus orientation – good governance mediates differing interests to reach a broad consensus on what is in the best interest of the group and, where possible, on policies and procedures.
Accountability – decision-makers in government, the private sector and civil society organizations are accountable to the public, as well as to institutional stakeholders. This accountability differs depending on the organizations and whether the decision is internal or external.
Transparency – transparency is built on the free flow of information. Processes, institutions, and information are directly accessible to those concerned with them, and enough information is provided to understand and monitor them.
Equity – all men and women have opportunities to improve or maintain their well-being.
Rule of law - legal frameworks should be fair and enforced impartially, particularly the laws of human rights.
Responsiveness – institutions and processes try to serve all stakeholders. Processes and institutions produce results that meet needs effectively and efficiently.
Principles of Sustainable Governance (Costanza et al. 1998)
Participation – all stakeholders are engaged in formulation and implementation of decisions.
Responsibility – access to environmental resources carries attendant responsibilities to use them in an ecologically sustainable, economically efficient and socially fair manner.
Scale-matching – decision making should be at the scale where relevant information is available, response is quick and efficient and integration can be achieved across scale boundaries.
Precaution – decision-makers err on the side of caution to avoid irreversible environmental impacts.
Adaptive Management – feedback mechanisms allow decision-makers to adjust management decisions based on new information.
Full cost allocation – internal and external costs and benefits, including social and ecological, are identified and allocated.
Criteria for Legitimacy in Policy-Making (Trachtenberg and Focht 2005)
Appropriate representation of non-governmental stakeholders – the participants must be in active communication with those they represent and reflect the range of interests, values, and relevant demographic characteristics of those they represent.

Fair consideration of stakeholders' concerns – take into account the beliefs and interests of those who decisions will affect, usually by such methods as survey research and/or soliciting testimony.
Genuine stakeholder consent – genuine consent is received if stakeholders are free from coercion, are fully informed, and there is a breadth of consent from an appropriate representation of stakeholders.
Improvement of stakeholders' welfare – the policy outcome must improve the conditions of life, including health, recreational opportunities, economic well-being, and the condition of wildlife.
Respecting stakeholders' rights – the policy outcome results in the notion that stakeholders are entitled to be treated, by both the government and each other, in ways that acknowledge and respect human dignity.
Fair distribution of welfare – the policy outcome must ensure that no group of non-governmental stakeholders can be used as a means to increase the welfare of another group of stakeholders.

Several water researchers have examined how governance influences water management (see de Loë 2005; Falkenmark et al. 2007; Fried 2008; Furlong and Bakker 2008; Schmidt 2010). These researchers recommend how to change a particular governance structure, suggesting broad-brush and systemic overhauls, such as including more education within the school system (Fried 2007), ethical language in policy (Postel 2008), and laws that demand ethical allocation and use of water. In order to put into practice these types of recommendations, a discussion about institutional arrangements and their roles in implementing the principles of a water ethic is important.

3.7 Defining Institutional Arrangements

Institutional arrangements are conceptually intertwined with governance. Governance and institutional behaviour are not the same, but they overlap and both apply in policy establishment and implementation (and have other roles as well). Governance, as already defined in this dissertation includes the structures and processes for regulating, sanctioning, and at times, implementing rules, regulation and plans. An institutional arrangement provides the means to develop and implement rules, regulations and plans. In other words, institutional arrangements facilitate the more specific development and implementation of decisions and agreements that result, in a more general, broad-based form, from the governance process. According to Young (2002, 4), institutional arrangements comprise “a set of rules, decision making procedures, and programs that define social practices, assign roles to participants in these practices, and guide interactions among occupants of those roles.” This definition indicates that institutions can be, as Young (2002) states, material entities that operate with personnel, offices, and a budget. However, the definition leaves room for the idea that institutional arrangements can be organized formally, such as a corporation or government, or informally, such as clans, families and social networks (March and Olsen 1989; Polski and Ostrom 1999; Rydin and Falleth 2006; Casson et al. 2010; Prell et al. 2010).

Apart from written laws, rules and procedures, informally established procedures, norms, practices and patterns of thought and behaviour may also form part of the institutional framework. After years of use,

tradition is established and informal practices also become rules in their own right when they are accepted by the relevant players (Prell et al 2010). Institutions “are patterns of norms and behaviors which persist because they are valued and useful” (Merrey 1993, 8). Institutional arrangements also refer to the manner in which institutions arrange themselves to deal with members of the public; the participation of non-institutional players would be included in the traditional definition. As Young (2002, 4) notes, “[M]ost of us are motivated not only by an interest in adding to the stock of scientific knowledge about such matters, but also by a desire to contribute to our capacity to design institutional arrangements that can play a role in improving the sustainability of human/environment relations.”

Some researchers (Scott and Lyman 1968; Douglas 1986; McCay and Acheson 1987; Wilson 2001) use the term ‘institution’ to describe long-lasting behavioural patterns; using this way of thinking can be useful when discussing a water ethic as it is, essentially, implementing a behavioural pattern where some of the principles will be followed and some will not. Scott (1995, 34) provides another relevant definition by stating that, “institutions consist of cognitive, normative, and regulative structures and activities that provide stability and meaning to social behavior.” Cognitive structures refer to institutions that are created based on what people know; normative institutions give society an idea of whether or not a specific type of behaviour is normal or desired; and, regulative institutions are created based on rules that guide present and future behaviour (Douglas 1986; Tisdell 1997; Young 2001, 2003). Depending on one’s perspective, Scott’s (1995) definition either expands upon or is in direct contradiction to the traditional idea put forward by institutional economists who state that institutions are “the rules of the game” (Bromley 1991, 15). The perspective taken by this research is that institutional arrangements are not necessarily just ‘rules of the game’, but rather how these ‘rules’ (laws, policies, principles of a water ethic, for example) are implemented through the continuous and gradual assigning of roles and responsibilities with changing contextual variations. This research also acknowledges that “rules” can include rules established by customary behaviour, entrenched ideas and established institutional practices.

3.7.1 Institutional Arrangements for the Management of Water Resources

Following the general definition of institutional arrangements, water institutions can be defined as “rules that together describe action situations, delineate action sets, provide incentives and determine outcomes both in individual and collective decisions related to water development, allocation, use and management” (Saleth and Dinar 2005, 3). As stated earlier when generally defining institutions, institutional arrangements that are organized to manage water resources are couched within cultural, social, economic and political contexts, and are dependent on a hierarchy of decision-making (Saleth 2010). In combination, these elements suggest that water institutional arrangements are influenced by individual perceptions, change through a continuous and gradual process, and are powerfully influenced by cultural, social, economic and political factors.

Water institutions are defined as the arrangement of various legal, policy, attitudinal, and organizational elements involved in water development, allocation, ownership, use, and management (Bromley 1989; Ostrom 1990; Saleth and Dinar 2004; Saleth 2010). Institutional arrangements for water resources management also differ in terms of their geographic coverage (for example, a watershed/river basin/catchment, or aquifer) and unit of analysis (a region, country or trans-boundary, for example) (Ostrom 1990; Huitema and Bressers 2007; Tropp 2007). For instance, the institutional arrangements governing agricultural water use usually are different from those governing urban water supply. Another example is that the institutional arrangements related to water quantity are different from those related to water quality. Similar distinctions exist between the institutional arrangements governing groundwater and those dealing with surface water. Despite the social, cultural, environmental, economic, and political variations that may exist from geographic area to geographic area, institutional arrangements for water resources management should have strong vertical and horizontal administrative linkages due to the very nature of water – it does not respect jurisdictional boundaries. Mitchell's (1990) definition of institutional arrangements in water management considers a combination of the following: (1) legislation and regulations; (2) policies and guidelines; (3) administrative structures; (4) economic and financial arrangements; (5) political structures and processes; (6) historical and traditional customs and values; and (7) key participants and actors.

The analysis of institutional arrangements has been gaining recognition in the social sciences. Disciplines such as economics, political science, and international development studies have examined how institutional arrangements affect human decisions and interactions (Moe 1984; Ostrom 1990; Nabil and Nugent 1989; Eggertson 1990). In public administration, institutional arrangements have long been a major focus of study. For example, Herbert Simon's early work, *Administrative Behavior*, examines how decision-making rules affect administrative behaviour within organizations (Simon 1945). During the past three decades, studies have examined how institutional arrangements affect the delivery of public services in urban areas and have generally concluded that fragmentation of authority and overlapping jurisdictions can limit efficiency and responsiveness (Ostrom et al. 1994; Jagerskog 2003). Other studies over this same time period have generally concluded that centralization and consolidation can also limit efficiency and responsiveness.

Inevitably, institutional arrangements are case specific; what works for one country or region within a country in a given period may be ineffective in another (Ostrom 1990; Young 2002). Based on the definitions given above and the terminology used in practice, institutional arrangements are a combination of:

- policies and objectives;
- laws, rules and regulations;
- organizations, their bylaws and core values;
- operational plans and procedures;

- incentive mechanisms;
- accountability mechanisms; and,
- norms, traditions, established practices, behavioural patterns, and customs.

All of these components have roles in water resources management and more specifically, in the implementation of a proposed water ethic. The following section of this chapter will discuss some of the criteria that can help make an institutional arrangement, or set of institutional arrangements, effective, particularly with respect to possible implementation of policies based on a proposed water ethic at the municipal level of government.

3.7.2 Evaluative Criteria for Effective Water-Related Policy Implementation

Similar to the literature on governance, the literature on institutional arrangements does not identify a perfect model; however, common elements increase the chances of institutional success. These elements, often linked to the literature on business and public administration (Haas et al. 1993; Haas 2000), include formation of what is referred to as a ‘sub-sector’. An example of a sub-sector in a Canadian context would be a municipality, or municipal government. An institutional arrangement’s sub-sector is created to encourage financial stability, invest in goods and skills (Haas et al. 1993; Cortner et al. 1998; March and Olsen 1998), manage a variety of organization types within a specific institutional arrangement, and bolster an institution’s ability to be adaptable and flexible given continuous change (Young 2003).

Institutional sub-sectors are established and designed to implement the legislation, regulations and policies of higher levels of government (federal, provincial, territorial). Local governments have a variety of organization types (e.g., regional or municipal). They are charged with ensuring financial stability of a particular part of a province, investing in infrastructure and human resources, and adapting to the flux in issues and governance structure (Berkes et al. 2007). With respect to water resources management, the institutional arrangement in a local government can reduce the uncertainty of human actions, and thereby have a stabilizing effect within a community. Established water allocation rules can bring about effective and equitable distribution of water, provided these rules are applied along with other related rules and norms, such as mechanisms to monitor water-delivery systems and laws relating to violation of commonly accepted allocation practices.

Work by organizations such as the International Fund on Agricultural Development (IFAD) (a branch of the UN) (2012), and the UNDP (2009) offered evaluative criteria for the effective implementation of policy related to rural and agricultural development. These criteria include transparency, accountability, contractual arrangements, choices, feedback, relevance, and sustainability of development efforts. Another approach to evaluative institutional performance, called the Institutional Analysis and Development (IAD) framework was developed by Ostrom and Ostrom (1986) and later modified by Blomquist (1992), Ostrom et al. (1993), and Ostrom et al. (1994). The IAD framework used evaluative criteria such as transaction costs

(information costs, coordination costs, and strategic costs), overall performance indicators (efficiency, equity, accountability, and adaptability) and impacts (policy outcomes). Each suggested framework offers very similar criteria, although, as Imperial and Yandle (1998, 15) found, the literature on institutional analysis and the success of policy implementation “lacks any common criteria for success.” The 1980s and 1990s resulted in a string of articles on the topic of policy implementation, in general, and there were several commonly found criteria for effective implementation, including compliance (see Mazmanian and Sabatier 1983), level of effort (see Thompson and Scicchitano 1985), feasibility (see Linder and Peters 1987), effectiveness (see Lippincott and Stoker 1992), policy outputs (see Ringquist 1993a), and policy outcomes (see Ringquist 1993b).

More recently, there has been research on institutional arrangements and water management that explore evaluative criteria for effective policy implementation (Kemper 2003; Annandale et al. 2004; Mitchell 2005; Minton et al. 2007), while the Reynolds and David (2008) presented criteria on the implementation of environmental policy. To help determine which elements contribute to effective decisions regarding water resources policy implementation, evaluative criteria are presented in Table 3.3. The criteria represent a synthesis of the more recent, representative literature on policy implementation. The criteria in Table 3.3 may be used by municipal staff (more specifically in the case study areas) to determine a possible best course of implementation for the proposed water ethic at the municipal level of government in Canada. The descriptions of the criteria are explained within the context of water resources management and are meant to apply the possible implementation of policy based on the proposed water ethic.

These five criteria provide a framework from which to devise a way to implement the principles of a proposed water ethic and in such a way that recognizes variability in local economic, political, environmental and social conditions. The criteria are silent on the objectives of water-related decision-making since this research requires a separate discussion on ethical issues that will help determine these objectives; the framework described in Table 3.3 is meant as a base for this separate discussion.

TABLE 3.3: EVALUATIVE CRITERIA FOR EFFECTIVE WATER-RELATED POLICY IMPLEMENTATION

	Evaluation Criteria	Description
1	Flexibility/Adaptability	As social, environmental, cultural and economic conditions change, to what extent is the approach to implementing the proposed water ethic flexible and adaptable? The greater its adaptability, the higher the score.
2	Administrative Simplicity	Given the scale at which this research proposes to implement a proposed water ethic (municipal level of government), policy options that are concise, measurable, can fit into existing policy frameworks, and can achieve multi-stakeholder agreement, will result in more effective implementation. The greater the administrative simplicity, the higher the score.
3	Equity (Distribution of Costs, Risks and Advantages)	Stakeholders will hold different views about a fair distribution of costs. Given the distribution of costs due to implementing a proposed water ethic, to what extent is there likely to be multi-stakeholder agreement on its equity? The greater the likelihood of multi-stakeholder agreement on equity, the higher the score should be.
4	Effectiveness and efficiency in influencing water use behaviour towards desired ends	What is the likelihood that implementing a proposed water ethic will positively alter the habits and behaviour of water users within a municipality? The greater the potential positive benefits, the higher the score.
5	Transferability of Knowledge	To what extent does implementing a proposed water ethic enable leveraging and sharing of local efforts?

Sources: Kemper 2001; Annandale et al. 2004; Mitchell 2005; Minton et al. 2007

3.8 Chapter Position

The purpose of this chapter is to fulfill some of the requirements of research objective two and provide background into the complexities related to the concepts of governance and institutional arrangements, particularly as they relate to water resources management. Implementing policies based on a proposed water ethic at the municipal level, within a Western context, “entails a substantial transition not just to a broader understanding and a more ambitious set of objectives, but also to more coherently interrelated institutional structures and processes of planning, administration, markets, tradition and choice at every scale” (Kemp et al. 2005, 6).

While it has been stated on multiple occasions (Kemp et al. 2005; Fried 2008; Schmidt 2012) that there is not one ideal governance structure for sustainability or water policy implementation, the challenge in this research is to determine the characteristics of a governance structure and institutional arrangements, or combination of arrangements, that will best suit the implementation of a proposed water ethic. What makes

this research doubly challenging is that institutional arrangements are often highly entrenched within established governance structures and there often can be resistance to changing them, despite potentially compelling evidence indicating a systematic change is necessary to improve the overall prospects for sustainability.

Based on research related to governance, the characteristics of good governance include an inclusive, participatory approach, combined with decision-making transparency, a responsive, adaptive and flexible policy environment, and accountability. For institutional arrangements, five evaluative criteria for effectively implementing water policy, and in particular the proposed water ethic, were introduced in this chapter: (1) adaptability; (2) administrative simplicity; (3) equity; (4) effectiveness and efficiency; and, (5) transferability of knowledge. These characteristics of good governance and evaluative criteria regarding institutional arrangements will be used in the case study analyses and to develop suggestions relating to the implementation of the proposed water ethic.

Chapter Four: Water and Ethics – Moving Towards a Set of Proposed Principles for the Ethical Use of Water

4.1 Introduction

As discussed in Chapter Two, an ethic is defined as a set of rules, guidelines, or imperatives of conduct for deciding whether a decision is right or wrong. In the context of water resource management, this definition can interpret a water ethic as the application of ethical principles to water use. In relation to water, this ethical obligation can be manifest in the form of laws, regulations and policies about the allocation, conservation, and regulation of this resource as well as the governance frameworks and institutional arrangements under which these obligations are created. Thus, protection of the biosphere can be interpreted through policy as: a divine order to protect creation (Peterson 2001; Armstrong 2006); as an emotional attachment of people to an environment with biodiversity (Wilson, 1984); as a source of inspiration and joy (Ehrenfeld 2005); as an educational means of practicing responsibility and maintaining social stability (Barrett et al. 2004); or, as a practical requirement for the maintenance of human economic and other interests.

This chapter provides a brief summary of water ethics, explaining its emergence into the water literature and why it is a difficult to achieve consensus on principles of ethical use of water at the global level. Based on an exploration of various approaches and guidelines from across the globe, I propose a set of six principles for a water ethic. The next challenge becomes how to integrate multiple, and often competing, factors when trying to determine how best to implement this proposed water ethic at the municipal level of government in Canada.

4.2 A Brief History of Water Ethics

The trajectory towards a widely accepted water ethic does include complications. According to Matthews et al. (2007, 338), “at least part of the difficulty is that identification of common ethical goals is difficult. There are differing perceptions of what is ethical as well as a wide diversity of approaches within and among nations. Moreover, this diversity is to some extent inevitable and appropriate in a world of markedly different ecological, economic, and cultural circumstances.” Despite these difficulties, the desire still exists for general agreement on the basic principles of a water ethic because, as Gleick (2000a, 128) points out, “lack of consensus on a guiding ethic for water policy has led to fragmented policies and incremental changes that typically satisfy none of the many affected parties.” This lack of consensus is not only a problem at the global scale, but trickles down to regional and municipal scales where implementation of policies and practices built on a water ethic, is necessary.

There was some movement at the global scale towards thinking about water not primarily from a human perspective (Postel 1992). The first international conference on water was held in 1977, in Mar del Plata, Argentina. The objectives of this intergovernmental forum were to promote national and international preparedness to help avoid a world water crisis, and to assess global water resources, water use and efficiency (UN 1992a). The International Conference on Water and the Environment (ICWE) held in Dublin, Ireland followed in January 1992 (UN 1992a). The recommendations from the ICWE meeting heavily influenced Agenda 21 (Chapter 18) (UN 1992b), which was subsequently adopted at the 1992 UNCED (UN 1992c). What resulted from the ICWE was a set of guiding principles, the Dublin Statement, which linked water and ethics.

4.2.1 The Dublin Statement

The Dublin Statement on Water and Sustainable Development recognises the increasing scarcity of clean, fresh water as a result of conflicting uses and overuses of water. The Statement is, however, most referred to as the UN document that declares water a finite natural resource with economic value. The four guiding principles regarding how water should be used and managed are shown in Box 4.1:

Box 4.1: The Dublin Statement Principles

- *Fresh water is a finite and vulnerable resource, essential to sustain life, development and the environment.* Since water sustains all life, effective management of water resources demands a holistic approach, linking social and economic development with protection of natural ecosystems. Effective management links land and water uses across the whole of a catchment area or groundwater aquifer.
- *Water development and management should be based on a participatory approach, involving users, planners and policy makers at all levels.* The participatory approach involves raising awareness of the importance of water among policy makers and the general public. It means that decisions are taken at the lower appropriate level, with full public consultation and involvement of users in the planning and implementation of water protects.
- *Women play a central role in the provision, management and safeguarding of water.* The pivotal role of women as providers and users of water and guardians of the living environment has seldom been reflected in institutional arrangements for the development and management of water resources. Acceptance and implementation of these principle requires positive policies to address women's specific needs and to equip and empower women to participate at all levels in water resources programmes, including decision making and implementation, in ways defined by them.
- *Water has an economic value in all its competing uses and should be recognized as an economic good.* It is vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price. Past failure to recognize the economic value of water has led to wasteful and environmentally damaging uses of the resource. Managing water as an economic good is an important way of achieving efficient and equitable use, and of encouraging conservation and protection of water resources.

Source: UNCED 1992

The Dublin Statement's final principle ("water has an economic value in all its competing uses and should be recognized as an economic good") has been considered by some (Bleisch 2006; Metha 2006; Seymour and Pincus 2008; WHO 2010) to be controversial as it adopts both economic and human rights perspectives on water. Some non-governmental organizations, such as the U.K.-based WaterAid (2011) or the Council of Canadians (2008), oppose the commodification of water resources, in part, because of the belief that, ethically-speaking, this way of thinking about water does not place enough value on equitable access to water, particularly for those people in unfortunate economic circumstances. Furthermore, at the time, the Dublin Statement was the only binding UN document that made a statement on the issue of prioritization (Hardbenger 2008). In 2002, however, the UN Committee on Economic, Social and Cultural Rights adopted General Comment No. 15, which was formulated by experts on the International Covenant on Economic, Social and Cultural Rights. In this Comment, water is recognized not only as a limited natural resource and a public good but also as a human right.

The Dublin Principles and General Comment No. 15, the two main UN documents that provide a form of implied ethical direction on water resources, do place different priorities on how this resource could be used. While the Dublin Principles emphasize water as a scarce economic good to be used efficiently, General Comment No. 15 expands the number of priorities to include ecological integrity, and the public good. Given that there could be more controversies over the most ethical use(s) of water, including disagreements on the priority of these emphases, there needs to be a way to resolve these potential incompatibilities when implementing a proposed water ethic. According to Vandenhoe and Wieders (2008, 404), having conflicting perspectives (economic and human rights) is not incompatible with the objective of providing everyone with affordable, safe, and sufficient access to the resource as long as water services comply with the principles of essential service and universal service. Marcatelli (2009, 8) borrows from the field of public health when defining essential services as those being "indispensable to life" whereas universal services are items of a "general interest." The incompatibility issue is addressed in the next section when summarizing the discussion on initiatives towards a water ethic.

4.2.2 Other Perspectives and Initiatives related to a Water Ethic

Coinciding with the 1992 UNCED and ICWE conferences was Postel's call for a water ethic, presented in *The Last Oasis* (1992). Postel's work could be compared to Aldo Leopold's (1949) challenge to land and water managers in the mid-20th century in that she emphasizes the need to think holistically about the management of an ecosystem. Postel (1992; 2000; 2008) challenged those in the water management field to put as much human ingenuity into learning to live in balance with water as had been put into controlling and manipulating ecological systems. Postel (1992, 15) states that, "instead of continuously reaching out for more water, the challenge is to do more with less — by conserving and recycling water and using it more efficiently." More recently, Postel (2008, 22) reiterated her call for a set of guidelines and principles that "stops us from chipping away at natural systems until nothing is left of their life-sustaining functions, which

the marketplace fails to value adequately, if at all. In short, we need a water ethic - a guide to right conduct in the face of complex decisions about natural systems that we do not and cannot fully understand.”

Various other conferences and commissions (e.g., The UN Commission on Sustainable Development 1998; the European Union’s 2001 Water Framework Directive; the 2002 World Summit on Sustainable Development in Johannesburg; the 3rd World Water Forum in Kyoto in 2003 and the subsequent World Water Forums in 2006 (Mexico) and 2009 (Turkey)) have been held to discuss and formulate action plans aimed at achieving “sustainable” water use. Some of the suggested measures to achieve sustainable water use include water pricing, encouraging more education about water resources management, developing better sets of indicators to monitor sustainable water use, and promoting the implementation of a set of yet to be determined ethical principles. This suggested set of ethical principles, that may form part of the proposed water ethic for this dissertation, is discussed below.

Several nations have responded to this challenge of achieving sustainable water use through the development of ethically-influenced water-related policies. For example, according to South Africa’s *National Water Act*, only environmental needs and basic human needs are identified as constitutional rights to water. The South African legislation recognizes the interrelations between humans and the ecological system, and places priority on water for the environment (Government of South Africa 1997; Hardberger, 2008; Postel 2008). However, it is not clear what need takes priority should available water resources only allow the satisfaction of one – environmental or human.

In Australia, “water policy reform has led to acceptance of ecosystem limits and allocation of a form of legal rights to the environment as a legitimate user of water” (Matthews, et al. 2007, 354) as well as through the Council of Australian Governments (COAG), where water for the environment is a provision in the Water Reform Agenda (COAG 2004). In India, in contrast, water is not an explicit right recognized in the constitution; however, federal and state levels of government have interpreted the constitutional right to life to include the right to safe and sufficient water through a legally-binding court case (Narain 2010).

Another example can be found in Spain and Portugal, where the idea of a water ethic has taken shape through the formation of the New Water Culture Foundation (NWCF). The NWCF is a non-governmental organization, consisting primarily of academics and water professionals, in Spain and Portugal, who study new methods of managing water resources. Their research emphasis is on education, policy formulation, and promotion of a ‘new water culture’ that goes beyond purely technical or traditional political frameworks, and towards more ethically-minded policy frameworks, such as those adopted by South Africa and Australia. This call for a ‘new water culture’ (akin to a water ethic) is also rapidly finding adherents in countries within Latin America (NWCF 2006).

The Canadian Water Resources Association has also addressed sustainable water use, and in 1994 drafted “Sustainability Principles for Water Management in Canada”, which were then updated several years ago (CWRA 1994; 2006): This organization’s Sustainability Ethic states, “[W]ise management of water resources must be achieved by a genuine commitment to ecological integrity and biological diversity to ensure a healthy environment; a dynamic economy; and social equity for present and future generations.” The Water Management Principles associated with accepting this Sustainability Ethic state that the actions in Box 4.2, below, should occur in order to follow this Ethic. These principles were originally published in 1994, two years after the Dublin Statement. The Sustainability Ethic, upon which these complementary principles rest, is directly related to the concept of sustainable development and its associated ideas of providing for present and future generations. Implementation of these principles is anticipated primarily through decisions made by various levels of government as well as through the involvement of organizations associated with water management.

Box 4.2: Canadian Water Resources Association Water Management Principles

1. Practice integrated water resource management by:

- (a) linking water quality, quantity and the management of other resources;
- (b) recognizing hydrological, ecological, social and institutional systems; and
- (c) recognizing the importance of watershed and aquifer boundaries

2. Encourage water conservation and the protection of water quality by:

- (a) recognizing the value and limits of water resources and the cost of providing it in adequate quantity and quality;
- (b) acknowledging its consumptive and non-consumptive values to both humans and other species; and,
- (c) balancing education, market forces, and regulatory systems to promote choice and recognition of the responsibility of beneficiaries to pay for use of the resource.

3. Resolve water management issues by:

- (a) employing planning, monitoring and research;
- (b) providing multidisciplinary information for decision making;
- (c) encouraging active consultation and participation among all affected parties and the public
- (d) using negotiation and mediation to seek consensus; and,
- (e) ensuring accountability through open communication, education and public access to information

Source: CWRA 1994, 2006

The link between water and ethics is slowly being made at a global level, by the United Nations (through the Millennium goals and UNESCO), with several documents examining this topic (Selborne 2000; Aureli and Brelet 2004; Brelet 2004; Priscoli et al. 2004). The UN, in 2000, drafted a statement regarding the ethical use of water, loosely based on the Dublin Principles of 1992 (Selborne 2000). The UN’s “The Ethics of Freshwater Use: A Survey” draws on a rich and varied body of discussion and documentation to provide an overview of the practical aspects of concern so as to identify relevant ethical stances. The aim was to help lay a foundation of trust, justice and equity regarding the availability of and access to freshwater resources for

the entire community of nations. Six ethical principles that apply to the issue of water were highlighted in the paper, and are listed in Box 4.3.

Box 4.3: The United Nations Principles for the Ethics of Freshwater Use

1. *Human dignity*: there is no life without water and those to whom it is denied are denied life.
2. *Participation*: all individuals, especially the poor and women, must be involved in water planning and management.
3. *Solidarity*: water continually confronts humans with their upstream and downstream interdependency.
4. *Human equity*: taken to mean rendering to all persons their due and which describes perfectly the challenges in river basin management today.
5. *Common good*: water is a common good and without proper water management human potential and dignity are diminished for all and denied to some.
6. *Stewardship*: much of water management is about finding an ethical balance among using, changing and preserving our water resources and land (Selborne 2000).

Several years later, UNESCO formed the World Commission on Ethics of Scientific Knowledge and Technology (known as COMEST) (Priscoli et al. 2004) to search for universals regarding the ethical use of water. The results from this work, using four case studies from Japan, South Africa, Philippines and the Andes region, summarize the fundamental ethical principles that should be applied in all fields of water use. Note in Box 4.4 that COMEST's first six principles are the same as those identified by the United Nations' "Ethics of Freshwater Use: A Survey" (Selborne 2000), in Box 4.4; principles seven through ten are COMEST's additions:

Box 4.4: The World Commission on Ethics of Scientific Knowledge and Technology (COMEST) Principles of Ethical Use of Water

1. Human dignity
2. Participation
3. Solidarity
4. Human equality
5. Water as common good
6. Stewardship
7. *Transparency and universal access to information*: means having an open dialogue and providing access to information for those stakeholders affected by water management decisions
8. *Inclusiveness*: water management policies must address the interests of all those affected, including minority and disadvantaged citizens.
9. *Empowerment*: for the requirement to facilitate participation in decision-making means much more than to allow for an opportunity for consultation
10. *Equity and access between and across generations*: water use must be fair and taken into account the needs of current and future water users.

(Source: Priscoli et. al., 2004)

The introduction of these Canadian and global sets of principles illustrates the growing interest in the development of water ethics principles, as well as the associated complexities regarding widespread agreement. Perhaps one reason why these principles, although admirable, are difficult to agree upon is because they are mostly silent on prioritization and trade-offs. Despite emphasizing ideas about transparency, open and participatory discussions, equity, and informed decision-making, the relative importance of each principle is not established. However, it is extremely difficult to reach consensus when making decisions about a natural resource crucial to the survival of the human race, even under the most desirable of circumstances.

It could also be too idealistic to assume that a set of principles regarding the ethical use of water could achieve consensus, while simultaneously addressing priorities and trade-offs. This dilemma occurs because, as Matthews et al. (2007, 343) suggest, “[p]erhaps the best that can be expected is consideration of all the key factors and use of fair and open processes. But, if so, it will be particularly important to ensure that water decision-making does address all the crucial issues, including opportunities to contribute to related livelihood objectives, and that it both uses and contributes to the spread and entrenchment of effectively participative democracy. If this is achieved, it will represent a significant advance over what has prevailed in the practice of water management decision making in most jurisdictions.”

This research adopts the ideas embedded in the above quotation and will therefore not attempt to prioritize the suggested principles of a water ethic at the end of this chapter. However, when conducting interviews in the case studies, interviewees were asked to rate their perceived importance of the suggested principles (refer to Appendix A). This was done in order to start the process of considering trade-offs and prioritization when attempting to implement a water ethic.

4.3 Current State of Water Ethics

As shown in the preceding section, some scholarship is aimed at establishing recipes, guidelines, best practices, and other templates to achieve order, coordination, consistency, and agreement about water. One aspect of this research takes the view that water conflict is inevitable and must be accepted and incorporated into decision-making. According to the Johannesburg memo (Sachs 2002, 67), “...communities and individuals bring extraordinarily diverse experiences, interests and worldviews to bear on the global stage. Conflict cannot be dreamed away; on the contrary, conflicts generate the upheavals, alliances and ideologies of that amalgam called global society. There is no universal way of seeing; there are only context bound viewpoints that offer particular perspectives.” I present the idea that it is possible to offer a generic set of principles that result in a proposed water ethic, test these principles in a Canadian context, and yet still be attentive to contextual (Western) considerations. Gibson (2006, 273), when discussing sustainability assessment and the need to merge generic criteria with contextual concerns, maintains that, “attention to these particulars – existing ecosystem stresses, cultural sensitivities, vulnerable communities, untapped

opportunities, etc. – is crucial if lasting gains are to be delivered.” I do not attempt to resolve the issue of establishing a global water ethic, but rather attempt to shed some light, through exploration of self-reported thinking in the interviews from the case studies, on some general considerations for a proposed water ethic. The water ethic that may be proposed towards the end of this dissertation will not have global applicability since the proposed principles will have been reviewed, and possibly endorsed, in the context of a Western perspective. The applicability may only be on a Canadian, and possibly North American, scale.

Contextual differences can be an impediment, or positive reinforcement, when trying to define a water ethic based on universal principles. While conflicting perspectives over the priorities of use and stewardship of water in cultural and economic terms do exist, this reality is not a sufficient reason to abandon the aspiration for universal principles regarding the ethical use of water that can be implemented. The basic fact is that water is essential to all life; the need to take care of this resource is reason enough to make an attempt at devising a plan to, at the very least, influence decision-making based on ethical principles. The key point is that an effort is being made and there is always the option to alter the wording of the broad principles to suit contextually specific situations. While another philosophical perspective may be to seek a solution based on situated ethics, this exploration may be conducted as part of a future research project.

It is difficult to achieve clear and transparent policy objectives that are ethical as well as practical through a political process characterized by interest group negotiation, bargaining, and brokered compromise. Ethical discourse is concerned with defining fundamental issues of right and wrong, including right and wrong processes for wrestling with ethical questions. Politics, as Lasswell (1950) reminds us, involves “who gets what, when and how.” Garner et al. (2012, 4) takes Lasswell’s statement and expands upon the notion of politics by stating, “[I]f we all had the same interests and values, and there was enough of everything to go around, there would be no need to make such decisions. We could have everything we wanted. Politics is predicated on the assumption that this is not the case.”

Thus, the challenge is to identify approaches for the implementation of ethical ideas that can guide the struggle for justice for the overall community in the context of political processes that typically involve competing interests and values. Furthermore, and consistent with Chapter Two, while Utilitarianism may promote efficiency, this approach is, at best, an instrumental ethical criterion whose purpose is usually thought to be the achievement of some higher goal. As Anderson (1979, 711-723) surmises, other principles, including a policy’s amenability to ranking conflicting social priorities, and its ability to mitigate risks imposed on the less fortunate populations – or vulnerable resources – are also important considerations in determining what makes a decision rational and/or ethical. Economically efficient water policies have often imposed adverse ecological and social risks on some. The following section identifies six principles that form a water ethic that could be implemented at the municipal level of government in Canada, based on the principles already introduced at the international level.

4.4 Defining a Proposed Water Ethic

This chapter previously provided several sets of principles regarding the ethical use of water. Based on writings by Postel (1992; 2000; 2008), Selborne (2000), UNESCO (2000; 2004), Priscoli et al. (2004), Rahaman and Varis (2005), the CWRA (2006), Matthews et al. (2007), and Brown and Schmidt (2010), six principles for a proposed water ethic are presented for an overall foundation regarding ethical water use. While the six principles do not encompass all of the individual suggestions in the literature, they have been selected because they do synthesize the dominant ideas found in the literature and structure them in such a way to allow their use in the case study portion of this research. There may be other ways of presenting these principles, such as separating the concepts of basic human needs and equity for example, but I chose to include them within the same principle since these concepts both address well-being. The six principles are listed in Box 4.5.

Box 4.5: Principles of a Proposed Water Ethic

1. Meet basic human needs and enhance equity today and for the future;
2. Safeguard ecosystems by allocating sufficient water to maintain ecosystem integrity, including the preservation of ecosystem services;
3. Encourage efficiency and conservation;
4. Establish open and participative decision-making processes;
5. Respect system complexity and emphasize precaution; and
6. Seek multiple sustainability benefits from water-centred initiatives, including enhancement of livelihood opportunities, health, education and security.

The first principle, *meeting basic human needs*, addresses the fundamental idea that community well-being is at the heart of further societal progress. Therefore, we must ensure that everyone has access to sufficient clean drinking water and sanitation services. This principle primarily involves, but does not rely exclusively on, using agreed upon standards defining the minimum amount of water needed for human survival, as well as any additional basic needs for reasonable sanitation services, food preparation and bathing; equitable distribution of water resources for the present generation; and, ensuring that decisions today do not have a deleterious consequence for future generations. Gleik (1998, 577) has interpreted equity, in the context of water management decision-making, to mean, “the fairness of both the distribution of positive and negative outcomes as well as the process used to arrive at a particular social decision.” This first principle endorses access to water as a basic human right only insofar as such access can then further protect this resource.

Adhering to the first principle over the long term is contingent on ensuring that the second principle, *safeguarding ecosystems*, is met. Like the first principle, emphasizing the use of agreed upon data that is informed by good research and making decisions based on a fair process are essential to the successful implementation of this principle. Allocating sufficient water to maintain ecosystem integrity and preserve ecosystem services is fundamental to the survival of this natural resource, for the benefit of both human and non-human species. Again, defining what is *sufficient* requires an agreement about the base level (quantity and quality) of water needed for the survival of ecological services. There are currently efforts to identify and measure base level water needs, and the responsibility for determining the degree to which ecosystems will be maintained currently rests with federal, provincial and/or municipal governments. As with the first principle, this principle must recognize that there will be disagreements between human and ecosystem needs (e.g, deciding whether permits for municipal wellfields should be renewed for human use despite evidence that pumping can cause severe adverse ecological impacts) and allowing discussions about trade-offs need to occur.

By strengthening conservation motivations and capabilities through educational, regulatory, and economic innovations and applications of appropriate technology, the third principle of *encouraging efficiency and conservation of water resources* should be achievable. With this principle, water “demand management must be considered generally preferable to exploiting new supplies, and all new supply initiatives must be designed for efficiency, flexibility, and appropriate use” (Matthews et al. 2007, 351). Other water management frameworks, such as IWRM and soft path approach explored in Chapter Three, may also contribute ways to satisfy this principle.

As discussed in previous sections of this chapter, *open and participative decision-making* is essential to any resource management process, and the potential success of this proposed water ethic is no different. This fourth principle involves recognizing that choices about ethical water use depend heavily on the effective and informed ideas of those within a particular community. Providing opportunity for meaningful public engagement and participation is now a given in most Western-based resource management literature. This principle is included for the very basic reason that any set of principles is more likely to be better understood, generally accepted, and more effectively implemented if stakeholders are given an opportunity to engage and participate in the public process. As Matthews et al. (2007, 352) state, “...the objective is to use water decision making as a means of building social and ecological understanding, stewardship capabilities, and collective capacities for protecting water as a common good.”

Having *respect for complexities and exercising precaution* is the fifth principle. This principle means making sure that, when making a decision and moving ahead with implementation, all options have been examined to facilitate expecting the unexpected (Walker and Salt 2006; Miller et al. 2010). Applying the precautionary principle to a decision-making process on water management centers on favouring low risk options and ensuring a way out of what could be a potentially wrong course – allowing for decisions to be low-risk and

reversible. The ultimate goal of this principle is to improve the integrity of interdependent ecological, social, and economic systems.

The last principle of the proposed water ethic is to ensure we are always *seeking multiple sustainability benefits with any decision*. Continuously building links between or among various objectives strengthens the entire system. This principle emphasizes that the components and services of a system are inextricably linked, that individual systems are inextricably linked to other systems at multiple scales and that respect for this characteristic contributes to establishing the conditions for a better, ethical, world.

4.5 Chapter Position

Water, as it pertains to life, may be associated with many ethical frameworks, and even though cultural values vary with different societies, most ethical perspectives arguably appreciate the importance of water. In many cultures, the idea of an ethics-based life is common; however, defining ethics that transcend all cultures is complex, and challenging. For many issues, municipal governance of an issue, such as tax collection or waste removal, may be satisfactory; however, for broad-reaching concerns, such as restoring, maintaining, or enhancing environmental integrity, achieving a shared doctrine becomes more important but difficult.

There is a relatively small amount of research and literature that identifies considerations for inclusion into a water ethic. The principles identified by the UN, the CWRA, the Dublin Statement, and various academics are similar. For this reason, six principles of a proposed water ethic were chosen, using the available information and synthesizing them into a manageable number to use in the case studies. As discussed in this chapter, a method for prioritizing these principles is not provided in this research for the basic reason that consensus must first be reached on a comprehensive, implementable ethic for water policy before attempting to imbed a ranking system. This proposed water ethic provides the key considerations for decision-makers and stakeholders and it is up to those who implement the ethic, in an open and fair process, to devise a prioritization or ranking system that best suits local conditions. However, this research does recognize that there will be trade-offs if and when two (or more) principles conflict with one another, and that much will depend on the specifics of the case and content for how to deal with these trade-offs. Therefore, interviewees in the two case study areas will be asked questions regarding the suggested principles of the water ethic, one of which will be to rate, according to strength of agreement or disagreement, the principles in order of the interviewees' perceived importance. The results could help future researchers determine what trade-offs could be accepted and under what conditions, and may help clarify the key surrounding considerations for each principle.

The tools that could help implement a water ethic are well established. International law, international organizations (such as the UN), and various levels of global governments are all examples of where such a global water ethic could be recognized, leading the way for various forms of this proposed water ethic to be adopted at municipal levels of government. However, even if a proposed water ethic addresses all the crucial issues described in this chapter, current governance structures and institutional arrangements may not fully incorporate the fundamental underpinnings of ethical thought. No research has addressed how fundamental ethical frameworks such as Utilitarianism, Consequentialism, Intrinsic Value and Theism influence current decision-making and yet, these ethics are at the heart of how we make our most basic decisions. The six principles that form the proposed water ethic for this dissertation borrow components from all four ethical frameworks already discussed in Chapter Two.

This chapter has focused on synthesizing the main international recommendations for inclusion in a water ethic into a set of six principles. In the following chapters, these principles will be used as a proposed water ethic for the two case study areas, both within Canada. Prior to the introduction of the case studies, a summary and explanation of the pertinent legislative frameworks is necessary to establish context. The next chapter therefore reviews the significant laws, policies and organizations that influence policy-making related to water in Canada.

Chapter Five: Overview of Applicable Water Legislation and Policy in Canada

5.1 Introduction

Drafting and implementing water policy provides a challenge in Canada. Should all stakeholders be included in the process? Whose values are more important? What about the rights of the Aboriginals? What about the rights of the environment? Can or should one water use outweigh another water use? When does policy become outdated? Who should be in charge of implementing water policy? How many jurisdictions are or should be involved?

The complexities involved in drafting and implementing water policy are significant. Complicated themes such as rights, values, perceptions, ethics, and philosophy all collide, and it is often difficult to establish clear, consistent and implementable policy. The first hurdle that a policy maker must face is usually to recognize the limitations of existing approach(es) to drafting water policy, followed by getting commitment to initiate new policy, or to enhance existing policy. This commitment is then followed by a second hurdle - jurisdictional coordination - because federal, provincial, municipal, territorial, and Aboriginal governments all have a role in how Canada's water resources are managed.

In terms of intergovernmental coordination, the competing interests and responsibilities of, between and among the various departments and agencies create the need for coordinated policy related to water quality and quantify. Ideally, each department or organization tries to develop clear and consistent goals; however, these goals sometimes clash, overlap or supersede each other. From a federal and provincial coordination perspective, tensions can also arise due to overlapping responsibilities. While each level of government has a constitutional right, for managing water resources specifically provided through the *Constitutional Act* (1867) (Nowlan 2005, 10), in some areas it is unclear which level of government has a higher level of responsibility (Nowlan 2005; NRTEE 2010).

The issue of determining priority between the issuance of water licenses (a provincial responsibility) and the federal *Fisheries Act* is an example of where clashes can occur. In the case of the Kemano Completion Project, a hydroelectric generating project in British Columbia, the project's proponent, Alcan, had a Provincially-issued conditional water license granting the company all rights to water above the site of its dam. Alcan ignored the direction of the Department of Fisheries and Ocean to release the quantity of water required to ensure the safety of fish, and in effect, denied federal jurisdiction under the *Fisheries Act*. After multiple hearings between Alcan and the Attorney General of Canada, the judge in this case ordered Alcan to comply with the federal *Fisheries Act* despite the conditions of the provincial water licence (Glenn 1999; Nowlan 2005; Cohen Commission 2011).

According to the National Roundtable on the Environment and the Economy (NRTEE), this continued tension regarding jurisdictional responsibility over water management is likely to pose a significant challenge to the future sustainability of Canada's water resources (NRTEE 2010, 42). There is a further jurisdictional conundrum regarding watershed boundaries. Since water does not normally respect political or administrative boundaries, watersheds can fall into several spatial areas of management. This jurisdictional reality means that special governance frameworks must be established to allow for effective management (Hoover et al. 2007; NRTEE 2010).

The purpose of this chapter is to understand the historical evolution of Canadian water legislation and institutions. The following sections describe how water resources are managed at the federal, provincial, territorial and municipal levels of government, as well as in Aboriginal communities. A brief, but comprehensive, summary of legislation and policy is provided in order to give a historical context for current water resource policy development and implementation. Chapters Six and Seven provide the legislative context for the two in-depth case studies of Guelph, Ontario and Calgary, Alberta. A more complex and specific review of provincial and municipal legislation, policy and programs for Guelph and Calgary will be provided at the start of the case study chapters.

5.2 Policy and Legislation Overview

There are myriad opinions on what the federal, provincial, territorial, Aboriginal, and municipal levels of government do, or do not do, regarding development and implementation of water resource management policy and legislation. Fundamentally, it is the government's job to protect water quality and water quantity (Boyd 2003). However, since water has also been a fundamental economic driver, means of transportation, factor in health, and the subject of international dispute, other governmental responsibilities reflect this fact and interact with water policy. Water policy and legislation can be analysed from several perspectives, including the various roles each player has in water policy, the purpose of each major piece of water legislation, and who has responsibility for regulating water in Canada. The necessity for a basic understanding, at the very least, of the historical development and evolution of Canada's governance and institutional arrangements for water resources in order to understand the current policy and legislative contexts across the country (Gleick 2006; de Loë 2008; Armstrong 2009) was highlighted Chapter Four.

When reading the rest of this chapter, several definitions for terms such as law, legislation, regulation, policy, and strategies/programs/framework should be top of mind. Laws are enforceable rules that govern the behaviour of governments, agencies and individuals, and for which there are negative consequences for failing to abide. Statute law/legislation, regulation and common law are the three types of law that exist in Canada (Maguire and Pak 2004). The Canadian *Fisheries Act*, the Ontario *Mining Act*, and the *Ontario Water Resources Act* are examples of statutes, which are enacted by Parliament or a provincial legislature to set out a broad framework of rules (Environment Canada 2011; MOE 2011). Regulations are

rules enacted by Cabinet in accordance with a statute. Regulations are subordinate to the governing statute and usually spell out in detail the implementation of a statute. Examples of regulations are the Metal Mining Effluent Regulations under the *Fisheries Act*, Mine Development and Closure Regulations under the *Ontario Mining Act*, and the Taking and Use of Water Regulations under the *Ontario Water Resources Act*. Common law is a set of legal rules developed by the legal system (i.e., court-based decisions), based on case precedents. The common law interprets statutes and regulations as well as imposes rules that govern behaviour (MNR 2011).

Policies are the mechanisms through which a government sets out its goals and objectives. Policy is not always legally enforceable and as a result, there are not necessarily any legal repercussions for failing to follow policy. Policy is generally created or changed when a new government is elected, when popular opinion changes, or when new issues arise (Maguire and Pak 2004). Policy may be implemented through government programs, action plans, or strategies. Laws may be enacted or amended to implement policy objectives. An example is the Federal Water Policy, which will be discussed later in this chapter. There are circumstances, however, when policy is legally enforceable. For example, a municipal Official Plan in Ontario contains a string of policies that, on their own, are not enforceable by law. However, the provincial *Planning Act* establishes that once the policies contained in Official Plans are reviewed and approved by the provincial government, the policies have legal authority (MMAH 2011).

For water resources management in Canada, superficially, there is a division of authorities and responsibilities regarding water legislation and policy stemming from the Constitution. Provincial governments and one territorial government (Yukon) manage water resources, while the federal government, through the Department of Indian and Northern Affairs Canada, is responsible for the two other territorial governments (Northwest Territories and Nunavut) navigable waters, waters on federal lands, fisheries, and international transboundary issues (Environment Canada 2011). However, a complex layering of legislation, authorities, and agreements actually exists regarding jurisdiction over water resources in Canada. The responsibility for managing water in Canada was originally devised, albeit crudely, through the *Constitution Act*, in 1867. This legislation divided responsibility between the federal and provincial levels of government, as shown in Table 5.1.

TABLE 5.1: A COMPARISON OF FEDERAL AND PROVINCIAL RESPONSIBILITIES RELATED TO WATER

Federal Responsibilities	Provincial Responsibilities
Peace, order and good government	Hospitals
Trade and commerce	Municipal institutions
Navigation and shipping	Local works and undertakings
Sea coast and inland fisheries	Property and civil rights
Criminal law	Matters of a “merely local or private nature”
Federal works and undertakings	Natural resources, forestry and electrical energy

Source: The Living Water Policy Project 2012

The *Constitution Act (1982)* was not specific regarding jurisdiction of fundamental aspects such as the “environment”, “public health”, or “water”. Because of this lack of clarity in legislative language, considerable shared jurisdiction exists related to the environment, public health and water that can result in friction, misunderstanding and possibly, inaction. This could have consequences if attempting to implement a water ethic at the municipal level of government in Canada. The following sections summarize the pertinent policy and legislation related to the federal, provincial, territorial and municipal levels of government. An explanation of Aboriginal approaches to water management is included, as are some examples of domestic agreements related to the management of water resources.

5.2.1 Federal Government

The federal government has significant constitutional authority regarding the protection and management of Canadian water resources. There are approximately 20 different federal agencies responsible for managing water resources and 12 different pieces of legislation used to organize these responsibilities (NRTEE 2010). This senior level of government has also been involved in the creation of various statutes, regulations, and policy directives, including the *Federal Water Policy*, as well as playing a role with respect to international agreements related to water. While different statutes provide concrete powers of authority over water resources in Canada, one policy, the *Federal Water Policy*, has played a significant role in the creation of provincial and municipal policies and consequently, uses of water. This section will first describe the *Federal Water Policy* and then provide a brief review of some of the legislation related to water management at the federal, provincial, and municipal levels of government.

5.2.1.2 Federal Water Policy

The federal government began an Inquiry on Federal Water Policy in 1985. The purpose was to identify the breadth and depth of involvement that the federal government should have in water-related activities and to also coordinate the multi-jurisdictional responsibilities regarding existing policies and legislation. The result was a report that provided a foundation for further federal policy development and led the government to establish the Interdepartmental Water Policy Task Force. This Task Force examined the recommendations of the Inquiry report. The 1987 Federal Water Policy was created to clarify “the federal government’s overall policy for water; its strategies relating to concerns such as water pricing, science leadership, and integrated planning; and its policies concerning topics such as inter-basin transfers, climate change, drinking water and wetlands” (de Loë 2008, 4).

Although the proposal to move water policy into comprehensive legislation was approved by Cabinet, ultimately, the Federal Water Policy was not legislated and therefore, was not fully implemented. The policy mainly reconfirmed the federal government’s commitment to water quality research and a wastewater infrastructure support role. Its current relevance is debatable as only one major policy initiative and one strategy – a ban on water exports and the *Strategy for the Management of Municipal Wastewater Effluents* - has occurred since 1987 (Barlow 2007; de Loë 2008; NRTEE 2010).

Water contamination incidents in Walkerton, Ontario, and North Battleford, Saskatchewan, concerns over the North American Free Trade Agreement and the exporting of Canadian water resources, drought and water shortages across Canada and discussions about the implications of climate change are all reasons for a heightened awareness and interest in water resource management in Canada (de Loë, 2008). Because of these widely publicized issues regarding water, a newly-found energy now exists to update the Federal Water Policy in order to address current and future water management challenges (Robins 2007; Morin and Cantin 2009). For example, a poll conducted in 2009 by the Institute for Research on Public Policy (IRPP 2009; Obignene 2009) found that 62% of Canadians believe water is Canada’s most important natural resource. In 2010, a survey by Ipsos-Reid (Ipsos-Reid 2010) suggests that 49% of Canadians believe water is our most important natural resource and are concerned with the availability and quality of Canada’s freshwater. Even in petroleum-rich regions of Eastern and Western Canada, water was selected as a source of concern at a 3-1 margin over oil and gas. These statistics illustrate that Canadians recognize the importance of water to Canada’s future and are primed to embrace a new policy on water resources management. While the updated policy may not carry the same name, the suggested benefits of such an update, as demonstrated by comparable initiatives in New Zealand, Australia, South Africa and the European Union, include clarification of water management roles; enhanced accountability; limited institutional fragmentation; greater consistency in response to national water issues; increased potential for innovation in policy; and better integration between all sectors of water management (de Loë, 2008, 4).

In order to reap the benefits of increased interest in water resources management, the 2004 Federal Water Framework and Federal Water Research Network, and the 2007 Action Plan on Clean Water have been introduced. The goal of the Action Plan is to implement a strategy to clean Canada's major lake systems as well as to improve access to safe drinking water for Aboriginal communities (Environment Canada 2010). Regarding the latter matter, the Federal government has a shared role regarding the provision of drinking water to the Aboriginal communities throughout Canada. The design, construction, maintenance and operation of water facilities is the primary, and shared, responsibility of First Nations Band Councils, Health Canada and Indian and Northern Affairs Canada. The Action Plan seeks to develop, and implement, standards for access to safe drinking water by including facets of the *Oceans Action Plan*, the *Plan of Action for Drinking Water in First Nations Communities*, and *Building Canada* (Water Canada 2010). Apart from these initiatives, however, there have been no concrete policies, strategies or legislation to update the *Federal Water Policy* to make it easier to manage water in a sustainable and ethical fashion. Referring to the lack of updates to the Federal Water Policy, a Senate Standing Committee report on Energy, Environment and Natural Resources has even gone so far to say that Canada's outdated and limited water policy was "shocking" and "unacceptable" (Bakker 2010, 3).

5.2.1.3 Federal Legislation

As previously mentioned, a significant number of federal agencies, such as Environment Canada, Fisheries and Oceans Canada, and Indian and Northern Affairs Canada, are charged with various water-related responsibilities (NRTEE 2010). Focusing specifically on the federal government's role in water resources, three areas of constitutional responsibility are significant: (1) fisheries and navigation; (2) waters that cross international borders; and, (3) water quality (Bakker 2007; Environment Canada 2010). The key statutes at the federal level are the *Canada Shipping Act*, *Canada Water Act*, *Canadian Environmental Assessment Act*, *Canadian Environmental Protection Act*, *Fisheries Act*, *International Boundary Waters Treaty Act*, *International Rivers Improvement Act*, and *Navigable Waters Protection Act*. Table 5.2 summarizes these key federal statutes, in chronological order.

There also exist numerous federal statutes, including the *Arctic Waters Pollution Prevention Act*, the *Dominion Water Power Act* and the *Northwest Territories Waters Act* and *Yukon Waters Act*. A variety of programs has emerged from the introduction of federal legislation, such as the National Flood Damage Reduction Program, the Comprehensive River Basin Program, and the Water Quality Monitoring Program with both Manitoba and British Columbia (Environment Canada 2011). These programs are important to recognize as they contribute to the management of Canada's water resources.

TABLE 5.2: SIGNIFICANT WATER-RELATED FEDERAL LEGISLATION

Federal Legislation	Purpose
Fisheries Act (1868)	Protects fish by prohibiting habitat disturbances and the deposit of “deleterious substances” in water frequented by fish; ensures construction of fish ways around any obstruction in a waterway (Fisheries and Oceans).
International Boundary Waters Treaty Act (1911)	Implements the 1909 Boundary Waters Treaty between the United States and Great Britain (on behalf of Canada), establishing principles and guidelines for the management of boundary and transboundary waters in order to prevent or resolve disputes over water quality and water quantity (Foreign Affairs and International Trade)
International Rivers Improvement Act (1955)	Prohibits damming, building a canal, a reservoir, or changing the natural flow of a river flowing out of Canada without a license (Environment Canada)
Canada Water Act (1970)	Authorizes agreements with the provinces for the designation of water quality management areas, and for the delineation of flood plains and hazardous shorelines to control flooding and erosion (Environment Canada)
Navigable Waters Protection Act (1985)	Prohibits dumping of wastes that may interfere with navigation and prohibits construction of works in navigable waters without approval (Transport Canada)
Canadian Environmental Assessment Act (1992)	Provides an opportunity to identify, assess and mitigate the effects of projects that could have significant impacts on groundwater or surface water (Environment Canada)
Canadian Environmental Protection Act (1999)	Establishes a regime for identifying, assessing and controlling toxic substances; imposes reporting requirements on anyone releasing a toxic substance; creates a national inventory of toxic releases; requires the development of Pollution Prevention Plans; controls nutrient discharges and marine pollution (Environment Canada)
Canada Shipping Act (2001)	Controls pollution from ships by imposing penalties for discharging pollutants without a permit or failing to report a spill (Transport Canada)

5.2.1.4 International Agreements on Water

The federal government also has a role with respect to international agreements related to water. The *International Boundary Waters Treaty Act*, passed by the federal government, implements the 1909 *Boundary Waters Treaty* between the United States and Canada. This Treaty recognizes that each country may be affected by the other's actions in the lake and river systems along their common border. Its purpose is to prevent and resolve disputes concerning these boundary waters (CEAA 2007).

The Treaty also created the International Joint Commission (IJC) to prevent and resolve these disputes. The IJC is an independent advisor to both governments. It rules on applications for approval of projects affecting boundary and transboundary waters, and may regulate the operation of these projects. In 1972, the governments of the United States and Canada signed the *Great Lakes Water Quality Agreement* (GLWQA). Its purpose is “to restore and maintain the chemical, physical and biological integrity of the Great Lakes Basin Ecosystem” (IJC 2010, 1). The IJC assists in the implementation of the GLWQA, in the improvement of transboundary air quality, and alerts governments to emerging issues along the boundary that may give rise to disputes. The Commission also assesses the effectiveness of programs and progress pursuant to the GLWQA.

5.2.2 Provincial and Territorial Governments

The arrangements in Canada for water resources management are dominated by provincial policies and regulations, particularly with respect to water quality (Jones and Rasmussen 2008). As discussed earlier in this chapter, the *Constitution Act (1982)* provides the provinces with jurisdiction over public lands, municipal institutions, local works and undertakings, non-renewable resources, property and civil rights and energy, and shared jurisdiction over agriculture. In order to fulfill these responsibilities, the provinces have devised numerous water-related policies, laws, regulations and programs. For example, every Canadian province has its own way of determining who gets water, how water is provided, the types of land uses allowed within particular water sensitive areas, and, through delegation by the *Fisheries Act*, what types and amounts of pollutants may be discharged within various proximities to water resources (de Loë, 2008, 7).

Some Canadian provinces, such as Ontario, have legislative authority over certain matters relating to public health and water management. This means that, in Ontario, all three levels of government have roles and responsibilities for environmental protection in general, and water in particular. In the Province of Quebec, a collaborative approach between water-related agencies and local communities is used to identify priorities within its watershed boundaries and to create master plans for these areas (Baril et al. 2005; Bakker 2007; MOE 2010). In Saskatchewan, three existing water-related governmental agencies (SaskWater, Saskatchewan Environment, and the Saskatchewan Wetland Conservation Corporation) were merged to create a Crown corporation, the Saskatchewan Watershed Authority, to improve reporting functions to the provincial minister of the environment and to enhance coordination regarding source water protection. The Province of Manitoba is unique because the Ministry of Water Stewardship has sole

responsibility for safeguarding the province's water resources (Manitoba Water Stewardship 2010). In Alberta, the *Water for Life Strategy* embraces a watershed approach to water management and establishes a collaborative governance model of planning and decision-making that straddles provincial, municipal and non-governmental agencies (Alberta Government 2010).

In addition to intra-provincial coordination, there are also some examples of successful inter-provincial coordination of water management. Under the *Master Agreement on Appropriation (1969)*, managed by the Prairie Province Water Board with representatives from Alberta, Saskatchewan, Manitoba and the Federal government, "Albert and Saskatchewan may each take up to one-half of the natural flow of water originating within their boundaries and one-half of the flow entering the province. The remainder is left to flow into Manitoba" (NRTEE 2010, 18).

Equally important to managing Canada's water resources are the three territories – the Northwest Territories (NWT), Nunavut and the Yukon. The water-related responsibilities for NWT and Nunavut are under the federal Department of Indian and Northern Affairs Canada's mandate; water in Yukon is managed by its own government (INAC 2007). Similar to the way the provinces function, the territories have their own systems of water allocation and distribution. Many statutes are relevant to provincial water management (refer to Bakker 2007, 372-374 for a full list). Many other government activities, such as land use and infrastructure decision-making, decisions under mining and environmental assessment laws concerning tailings, energy law, and policy concerning hydropower, are also influential. Some of these activities are captured in the following sections on municipal and Aboriginal government.

5.2.3 Municipal/Local Governments

The third set of government authorities with an indispensable role in water resource management is at the municipal level, particularly with respect to water and sewage treatment, domestic water supply, and general water infrastructure (MOE 2010). The provinces have delegated much of their constitutional responsibilities regarding water supply, sewage collection, land-use planning, and water quality regulations to municipal and regional authorities (MOE 2010; Environment Canada 2010). The provincial governments have retained their supervisory and appeal functions related to these activities through municipal affairs and natural resource ministries and agencies, but municipal governments have authority related to municipal water-use bylaws, watershed management, and general operations of water and wastewater systems (MOE 2010). They are also key implementation agents of provincial water policies, making them critically important to the success of a proposed water ethic. The role of municipal governments is critical since many water uses, and resulting conflicts, relate to local issues such as water shortages, poor water quality and flood plain management. Also, "the Walkerton tragedy clearly outlined the significance of provincial-local institutions, the role played by municipalities in monitoring and maintaining water systems, and that of local governments in managing multiple uses of water resources" (Jones and Rasmussen 2008, 84).

There also exists special-purpose bodies designed to manage water resources with local representation. In Ontario, Conservation Authorities (CA) are such special-purpose bodies, with specific legislative mandates to manage water and related land-based resources on a watershed basis. Conservation Authorities have the ability to purchase, lease, or expropriate land, and make regulations restricting and regulating the use of water within their jurisdiction, particularly related to flood plain management. Conservation Authorities also have been involved in watershed planning, environmental assessment, and community stewardship of environmental resources (Conservation Ontario 2012).

Other organizations, such as Conservation Districts, exist in Manitoba as a cost-sharing partnership between all levels of government and local stakeholders. Their ability to develop and implement integrated watershed management plans, as well as provide programming and direction on drinking water protection and water quality, for example, suggest a successful, locally-driven decision-making partnership (Province of Manitoba 2010). In Saskatchewan, the Saskatchewan Watershed Authority (SWA) is responsible for the management of provincial surface and groundwater resources (SWA 2010). This work is complemented by the Meewasin Valley Authority (MVA), funded and supported by the Province of Saskatchewan, the City of Saskatoon and the University of Saskatchewan, whose purpose is to conserve the natural and cultural resources of the South Saskatchewan River Valley in Saskatoon (MVA 2010). Several organizations also exist in Alberta, including the Bow River Basin Council and the Watershed Planning Advisory Councils. More coverage regarding the operation of these agencies will be provided in the subsequent case study chapter.

5.2.4 Aboriginal Approaches to Water Management

The historical relevance of Aboriginal claims and claim agreements to water resources and their management is significant. This research acknowledges the depth of these implications; however, I do not provide more than a cursory overview of Aboriginal roles in order to keep the scope of this research manageable. While the federal government has constitutional authority over water resources and provincial, municipal, and territorial governments implement various parts of this authority, the rights of the Aboriginal people predate this authority (Government of Canada 2010). As such, Aboriginal communities claim inherent rights to the land and the resources contained within, despite having often ceded the lands to the Crown, by treaty in the 18th and 19th centuries (Nowlan 2005). Within Aboriginal communities, water uses are determined using a priority system whereby the date of the establishment of water rights on reserved lands, through treaty or other means, is the ultimate criterion (Assembly of First Nations 2010). This criterion means that Aboriginal rights to water use are founded in traditional uses, treaty, and common-law (riparian) rights.

The Aboriginal people did not – from their perspective – give up their sovereignty or rights to the use of water resources when the *Constitution Act* (1982) and the *Canadian Charter of Rights and Freedoms* (1982) came into effect and recognized existing Aboriginal and treaty rights. It is also important to understand

that, while the federal government has always enjoyed exclusive jurisdiction and has fiduciary duty with respect to Aboriginal water rights, since 1982 these rights can “only be regulated or extinguished by constitutional amendment or by agreement with the aboriginal people” (Bartlett 1986, 128). There are some examples across Canada where Aboriginal people are becoming more directly involved in water management decision-making. In the Northwest Territories (NWT), for example, collaboration between the Aboriginal peoples and the NWT government resulted into the development of the Territory’s Water Stewardship Strategy (NRTEE 2010). Heightened awareness of the importance of including traditional and indigenous knowledge in governmental decision-making is occurring and this evolution can result in more well-rounded, credible, and successful water resources management.

5.3 Governance and Institutional Arrangements within Canada

For almost six decades, water-related policy-making has been supported by various forms of intergovernmental relationships. According to Hessing et al. (2005, 64) “while the federal government is able to deal with some problems that have a national scope, the most effective problem-solving is often accomplished through intergovernmental agreement rather than legislative dictates”. As a result, various formal, intergovernmental institutional arrangements have been created to facilitate environmental policy-making and implementation.

For example, the Canadian Council of Ministers of the Environment (CCME) (formerly the Canadian Council of Resource Ministers) was originally established in 1964. The ministers meet annually to discuss environmental priorities, at both the federal and provincial levels, collaborate on national water priorities, investigate the relationships between science and policy as they relate to the environmental priorities, accelerate the development of water-related guidelines (e.g., the Canadian Water Quality Guidelines, 1987) and work towards improved monitoring of water quality. One of the most recent priorities for the CCME was to develop a strategic Canada-wide vision for water that takes a more integrated approach to water. This vision, encompassed within the *Setting Strategic Directions for Water* framework (2009), is for Canadians to “have access to clean, safe and sufficient water to meet their needs in ways that maintain the integrity of ecosystems” (CCME 2009, 2).

Another related committee, composed of deputy ministers, discusses how to implement matters discussed at the CCME meetings by the federal and provincial levels of government. Other examples of intergovernmental collaboration include the Prairie Provinces Water Board (discussed further in Chapter Six – Calgary Case Study), the Mackenzie River Basin Board, the Canadian Council of Fisheries and Aquaculture Ministers, and the Federation of Canadian Municipalities (devoted to representing the interests of municipal government).

A final form of governance is created in the absence of sufficiently comprehensive and effectively implemented policy, such as with the Federal Water Policy. *De facto* policy is typically revealed through specific decisions. These may be decisions on major water programme initiatives, such as the previously mentioned *Action Plan on Clean Water* and the *Setting Directions for Water* framework, or on undertakings that have significant effects on water, such as the successive approvals of individual tar sands projects in the Athabasca Basin, resulting in *de facto* water policy (Griffiths et al. 2006). The complicated nature of how formal and informal policy is created and used in Canada is perhaps one of the reasons why the management of water resources is fragmented and can, at some times, work towards opposing ends.

Policy fragmentation, governance and institutional complexity, and sometimes poorly designed and implemented water management policy, are all side effects of the structure of Canadian water resources management (NTREE 2010). According to various authors (VanderZwaag and Duncan 1992; Harrison 1996; Skogstad 1996), these side effects result in “buck-passing”, whereby “both federal and provincial governments attempt to take popular, symbolic steps for which it is easy to claim credit, but blame-avoidance generally prevails, with federal officials reluctant to offend provincial independence and provincial authorities unwilling to do anything that might disturb established patterns or relationships” (Jones and Rasmussen 2008, 87).

5.4 Chapter Position

In this chapter, I provide a brief overview of the historical development of water policies, legislation, regulations and strategies in Canada. This chapter offers a reference for, and base understanding of, how water is managed in a multi-jurisdictional environment so that a greater knowledge of the complexities of implementing a proposed water ethic at the municipal level can be gained.

Water is a local resource, yet is managed by multiple levels of government and through various governance structures and institutional arrangements. The *Constitution (1982)*, the *Canada Water Act*, and the *Federal Water Policy* guide the relationships between and among federal, provincial and territorial levels of government regarding water resource management, aided by the collaborative intergovernmental institutions such as the Canadian Council of Ministers of the Environment. In simple terms, the federal government creates broad policy and legislative direction and the provincial governments decide how best to fulfill their responsibilities through further law and policy creation, particularly in provincial areas of Constitutional jurisdiction. The municipal governments then “do” what the provincial and federal policies laws stipulate related to water efficiency strategies, water metering, or various other policy tools available to municipalities (see Thomas 2008, in Sproule-Jones et al. (eds) 2008, for a list of policy instruments). There are then partnerships and mechanisms that have formed between provincial and municipal levels of government, such as Ontario’s CAs and the Watershed Planning Advisory Councils in Alberta, to work collaboratively to manage water resources. Additionally, in a variety of areas across Canada, Aboriginal peoples are becoming

directly involved in water governance activities, watershed planning, source water protection planning, and other water management initiatives by collaborating with all levels of governments and agencies.

Despite some governance and institutional rigidity and tensions in the management of water resources in the Canadian federal system, there is scope for selecting different policy instruments, incrementally altering current governance and institutional arrangements to achieve different water resource management goals, and increasing the potential of implementing the water ethic proposed in this research. The following chapters use two main Canadian case studies to determine the underlying ethical foundations for decision-making in water policy, analyse the challenges to implementation of the proposed water ethic, and suggest a framework for municipal level implementation.

Chapter Six: Calgary Case Study

6.1 Introduction

The purpose of this research is to explore the relationship between ethics and water resource management, specifically examining how ethics can or should affect decisions about water policy and its implementation at the municipal level of government in Canada. To this point in the dissertation, several components have been presented in order to help fulfill the research goal:

- an outline of the research methodology;
- a summary of the major (well-acknowledged) ethical frameworks that have influenced environmental thought, in particular;
- an historical overview of the water management frameworks that have been used and their influence on governance and institutional arrangement;
- a summary of the suggested principles for a water ethic that have been presented over the years and a synthesis of these principles into a proposed water ethic; and,
- a summary of Canadian legislation, regulations, policies, and strategies.

This information was provided in order to give a baseline understanding, and in some cases, an analysis of the complex and challenging issues involved in exploring ethics and water resources management. The following case study chapters use this information and provide further exploration into how and if a proposed water ethic can be implemented in Canada.

The first section of this chapter will provide a summary of the state of water resources in the province of Alberta, including an overview and analysis of relevant federal, provincial and municipal legislation. Particular emphasis will be on the *Water for Life* strategy that the province of Alberta introduced in 2003. This strategy provides much of the direction for current provincial and municipal policy formation. The second section of the chapter will introduce the City of Calgary as the first case study. The intent is to provide a summary of the issues, concerns and comments provided through interviews with provincial and municipal decision-makers that explored, through a series of standard questions, their underlying ethical perspective on the use of water resources and how this might influence their acceptance and implementation of a proposed water ethic.

Canadian policy makers, environmentalists, and some politicians are increasingly aware of the limits of water resources (Bakker 2009; Nanos 2009; McLaughlin 2009; Taylor 2009: Living Water Policy Project 2010). This awareness is extremely apparent in Alberta, where water scarcity is testing provincial governance regimes as never before. The provincial government undertook a review and revision of water legislation, implementing a new *Water Act* in 2000, and introducing the *Water for Life* strategy in 2003 (Canada West Foundation 2005). Both initiatives recognized the threat of looming water scarcity and acknowledged the need to protect and restore aquatic ecosystems. Together, these initiatives also identified

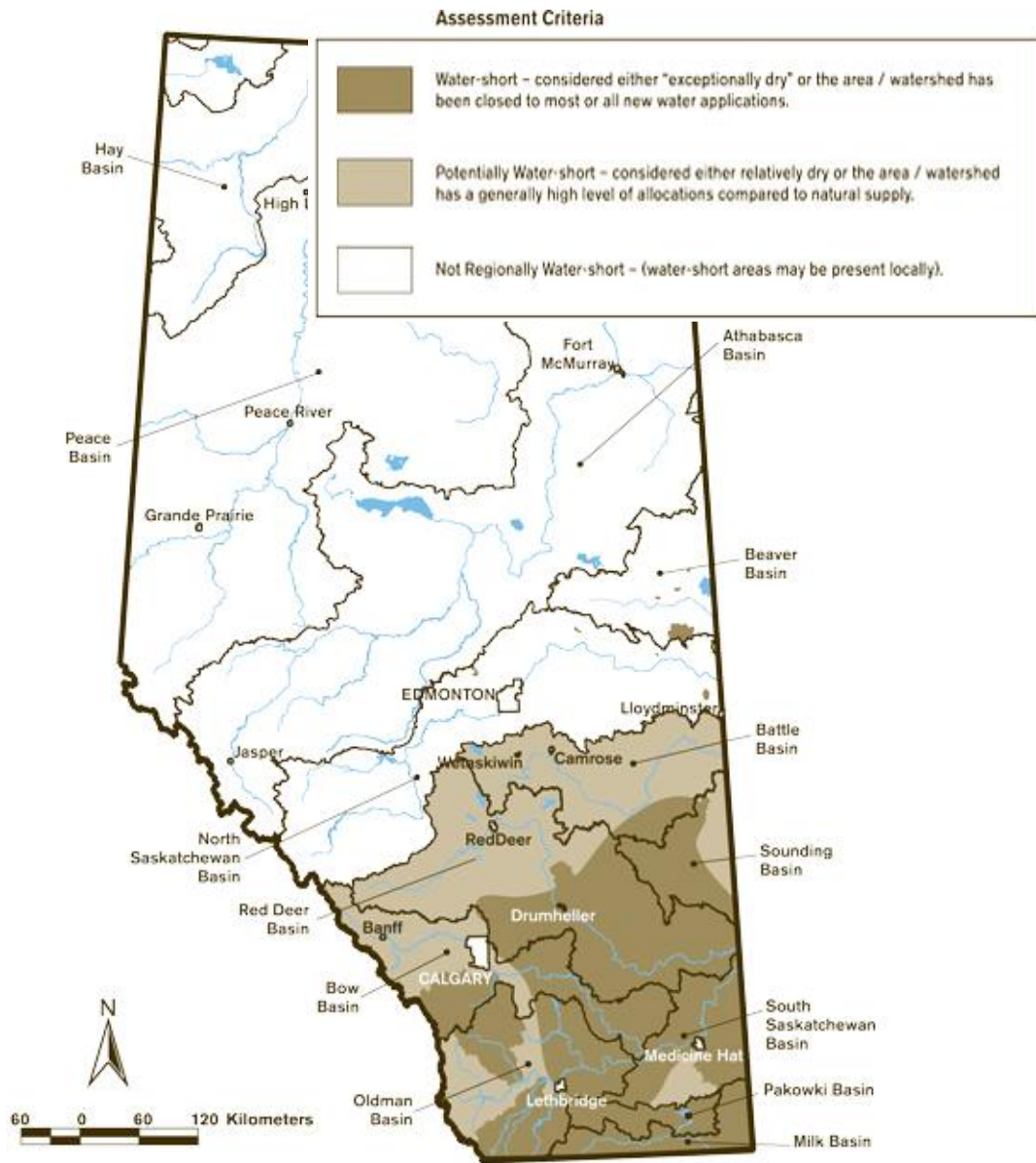
a wide range of tools: data gathering and synthesis; regulatory oversight; protective environmental objectives, allocations and holdbacks; increased public consultation; and economic instruments such as water-rights trade (Alberta Water Council 2009; Living Water Policy Project 2010).

The goals of the *Water for Life Strategy* are far-reaching, but implementation has been slow, partly because very few measurable action items were identified, and also partly due to insufficient funding and lack of political commitment. Such slow progress is worrisome, especially given the 2006 imposition of the moratorium on new water licence applications in southern Alberta (Berzins et al. 2006; Christensen and Droitsch 2008; Taylor 2009). This moratorium has already fuelled plans for long-range water transfers within the province, and – for the first time in Canadian history – opened an active water-trading market. Together, these developments could increase the intensity of existing water uses, reducing the flow in rivers and lowering the levels of lakes (Taylor 2009).

Southern Alberta is one of the first regions in Canada to grapple with prolonged water scarcity. Alberta has only 2.2% of Canada's renewable freshwater and 80% of that water is in the north while 80 % of the population is in the south (Dechene 2010, 1). The City of Calgary, located in southern Alberta, is the largest urban area within the province. The province has a population of just over four million people and is growing at a rate of approximately 2.2% per year (Statistics Canada 2011), making it one of the fastest growing cities in the country. As shown in Figure 6.1, this area of the province has also experienced some of the most extreme water scarcity, particularly in the southern portion of the province.

The City of Calgary is chosen as a case study for these two important reasons (growth rate and scarcity concerns), and because of the variety of provincial and municipal legislation regarding water management. Moreover, the City of Calgary has been working closely with the Province, non-governmental organizations, and public interest groups to heighten the awareness about water quantity and quality issues as well as to use policy to facilitate behavioural changes in water use.

Figure 6.1: Water Scarcity Map of the Province of Alberta



Source: Alberta Water Smart, 2012

6.2 Alberta Water Resource Management Overview

6.2.1 Water in Alberta

Alberta is a landlocked province, as shown on Figure 6.2, below. The province is approximately 22 million square kilometers in area, and it is bordered on the west by British Columbia and the Rocky Mountains and on the east by Saskatchewan and the prairies. The Northwest Territories is located on Alberta's northern border, while the American state of Montana lies to the south. About two-thirds of Alberta's four million residents live in Calgary and Edmonton, although smaller regional centres such as Fort McMurray, Red Deer, and Lethbridge also contribute to the 80 % of the population in urban areas (Government of Alberta 2010).

Figure 6.2: A Map of the Province of Alberta



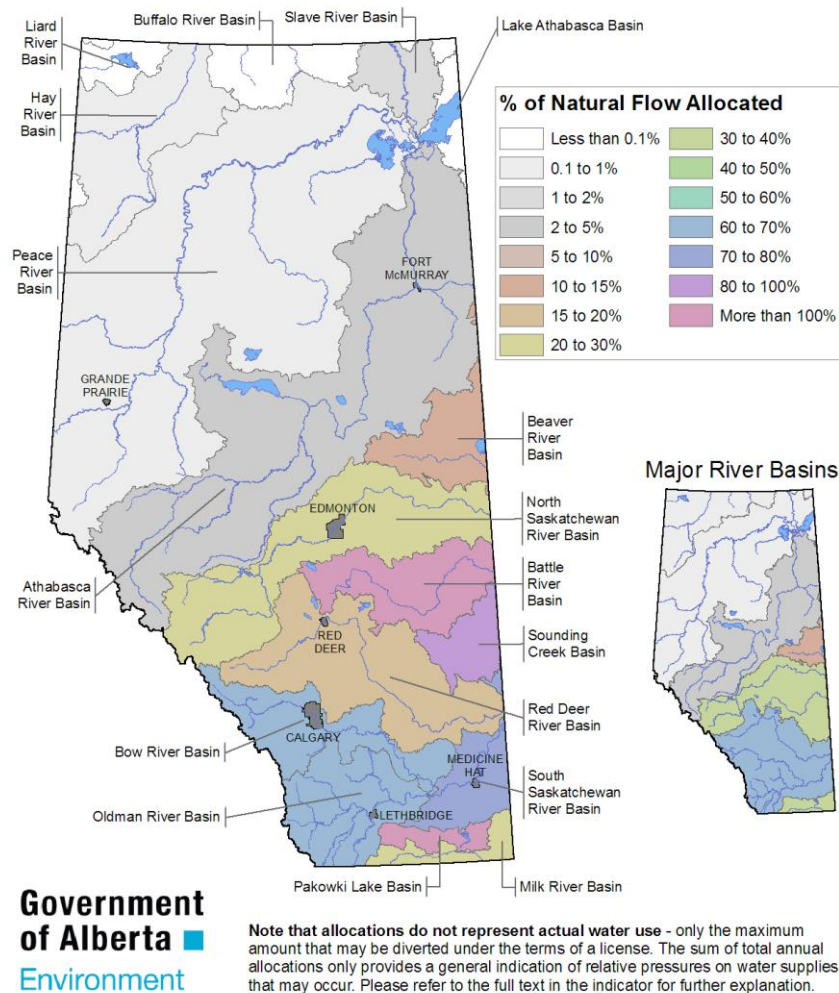
*Source: <http://www.ironstoneresources.com/province-of-alberta-canada>, 2012
(please note that a map scale was not provided at source)*

Alberta is at the epicenter of the western Canadian sedimentary basin, which contains vast amounts of oil and natural gas. Hydrocarbon resources have made Alberta the wealthiest province in Canada (Nikiforuk 2009). This wealth has attracted thousands of new residents and contributed to a booming economy. With an increasing population, rapid economic growth, and wealth derived from natural resources, what happens in Alberta is of great importance to the rest of Canada. If, for example, the Bow River, which supplies the Calgary region with water, were to diminish significantly in quantity or quality in the next 25 years, as some environmentalists and geographers anticipate, the economic, environmental, and

demographic consequences for the city, province, and country would be significant (Schindler 2006; Natural Resources Canada 2007; Bow River Basin Council 2010).

Most of Alberta’s major waterways originate in the Rocky Mountains. The Athabasca and Peace rivers form the headwaters of the Mackenzie River system. The Saskatchewan River system, however, is vital to Alberta’s supply of freshwater (Taylor 2009). This system of rivers begins in the Rockies and flows through Alberta, Saskatchewan, and Manitoba, ending up in Hudson Bay. There are seven major river systems or basins in the province – the Milk River, the North and South Saskatchewan River, the Beaver River, and the Peace, Athabasca, and Hay River – and several minor river basins (Government of Alberta 2011). Figure 6.3 shows the location of these major and minor river systems and the amount of water (natural flow percentages) allocated through water licenses.

Figure 6.3: Map of the Seven Major River Systems in Alberta and 2010 Licence Allocations



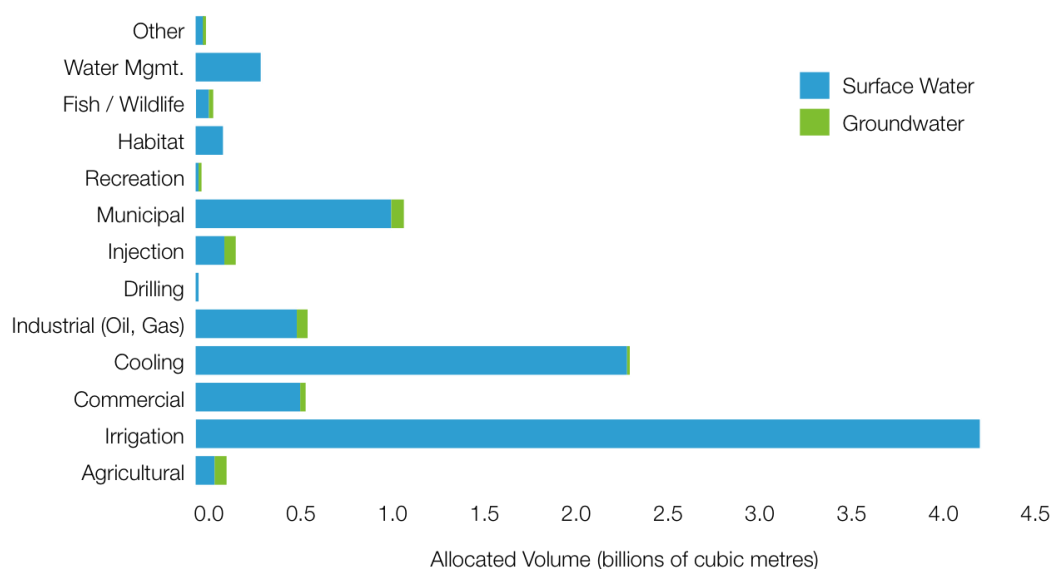
*Source: Government of Alberta 2011b
(please note that map scale is not provided at source)*

As with Alberta's rivers and lakes, the province's groundwater originates in the Rockies. While the stream-flow data from the river basins are reliable, the groundwater data in Alberta, as in other provinces, are not. There are no accurate figures on either how much groundwater is available or how much is used. As a result, aquifers in the province are an uncertain source of supply (NRTEE 2010).

6.2.2 Water Uses in Alberta

Alberta's lakes and rivers are affected by multiple human uses. They are a source of food and water for a variety of animal species and are essential to human habitation. Today, surface water is used for various purposes, including irrigation, industry, oil and gas extraction, recreation, domestic consumption, and waste disposal. While surface water is still used for transportation in some regions of Alberta, an increasing amount is consumed for commercial purposes (Government of Alberta 2011a). Figure 6.4 illustrates surface and ground water allocations in Alberta.

Figure 6.4: Water Allocations by Sector in Alberta (2008)

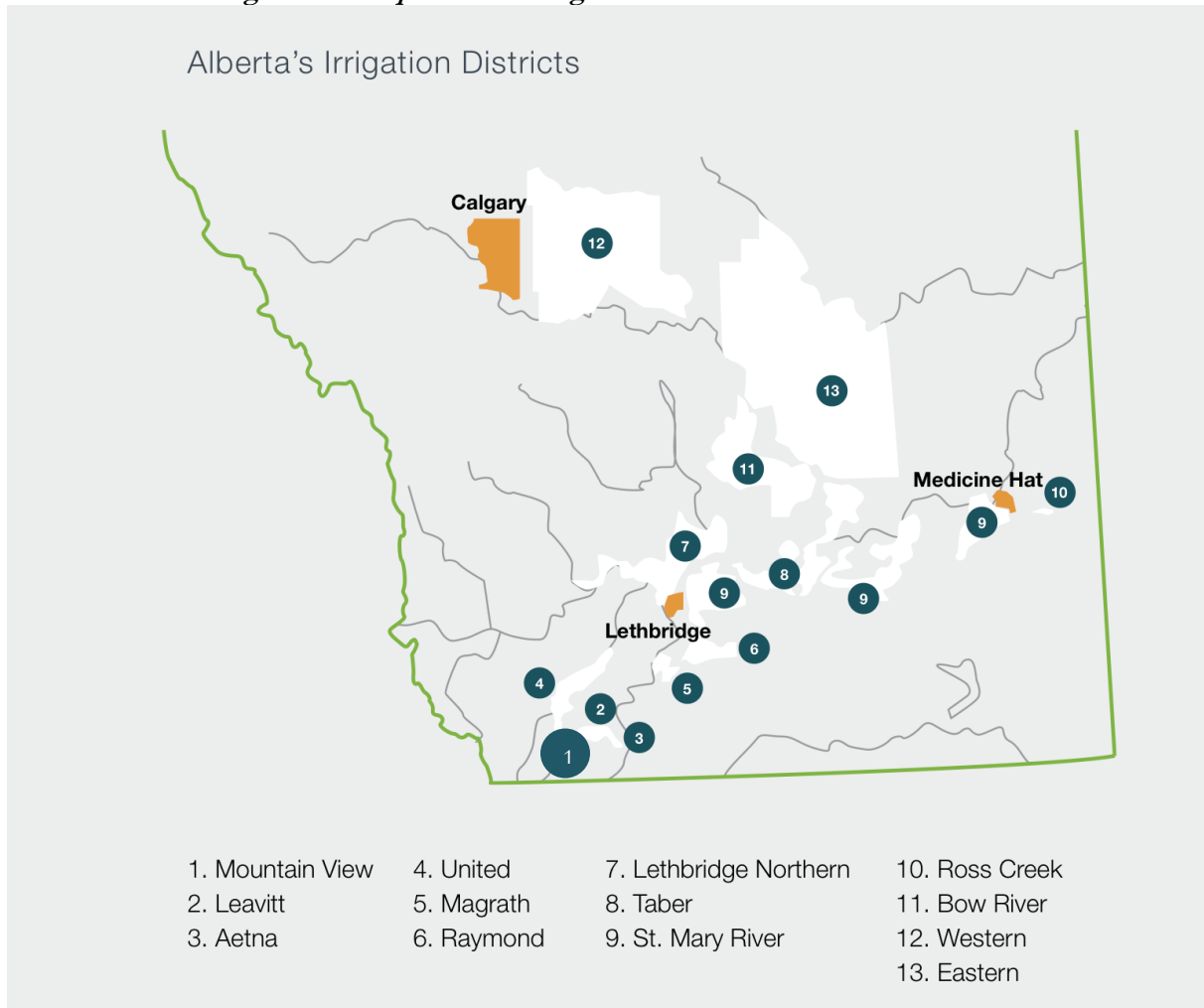


Source: Government of Alberta 2010

As of 2008, the two major users of surface water are irrigation at approximately 71 % and commercial-industrial operations at approximately 15 %. Municipal water supplied accounted for approximately six % of surface water consumption (Water Chronicles 2008; Government of Alberta 2010). The three main groundwater uses are commercial-industrial operations at 58 %, agricultural uses at 25 %, and municipalities at 18 % of total groundwater consumption (Alberta Environment 2000b, 2002; Eckert 2004; Alberta Environment 2009; Government of Alberta 2010).

The agricultural sector comprises approximately 30 % of Alberta’s total land area (Alberta Water Portal 2011). Crop and livestock production is one of the province’s largest economic sectors and a farm may depend on surface water, groundwater, or a combination of the two for stock watering, crop production, domestic use, and irrigation. The southern portion of Alberta is divided into thirteen irrigation districts (Figure 6.5).

Figure 6.5: Map of the 13 Irrigation Districts in Southern Alberta



*Source: Government of Alberta 2010
(Please note that map scale is not provided at source)*

Irrigation districts are self-governing cooperatives that construct dams and canals, and manage the distribution of surface water for agricultural and other purposes. All the districts located within the South Saskatchewan River Basin withdraw water from the Oldman, the Bow, and the South Saskatchewan Rivers, or their tributaries. The irrigation districts pay no fees to the province for the withdrawal of water, but are

required to charge their members the costs associated with constructing and maintaining irrigation infrastructure such as dams and canals (Heinmiller 2011).

6.2.3 Water Regimes in Alberta

As summarized in Chapter Five, under the *Constitution Act*, 1982 the provinces have jurisdiction over the natural resources within their borders, including most water resources (Bakker 2007; 2009). The Prairie Provinces were an exception, however, and did not obtain control over their natural resources until the Natural Resources Transfer Agreements of 1930. As a result, the federal government set the pattern of water allocation in the province of Alberta early in its history. Through the subjugation of the Aboriginal people and the extermination of buffalo herds, the prairie was cleared for European settlement (Kaye 2011). A policy of accelerated economic development and cultural ethnocentrism guided federal decision-makers in determining who would benefit from the natural resources of the area, especially regarding water (Beveridge 2006).

Farmers and ranchers were the primary recipients of federal water allocations during Alberta's infant years. As Alberta became established as a predominantly rural province, the political ideology of the provincial government supported, and perhaps even catered to, the farming community through a government-mandated water allocation system (Levi 1988, 10-40). The American West's concept of "first in time, first in right" (or FITFIR, as it is commonly known) was adopted by the Alberta water allocation system, but modified to ensure that all water was retained as Crown property, with allocations granted as licenses rather than as a private property. This arrangement created a system whereby riparian rights for watering and domestic use remained and all large water users were licensed on the basis of temporal priority. This system also solidified the concept that agricultural settlers had first priority in access to water resources, through the government licensing process (Christensen and Lintner 2007).

A greater balance now exists between urban and rural ways of life in Alberta. Nevertheless, the influence of the agricultural community has continued to dominate in the provincial legislature, even though the demographic and economic importance of rural Alberta has gradually declined (Beveridge 2006). When the Alberta government obtained jurisdiction over its natural resources in 1930, the government maintained this pattern of water distribution for economic development reasons. As a result, the allocation of water has changed little since the early days of European settlement. In the last several decades, the FITFIR principle of water allocation has also resulted in increasing conflict between a declining rural, agricultural community and an increasingly powerful, growing urban community. A review of the province's water allocation rules by the Government of Alberta was started in 2009 to address some of the imbalances between urban and rural water allocations, but the licenses granted under the FITFIR system have yet to be changed, and remain the dominant feature of Alberta water policy (Droitsch 2009). It is not clear when the results of the review will be completed and released (Government of Alberta 2011).

While the province owns the majority of water resources, local authorities, through various

arrangements are licensed by the province to distribute fresh water for drinking, sewage, recreation, and irrigation (Christensen and Lintner 2007; Christensen and Droitsch 2008). The most important local institutions are the 13 irrigation districts established under the provincial *Irrigation Districts Act, 2000*. The federal government intervenes only when water consumption and diversion issues involve Aboriginals' reserves, military bases, and interprovincial and international waterways. Also, some private corporations have licenses from the province to withdraw water from aquifers, rivers, and lakes for purposes ranging from oil and gas production to intensive agriculture (Alberta Water Council 2009; Alberta Water Portal 2011). The myriad institutions involved in contemporary Alberta water governance are outlined in further detail below.

6.2.3.1 Federal Government

When the federal government handed over control of natural resources to Alberta in 1930 (Bakker 2007, 2009; Droitsch and Robinson 2008), water management became the responsibility of the province. However, the federal government's role in water did not end entirely. As outlined in Chapter Five, the division of powers in the *Constitution Act, (1982)* assigned most authority over water to the provincial governments, but this authority is limited by several federal constitutional powers. These powers allow the federal government to limit provincial authority related to fisheries management, navigation, and transboundary waters, and many relevant statutes have already been described in Chapter Five. The most important federal statutes are summarized in Table 6.1.

**TABLE 6.1: FEDERAL LEGISLATION RELEVANT
TO ALBERTA WATER MANAGEMENT**

Legislation	Description	Significance
Canada Water Act, 1985	Provides for federal-provincial agreements on water inventories, data collection, management and implementation of water resource plans	Has resulted in increased monitoring of river flows and data gathering on water uses, but produced no substantive changes to water allocations or water usage
Fisheries Act, 1985	Includes protection of fish habitat, prohibition of obstruction of fish passage, and rules against water pollution	Has been instrumental in triggering environmental assessments of controversial projects such as the Oldman River Dam, the Pine Coulee project, the Little Bow project, the Jack Pine Oil Sands Mine Expansion, and the Alberta Pacific pulp mill
Navigable Waters Protection Act, 1985	Designed to protect the public right of navigation on all waterways deemed navigable by the Minister of Fisheries and Oceans; it can apply to any permanent work on any provincial waterway	While the Act has not always been vigorously enforced, relatively recent litigation by several groups looking to alter or stop several major projects (e.g., the Oldman River Dam, Little Bow River Project) on various waterways indicates its continuing relevance
Canadian Environmental Assessment Act, 1992	Requires that an environmental assessment be undertaken before a federal authority carries out a project, before it provides financial assistance for a project, and before it transfers administration or control, sells, or leases federal land to allow a project	The environmental assessment process has provided environmentalists, Aboriginals, and other groups key opportunity for input into many water projects, even though the federal government has not always followed the assessments' recommendations
Canadian Environmental Protection Act, 1999	The principles of the Act include a federal-provincial framework for cooperation in matters affecting the environment (including water), environmental quality guidelines, control of toxic substances, control of material that promote growth of aquatic vegetation such as phosphates, and guidelines for federal works and lands	In accordance with the Act, the governments of Canada and Alberta have signed an Agreement on the Equivalency of Federal and Alberta Regulations for the Control of Toxic Substances in Alberta. The agreement requires Alberta to set standards for environmental protection equivalent to those prescribed under the various regulations of the Environmental Protection Act in areas such as testing, standards, penalties, enforcement, and the public's ability to request investigations.

6.2.3.2 The Province of Alberta

The provincial government is the central player in the creation and implementation of water resource policy in Alberta, and various provincial departments and agencies play key roles. Alberta Environment issues licenses for water use and records all the water that is allocated. Allocations from surface flows constitute 97.5 % of the total, while the other 2.5 % is from aquifers (Alberta Environment 2010, 27). However, “over 90 percent of rural Albertans rely on groundwater [aquifers]” (Droitsch and Robinson 2008, 11).

Eight provincial statutes influence water policy in Alberta, the most significant being the *Water Act*, 2000, the *Environmental Protection and Enhancement Act*, 2000, the *Irrigation Districts Act*, 2000, and the *Alberta Land Stewardship Act*, 2009 (Christensen and Droitsch 2008; BRBC 2010). Table 6.2 summarizes the nature and significance of these Acts.

The newest legislation regarding the use of water resources is the *Alberta Land Stewardship Act*, 2009 created to implement a Land-Use Framework (LUF) introduced in 2008. This provincial LUF was created in response to rapid population increases and the associated need for a cohesive direction for land use planning, particularly at the regional and/or municipal level (Government of Alberta 2011b). Other legislation that affects Alberta water policy includes the *Municipal Government Act*, 2000 which gives municipalities direction, control, and management of rivers, streams, watercourses, lakes, and other bodies of water within their administrative boundaries. Municipalities with a population over 3500 people must create a development plan consistent with provincial land-use policies (Government of Alberta 2011c). These plans must contain provisions for the protection of water bodies and natural riparian habitat. The *Energy Resources Conservation Act*, 2000, *Irrigation Districts Act*, 2000, *Municipal Government Act*, 2000, *Public Health Act*, 2000, *Public Lands Act*, 2000, and the *Public Utilities Board Act* (2000) also have some components regarding water resource use, but do not have as significant direct influence as those in Table 6.2 (Living Water Policy Project 2010).

**TABLE 6.2: PROVINCIAL LEGISLATION RELEVANT
TO ALBERTA WATER MANAGEMENT**

Legislation	Description	Significance
Water Act, 2000	The purpose of this Act is to support and promote the conservation and management of water, including the wise allocation and use of water.	<ul style="list-style-type: none"> • Protect existing water licenses in good standing • Protect existing traditional agricultural uses of water through a grandfather clause • Recognize the priority of household water use as a statutory right • Ensure sustainability of Alberta's water by requiring a provincial water management planning framework • Allow for water management plans to be developed to address local and regional issues • Recognize the importance of protecting Alberta's rivers, streams, lakes and wetlands, by requiring a strategy for the aquatic environment be developed as part of the provincial water management planning framework • Provide a streamlined, one-window licensing and approval process for water-related activities and diversions • Allow for flexible water management in areas where available water is already allocated, by providing the ability to transfer water licenses • Prohibit export of Alberta's water to the United States • Prohibit any inter-basin transfers of water between Alberta's major river basins • Encourage cooperation and proactive measures to resolve water management problems • Provide a wide range of enforcement measures • Give Albertans the opportunity to provide advice on, and to understand water management
Environmental Protection and Enhancement Act, 2000	Purpose is to promote the protection, enhancement and wise use of the environment.	<p>Endeavours to balance these principles:</p> <ul style="list-style-type: none"> • Protecting the environment for the well-being of society • Carrying out Alberta's economic growth in an environmentally responsible manner • Achieving sustainable development • Preventing and mitigating the adverse environmental impact of development and of government policies • Providing government leadership • Facilitating shared responsibility of all Alberta citizens for environmental protection • Creating opportunities for citizens to provide advice on decisions affecting the environment • Achieving co-operation with governments of other jurisdictions to minimize adverse trans-boundary environmental impacts • Applying the "polluter pays" principle
Irrigation Districts Act, 2000	To provide for the formation, dissolution and governance of Alberta's thirteen irrigation districts in order that the management and delivery of water in the districts occur in an efficient manner that provides for the needs of the users	<p>Allows for the construction, operation, and maintenance of irrigation works in each district for the conveyance and delivery of water; divert and use of water in accordance with the terms and conditions of licence under the <i>Water Act</i>; and to maintain and promote the economic viability of the district. Rates may be charged for irrigation acres, water conveyance agreements, and irrigation surcharges may be imposed upon users for the delivery of water.</p> <p>Allows irrigators greater autonomy and independence, but with greater accountability. Under the Act, an irrigator can, with the consent of their irrigation district, change the point of diversion and the location of an irrigated field. A water right can be transferred to a different piece of land, as long as it also is classified for irrigation.</p>
Land Stewardship Act, 2009	A comprehensive planning approach designed to better manage public and private lands and natural resources to achieve Alberta's long-term economic, environmental and social goals.	<p>Implementing the Land-use Framework will allow government to:</p> <ul style="list-style-type: none"> • Move forward with priorities identified by Albertans; • Provide greater certainty for Albertans; and, • Plan and carry out activities on the land. <p>Develop regional plans that will:</p> <ul style="list-style-type: none"> • Integrate provincial policies at the regional level. • Set out regional land-use objectives. • Provide direction and context for land-use • decision-making in the region.

6.3 Policy-Making within Alberta Water Institutions

Based on a review of the language, goals, and objectives in relevant provincial legislation, policies and strategies, within the institutional context of water policy in Alberta, the FITFIR concept is central (Droitsch and Robinson 2008). As the primary economic activity of the first European settlers, agriculture was given precedence over almost any other activity (Brownsey 2008), with the exception of resource extraction and processing. With what appeared to be abundant surface and groundwater, irrigation became an early priority of the federal and provincial governments, especially in the semi-arid regions of the southern half of the province. This situation has continued for several reasons.

FITFIR and irrigation priorities continue to dominate water policy because of the centralization of decision-making (Droitsch 2009; Wenig 2010). The political composition of Alberta's legislature heavily favours rural areas. While over two million of Alberta's 3.3 million residents live within the metropolitan areas of Calgary and Edmonton, these cities have only 42 of the legislature's 87 seats (CBC 2011), leaving 45 seats to approximately one million rural residents. This rural dominance has helped to maintain the historical pre-eminence of agricultural interests in provincial policy-making and the 13 irrigation districts maintain very influential voices within the water policy community (Sproule-Jones 2008). As a result, the irrigation districts have a greater influence on provincial political life than their populations would otherwise suggest (Heinmiller 2011).

In the early 1970s, the federal government decided to get out of the irrigation business, thereby reshaping the water policy subsystem so that it was centered entirely on Alberta's provincial government. For the most part, this worked to the advantage of the agricultural community and irrigation districts, as they enjoyed more political influence at the provincial level than at the federal level. By that time, irrigation constituted an important part of the Alberta economy and provincial politicians were acutely sensitive to this reality. One reason for their sensitivity was the distribution of seats in the Alberta legislature which over-represented rural areas compared to urban areas, so that winning the irrigation belt was important to any political party hoping to form government (Brownsey 2008, 150). Within the Alberta legislature, there was also an Irrigation Caucus Committee of irrigation belt Members of the Legislative Assembly who were closely connected to the irrigation districts and provincial irrigation bureaucrats. So, when the federal government withdrew from the policy subsystem, the agricultural community's power – particularly its stranglehold on the formal legal authority to make water policy decisions – was strengthened. Not surprisingly, the 'dam and divert' water policies continued.

In addition, FITFIR is still a dominant policy model because of the historical fragmentation of interests related to the creation and implementation of water policy. This fragmentation, combined with the continued influence of the rural sector and the oil and gas industry, dominate the decision-making process related to water in Alberta (Brownsey 2008). As an example of this fragmentation, four provincial

departments have a direct role in water policy: Alberta Agriculture, Food and Rural Development; Alberta Environment; Alberta Sustainable Resource Development; and Alberta Community Development. Despite the numerous provincial statutes, regulations and policies, and the various departments dealing with water issues, no governmental coordinating committee exists with an environmental or water policy focus.

To complicate matters and potentially enhance fragmentation, the decision-making process for water policy involves many voices, including governmental and non-governmental organizations, farmers, urban residents, and environmental organizations. For example, the Pembina Institute maintains a directory of over 400 environmental groups (some with water-related agendas, such as the Bow River Council and Water Matters) in the province (Pembina 2011). While most groups have local objectives, organizations such as the Sierra Club, the Bow River Council, Pollution Probe, Ecojustice, and Water Matters are provincial and even national in scope.

In the Calgary region, the Alberta Conservation Association (ACA), composed of nine different groups such as Nature Alberta and Trout Unlimited, is one organization that is involved in water policy development (ACA 2011). The ACA runs several water-related programs, including the Fisheries Management Enhancement Program and Fisheries Habitat Development Program. Other non-governmental organizations involved in the provincial water policy community include Ducks Unlimited, Partners for the Saskatchewan River Basin, the Treaty Eight First Nation of Alberta, the Sierra Club, Friends of the Oldman River and the Bow River Basin Council (BRBC) (Sproule-Jones 2008). These interest groups vary in their orientation, but present a consistent message on water – that conservation of water and associated ecological services should be ranked above competing economic and political interests. The positions of these non-governmental organizations are also often in conflict with the position of the political party in power.

The Oldman River Dam is an example of when conflicting opinions about the necessity of a water-related infrastructure project resulted in a legal challenge to the Canadian *Environmental Assessment Act*, 1995) by a group of non-governmental organizations. Irrigators within Southern Alberta presented a case for the Oldman River Dam, supported by science demonstrating that irrigation expansion was necessary to prevent recurring water shortages, particularly within the Lethbridge Northern Irrigation District. The reigning Progressive Conservative government also supported this infrastructure project based on sound reasoning for damming the river (Heinmiller 2011).

Organizations (such as the Federation of Alberta Naturalists, Trout Unlimited and the Canadian Nature Federation), which also allied themselves with the Peigan First Nations people, organized into a group called Friends of the Oldman River (FOR), opposed the damming of the river, citing further destruction of Alberta's ecosystem (Heinmiller 2011). The project was challenged based on the argument that the province of Alberta did not receive the proper approval requirements under the (federal) *Navigable*

Waters Protection Act and therefore, it was asserted that further construction on the dam without federal approval would be a breach of federal law (Sproule-Jones et al. 2008). In 1990, the federal government ordered an Environmental Assessment Review, to be conducted by an independent review panel (EARP) of the project. Construction on the dam was allowed to continue while the review was being conducted (Glenn 1990).

FOR successfully managed to convince the Environmental Assessment Review Panel (EARP), through the submission of their report in 1992 to the federal government that, “the environmental, social and economic costs of the project are not balanced by corresponding benefits and finds that, as presently configured, the project is unacceptable” (EARP 1992, 6). Although the Oldman River Dam was almost operational at the time the EARP report was submitted and the panel could not reasonably assume the preferred recommendation of decommissioning the dam would be accepted, the panel made 22 other recommendations based on a variety of “stringent conditions”, such as a long-term commitment to mitigating the environmental impacts of the dam (Daschuk and Marchildon 2006). Although there has been a series of legal challenges to the government of Alberta’s decision to disregard the recommendations of the EARP report, FOR may have made the public more receptive to shifting away from “dam and divert” water policy (Heinmiller 2011), and may have ultimately influenced the underlying philosophy of Alberta’s *Water for Life* Strategy.

There has been significant focus over the last decade on the development of a provincial water strategy in Alberta, the *Water for Life Strategy*, which was designed to help reduce fragmentation and provide a comprehensive and consistent message regarding water management. The *Water for Life Strategy* will be summarized and analyzed in the following section to explore some of the issues surrounding water policy creation and implementation in Alberta.

6.3.1 The Water for Life Policy Initiative

In response to the growing concerns over a possible lack of sufficient fresh water as a result of a three-year drought in Alberta (1997-2001), the Walkerton tragedy in Ontario, and, closer to home, the E. coli contamination in the water supply of North Battleford, Saskatchewan the province of Alberta responded in 2003 with a set of proposals to ensure sufficient quantity and quality of fresh water labeling it a *Water for Life Strategy* (Strategy) (McAllister 2004; Schmidt 2010; Heinmiller 2011). The Strategy was adopted by the provincial government in 2003 and later updated in 2008 (*Water for Life: a Renewal*) (Renewal) and 2009 (*Water for Life Action Plan*) (Action Plan). The introduction to the 2003 Strategy states that Alberta “is facing significant pressure on its water resources” and a “fluctuating and unpredictable water supply in recent years” (Government of Alberta 2003, 1). The demands of population growth, intensive agriculture, industry, and drought are claimed to have placed an increasing and unsustainable burden on the province’s water supplies. In the past, Alberta managed its water through a series of ad hoc and uncoordinated policies and programs, in place for most of the province’s history (Sproule-Jones 2008).

The principle of “first in time, first in right” has guaranteed agriculture primacy in the use of Alberta’s surface and groundwater (Brownsey 2008; Heinmiller 2011). However, increasing demand and unpredictable supplies necessitated an effort to regulate taking and use of the apparently limited supplies of fresh water.

The Strategy was developed in consultation with stakeholders across the province over an 18-month period. The long period of public consultation for the Strategy, according to Saunders (2010), could be taken as acknowledgement by the provincial government that the *Water Act* (2000), which was effectively seen as the cornerstone of the water management legislation in Alberta, could not fully implement the concept of an ecosystem approach to water resource management.

The 2003 Strategy reflects the provincial government’s desire to manage water on a watershed-by-watershed basis, or as Saunders (2010, 3) describes, adopting a watershed management approach that “strives for a comprehensive or holistic planning effort that links management decisions with respect to both water quality and quantity” (Saunders 2010, 3). The 2003 Strategy introduces several institutional arrangements, including the Alberta Water Council (AWC), the Watershed Planning and Advisory Councils (WPACs), and Watershed Stewardship Groups. The purpose of the AWC is to guide overall implementation of the Strategy, to provide advice to the provincial government on emerging water issues, and to continually engage the citizens of Alberta on water issues (Government of Alberta 2003, 15). The WPACs responsibilities are to take the lead on developing watershed management plans for each identified watershed and to “develop best management practices, foster stewardship activities within the watershed, respond on the state of the watershed, and educate users of the water resource” (Government of Alberta 2008, 13). These watershed management plans are different from the water management plans identified in the *Water Act* (2000) and the WPAC plans are therefore not recognized in legislation. WPACs “will not have a direct reporting relationship with the AWC, they will benefit from their guidance and mentoring” (Government of Alberta 2003, 15-16).

The 2003 Strategy is structured around water resource management principles, three goals, three key directions that directly relate to the goals, and finally, specific outcomes that have accompanying key actions based on short term (2004/5 to 2006/7), medium term (2007/8 to 2009/10) and long term (2010/11 to 2013/14) timelines. The Strategy’s three specific goals are to provide Albertans with:

- Safe, secure drinking water supply;
- Healthy aquatic ecosystems; and,
- Reliable, quality water supplies for a sustainable economy (Government of Alberta 2003, 2011).

The original 2003 Strategy also contained three key directions to help achieve the three specific goals, including knowledge and research, partnerships, and water conservation (Government of Alberta 2012, 1). The key direction related to water conservation, for example, stated that, “Albertans will be

leaders in conservation by using water efficiently and effectively” (Government of Alberta 2003, 20). A key action for this direction in the Strategy was “to prepare water conservation and productivity plans for all water-using sectors by 2010” (Government of Alberta 2001b). As of November 2012, six of the seven water conservation and productivity plans had been completed, with the remaining four “under development” (Government of Alberta 2012), including:

- Urban Municipalities (Alberta Urban Municipalities Association) (completed);
- Irrigation (Alberta Irrigation Projects Association) (completed);
- Upstream Oil and Gas (Canadian Association of Petroleum Producers and the Oil Sands Developers Group) and Downstream Petroleum (Canadian Petroleum Products Institute) (completed);
- Forestry (Alberta’s Forest Products Association) (completed);
- Chemical and Petrochemical (under development);
- Power generation (completed); and,
- Mining/Oil Sands (completed).

In the 2008 Renewal document, there were several changes to the key direction for water conservation that now state, “[A]ll sectors understand how their behaviours impact water quality, quantity and the health of aquatic ecosystems, adopt a ‘water conservation ethic’ and take action” (Government of Alberta 2008, 15). The corresponding key action was also changed to read, “[E]ncourage all sectors to develop and implement sector plans for water conservation, efficiency and productivity” (Government of Alberta 2008, 15). Depending on one’s perspective, the removal of target dates from the key direction changes could either be seen as an enhancement or weakening of the strength of the updated Strategy

The key actions mentioned within the 2003 and renewed 2008 Strategy should contribute to achieving the Strategy’s specific outcomes (Government of Alberta 2010). The majority of these specific outcomes are, however, of a general nature. For example, the short-term outcome under goal 1 is that “Albertans have full and complete knowledge of drinking water issues” (Government of Alberta 2003, 7); however, a means of measuring this goal has not been provided within the Strategy. The guiding principles, three goals, three key directions, specific outcomes and key actions in the 2003 Strategy, 2008 Renewal document and 2009 Action Plan constitute the provincial government’s response to the problem of maintaining sufficient reserves of freshwater for a growing economy and population. However, the content of the Strategy is not entrenched in law. *Water for Life* is seen by organizations such as the Pembina Institute, Water Matters, and EcoJustice, and the Canadian Environmental Law Association as the first step of many in the construction of a comprehensive strategy of water conservation and planning for the province (Heinmiller 2011).

6.4 Summary

The province of Alberta, and Southern Alberta in particular, has experienced prolonged water scarcity, due in part to population growth, climate change, and access to water supplies. For example, Alberta has 7% of Canada's land area, 10% of Canada's population, but only 2.2% of Canada's renewable freshwater with 80% of that water in the north while 80 % of the population is in the south (Dechene 2010, 1). Since European settlement, the extraction and allocation of water in Alberta has been guided and dominated by the principle of "first in time, first in right". This principle has framed the legal and policy debates surrounding water resources in favour of agriculture and, to a lesser extent, the oil and gas industry. The constitutional, legal, and political framework for water policy has also helped to create a situation of administrative and policy fragmentation (Brownsey 2008; Sproule-Jones et al. 2008). This fragmentation results in divided jurisdictional responsibility between the federal and provincial governments.

The *Water for Life Strategy* contains goals, key directions and key actions that could potentially, if fully implemented, alter the way water management occurs. However, some challenges exist with this strategy, including that it is not accompanied by any legislated mandate or timelines, therefore decreasing the accountability of government. According to Saunders and Vlavianos (2010, 7),

“[T]his is particularly significant given the much different approach in the Land-use Framework as implemented by the Alberta Land Stewardship Act (ALSA), which has legal consequences — as reflected, for example, in the fact that the land-use plans generated by that process will trump existing regional and local plans (which will have to be brought into conformity with the ALSA plans in the event of a conflict). Since the land-use plans emerging from the ALSA process will include planning for water use, it is possible that as a practical matter Water for Life could fade in significance as stakeholders focus on the planning process with real legal force.”

In addition to the lack of legislative teeth for the *Water for Life Strategy*, there is no mention of implementation tools, lack of definitions for significant terms such as “ecosystem” and “ecosystem health”, and no recognition of the significant role that agriculture and irrigation districts play in the use of water within the Province (Saunders 2010; Wenig 2010). The absence of these terms and concepts can result in an ineffective Strategy that will not be able to achieve its stated goals and objectives. However, these deficiencies also present an opportunity for improvement. A proposed water ethic, if implemented within the context of the current legislative climate, could be effective in aiding this water-scarce province to achieve its goal of 30% reduction in water use. It would focus policy and decision-makers on the underlying ethical considerations of water use and, potentially, allow for the introduction of more effective measurable targets. The second part of this chapter will turn to the case study area of Calgary, Alberta.

6.5 The City of Calgary Overview

The city of Calgary (Calgary) is one of Canada's fastest growing cities, growing at a rate of approximately 12.6% between 2006 and 2011, compared to the national rate of 5.9% (CBC 2012). The

Greater Calgary Area (Figure 6.6) had a combined population of approximately 1.24 million people in 2010 (Statistics Canada 2011).

Figure 6.6: The Greater Calgary Area



*Source: City of Calgary 2011
(Please note that a map scale is not provided at source)*

From 2003 to 2006, Calgary grew by approximately 17,000 people (about 10,000 new homes) every year. The growth is largely a result of Alberta's strong economy, driven by the petroleum industry as well as agriculture, tourism, and high-tech industries (FCM 2007; Schmidt 2012).

Calgary is located in one of Canada's driest regions. In the past decade, temperatures have been rising, precipitation patterns have been changing and river flows have been declining. Historic climate records indicate a warming trend with the average annual temperature increasing at a rate about 1.0°C/100 years, and the expectation by Alberta Environment (GOA 2011) is that this trend will continue. In addition, Alberta Environment (2011) indicates that the Bow and Elbow rivers flowing into southern Alberta have experienced the largest decline in flow rates in recent years. An analysis of the total annual flow rate from the Bow and Elbow rivers, dating back to 1909, indicates a decline of 5.7% over 90 years. This trend suggests that the decline in river flow into Calgary may be primarily due to increased upstream

evapotranspiration, with a very small amount (between 1% and 5% in extremely low flow years) accounted for by glacial wastage (melt minus accumulation). Historical river flow data show multi-decadal cycles varying by up to 12% of the average value, which means that, in a low flow period, the river has only 88% of the average flow rate (NRCAN 2007). While these historical trends are useful and shed some light on previous river flow trends, climate change uncertainties challenge the reliability of such data. In addition, because climate change projections may not be linear, it would be wise to anticipate and prepare for a range of possibilities, including much sharper flow reductions in the Bow and Elbow rivers (Visser et al. 2000; Schneider 2000; Randall et al. 2007; Sauchyn and Kulshreshtha 2008).

Since 2005, the daily amount of water consumed per person in Calgary has remained lower than in many other North American cities (NRCAN 2007; Calgary 2012). The average North American city resident consumes 587 litres/person/day, while the City of Calgary average is 428 litres/person/day (Siemens 2011). Municipal water demand exhibits a strong seasonal variation, with summer demand being about 170% of winter demand during “normal” years and up to 250% of winter demand in “hot and dry” years. Summer water consumption increases dramatically when the weekly mean temperature exceeds 10°C, or when weekly precipitation accumulation is less than 30 mm.

Calgary has two sources of drinking water: the Bow River and the Elbow River. The Bow River supplies the Bearspaw Water Treatment Plant while the Elbow River supplies the Glenmore Reservoir and the Glenmore Water Treatment Plant. Both rivers originate in the Rocky Mountains west of Calgary, flowing eastward through the foothills and prairies. The Bow River watershed is approximately 7,770 km² and the Elbow Valley watershed covers an area of 1,210 km². Both rivers are part of the South Saskatchewan River basin, which supports all thirteen of the province’s irrigation districts (described earlier in this Chapter). Calgary is licensed for an average daily withdrawal of 626.4 megalitres/day (ML) from the Bow River and 300ML/day from the Elbow River. This combined amount of 926ML/day will meet current peak demand, estimated at 648ML/day (City of Calgary 2010), but according to Chen et al. (2006, 10), will be insufficient “to balance the demand growth and supply availability. It [current peak demand] will exceed the 1000ML/day licensed water withdraw by 2020.” Since Calgary has few options for new water sources, yet the City’s population is projected to double by 2064 (Chen et al. 2006; NRCAN 2007; Water Chronicles 2008), there is significant impetus to have and adhere to a strict water efficiency strategy.

In 2005, Natural Resources Canada (NRCAN) partnered with the City of Calgary to study the future water demand in the Greater Calgary Area and to quantify the future impacts of climate change on water supplies. The results of the study suggested that Calgary must achieve a 50% reduction in per capita use by 2064 in order to provide a sustainable water supply (NRCAN 2007). Schindler (2006, 1) has likened Calgary’s situation to “the view from the locomotive, 10 seconds before the train crash. Sometime in the coming century, the increasing human demand for water, the increasing scarcity of water due to climate warming, and one of the long droughts of the past centuries will collide, and Albertans will learn first-hand

what water scarcity is all about.” In 2005, in order to achieve the per capita reductions in water use and to avoid the proverbial train crash, Calgary introduced its Water Efficiency Plan, summarized below in section 6.5.1.1.

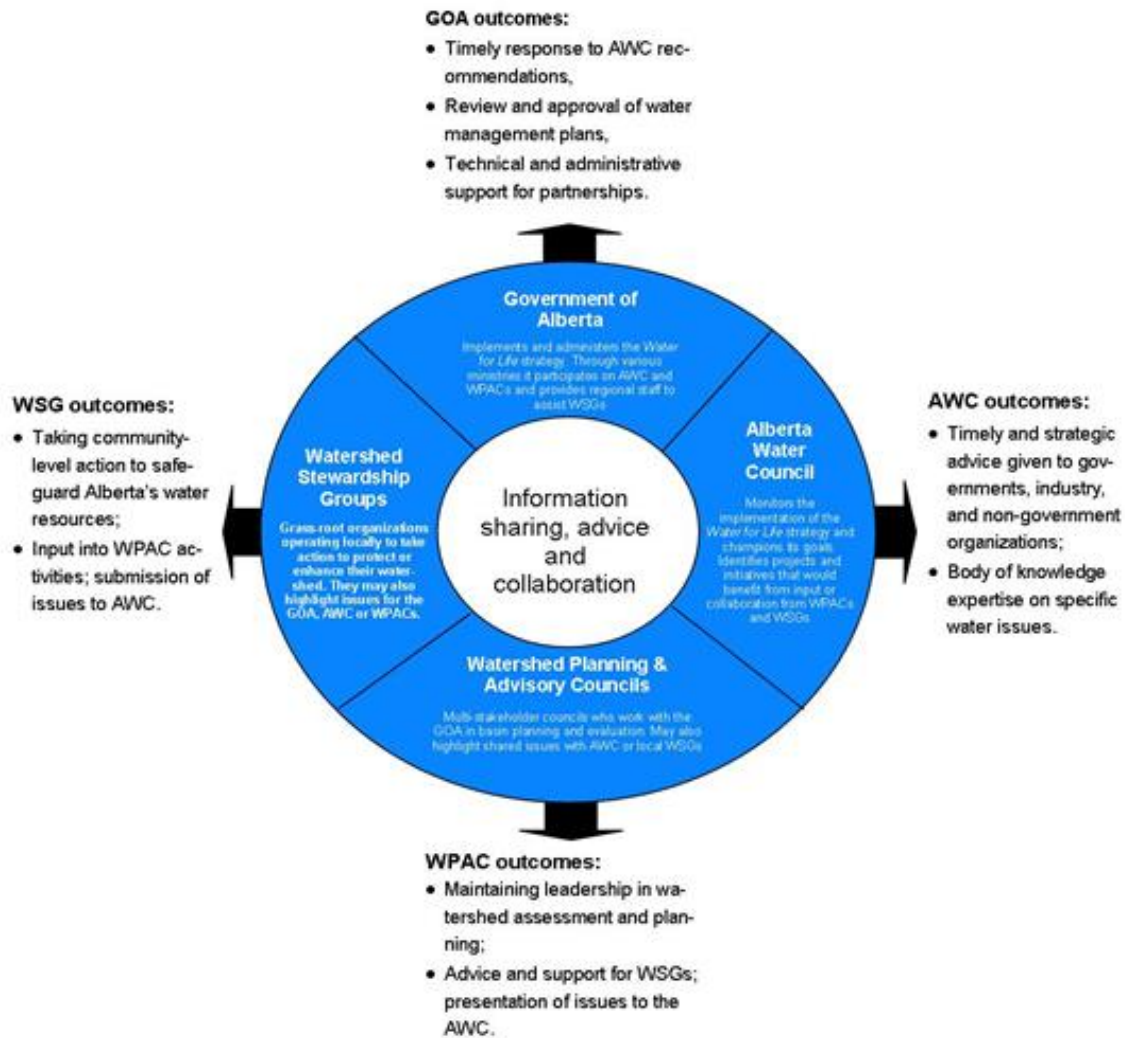
Before summarizing the City’s plans, policies and strategies that apply to the management of municipal water resources, it is necessary to provide an overview of the governance structure and institutional arrangements for water management in the City of Calgary.

6.5.1 City of Calgary Governance and Institutional Arrangements

Chapter Five and the first part of this chapter summarized the responsibilities of the federal, provincial, and municipal levels of government with respect to water. The federal government is responsible for higher level legislative and policy direction, with a focus on the navigation on oceans and rivers, interprovincial and international water matters, fisheries, and water matters relating to the Aboriginal people of Canada. The provincial government is responsible for creating water legislation and policies relevant to water supply (e.g., potability) and resource management (e.g., environmental protection and licensing) and governance (e.g., accountability). Approximately five full-time equivalent staff members at this level of government are directly responsible for developing and writing provincial water policy and legislation (pers. comm. 2010). The 2003 *Water for Life* Strategy, discussed in the earlier part of this chapter, is a major, provincially-spearheaded initiative that first, recognizes the threat of water scarcity in Alberta and second, identifies a range of goals, actions and tools to protect water resources. These tools include data gathering and synthesis; regulatory oversight; protective environmental objectives, allocations and holdbacks; increased public consultation; and, economic instruments such as water rights trading (Droitsch and Robinson 2008).

This Strategy is based on a shared governance model (Saunders 2010; Wenig 2010; Government of Alberta 2011). As mentioned in section 6.3 of this chapter, the provincial government maintains accountability for implementing *Water for Life*, but government staff advise and assist the three partner organizations, including the AWC (provincial scale), the WPACs (watershed scale), and the Watershed Stewardship Groups (local scale). Figure 6.7 provides a more detailed depiction of the collaboration between the provincial government and the three partners.

Figure 6.7: The Water for Life Shared Governance Model



Source: Alberta Water Council 2009

At the municipal level, staff at the City of Calgary (corporation) report to the 15 elected councillors (including the mayor) on City Council, representing 14 wards. The City of Calgary is responsible for fulfilling the policy and legislative requirements of the federal and provincial governments with respect to water resources, municipal water treatment, distribution, and conservation. Specifically, water is managed by the Utilities and Environmental Management Department, in which there are three business units:

- Environmental and Safety Management;
- Waste and Recycling Services; and,
- Water Services.

The Water Services unit operates and maintains water and wastewater infrastructure, including the Glenmore and Bearspaw Water Treatment Plants, 30 pump station sites to 37 pressure zones, twelve water storage reservoir sites with 19 basins, nearly 4000 kilometers of pipes (including watermains) and over 260,000 service (residential) connections (City of Calgary 2011). This unit is also responsible for developing the City's Water Efficiency Plan, developing and delivering water conservation education programs to residents, responding to flood events, and managing stormwater drainage. Within the Utilities and Environmental Management department, approximately three full-time equivalent staff members develop water resource management policy and plans, including a manager of strategic water services, a water services community and customer initiatives representative, and a customer coordinator of water resources (Calgary 2012b).

In addition to the Utilities and Environmental Management department, there is the Planning, Development and Assessment department. This department has three business units: land use planning and policy, development and building approvals, and assessment. The land use planning and policy unit is responsible for creating and implementing the Municipal Development Plan, a land use planning and policy document that is legally enforceable and contains goals, objectives and policies related either directly or indirectly to the management of the city's water resources (City of Calgary 2012). Approximately three full-time equivalent staff members were devoted to the crafting of the policies in the Municipal Development Plan on a full-time basis (City of Calgary 2012, pers. comm.).

A variety of other organizations and stakeholders is involved in the governance and institutional arrangements for water management within the City of Calgary, including the Calgary Regional Partnership (CRP) and the BRBC. The CRP is a coalition of 15 municipalities, whose membership includes councillors and mayors from these municipalities. The CRP is not another level of government, but given the political membership, does have influence over decision-making through published documents such as the Calgary Metropolitan Plan (CMP). The CRP and the CMP address such issues as:

- The need for coordinated regional planning;
- Complex inter-municipal relationships;
- Regional environmental carrying capacity;
- Transportation pressures; and,
- Infrastructure and servicing needs (CRP 2011).

The Bow River Basin Council (BRBC) was established in 1992 as an advisory body to the provincial Minister of Environmental Protection. The BRBC includes representatives from urban and rural municipalities, including the City of Calgary, irrigated and dryland agriculture, as well as recreational, industrial and other interests, and First Nations people within the Bow River Basin. In 2004, the BRBC was designated by Alberta Environment as the WPAC for the Bow River basin, which means this group

also has some influence over the policies written at the provincial and municipal level (Government of Alberta 2003; BRBC 2012).

The following sections provide a description and broad analysis of the municipal documents that apply to the management of water resources in Calgary, including the Water Efficiency Plan, the *imagine*Calgary Plan, and the Municipal Development Plan.

6.5.1.1 City of Calgary's Water Efficiency Plan

Calgary's Water Efficiency Plan (WEP) was approved by City Council in December 2005 and was updated in 2010. The WEP takes a demand-management approach to water resources and provides a framework for the City's water conservation efforts. The overarching "30 by 30" goal (referred to in the document as a 'sustainability' goal) states that in 30 years, using 2003 as the benchmark year, the target reduction of the average gross per capita water consumption (residential, commercial and industrial) by each person in Calgary will be reduced by 30 %. In 2003, the average gross per capita water consumption was 500 litres/day; a 30 percent reduction over 30 years would bring this average to 350 litres per day by 2033. A 30-year period was chosen to align with the City's initiative to create a long-range vision for a sustainable city—a project called *imagine*Calgary. According to City staff, a 30 % reduction over 30 years was chosen as an appropriate target since the city will be able to service its growing population and customer base without increasing the total amount of water diverted from the Bow and Elbow Rivers, based on the 2003 benchmark flows (WEP 2010, 6). What is not explained in the WEP, however, is why the flow rates of 2003 are the ideal.

A 2007 study, conducted by Natural Resources Canada (NRCAN) in collaboration with the Canadian Institute of Planners and a review by City of Calgary staff, investigated the likely impact of climate change on Calgary's water supply over a 60-year period (2004-2064) and provided quantitative projections based on a 25% and 50% Water Conservation Scenarios, and using the city's current 1000 ML/day withdrawal licence limitation. The key finding from this study indicates that given historical river flow data and projected climatic cycles, a 50% conservation scenario is necessary in order to work within the city's current water supply sources (NRCAN 2007, 9). The study indicates that, "[C]ity officials are already using the NRCAN research findings to further assist their ongoing policy development and water conservation programs" (NRCAN 2007, 7), but the "30 by 30" WEP goal has not yet been adjusted to reflect the results of this study.

Water conservation was not a new concept to Calgarians when the WEP was formally approved by City Council in 2005. The WEP built upon a number of water demand programs already in place, including leak detection, water metering, seasonal water use campaigns, and youth education (City of Calgary 2005, 2010). For example, the City expanded a 1991 customer-oriented water conservation program that was designed to install water meters for all residents and charge residents for the exact volume of their water use. At the time, only 22 percent of residential water users had meters. The

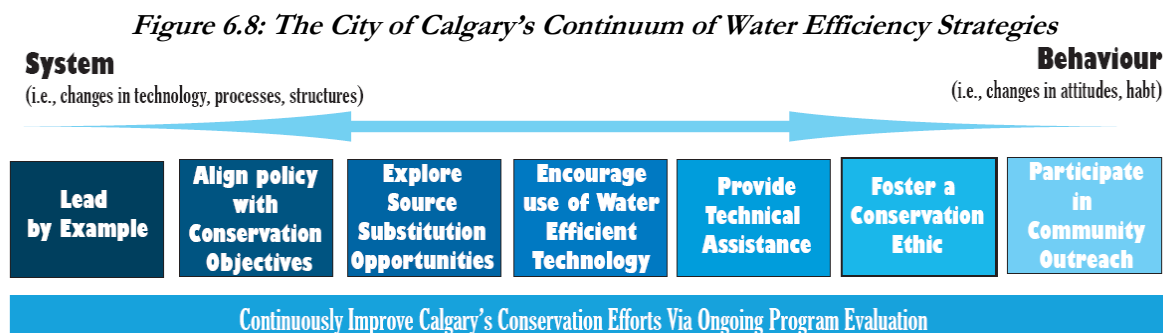
remaining 78 percent were charged a flat rate for municipal water (NRCAN 2007). The public was not easily convinced that installation of water meters was the best course of action and between 1991 and 2010, and it has taken a significant amount of effort and an active public participation strategy to sway public opinion to support water meters. As of December 2010, meters had been installed in 85% percent of residential homes and the City expects all residential water users to be metered by 2014 (NRCAN 2007; City of Calgary 2011). In addition to water meters, other programs were introduced through the WEP to manage water demand. These programs include enhancing the leak detection program, a water main replacement program, water audits for industrial, commercial and institutional (ICI) customers, youth outreach programs, and a toilet rebate program for single-family residential homes (WEP 2010).

According to city staff (NRCAN 2007), the challenges that Calgary staff faced in terms of creating a WEP fell into three general categories: (1) explaining the concept of sustainability in relation to water supply; (2) synthesizing the best practices of a water demand management approach into a strategy such that rapid growth could still continue; and, (3) engaging the public (NRCAN 2005).

Regarding the first challenge, the city recognized that a common vision for managing water resources did not exist, nor did an explicit set of parameters against which the strategy goals could be measured and/or prioritized. The WEP was the mechanism through which to introduce a consistent, demand-management focused message about what Calgary regarded as the sustainable use of water resources. The difficulty, however, was that the public did not support some of the actions needed, such as installing water meters, to reach the “30 by 30” goal (NRCAN 2007). Also at issue is that a definition for sustainability does not exist within the document; therefore, explaining the concept to city customers may have been inconsistent and/or confusing.

The reluctance to support water conservation actions, which was the second challenge that staff faced when creating the WEP, arose because water demand had already decreased from 800 litres per capita per day, consumed in the early 1980s, through improved water system maintenance and leakage control (NRCAN 2007). Water consumption between 2002 and 2004 was at 500 litres per capita per day and the general public perception was that residents had already done a great deal to reduce water use. The majority of city residents were unwilling to voluntarily change water use habits further, and this lack of self-initiated water conservation presented the third challenge for city staff (NRCAN 2007). For example, City staff conducted a survey in 2005 and the results showed that 96 percent of residents considered water efficiency to be important, but of that 96 percent, only 24 percent were willing to act to reduce water use further (City of Calgary 2006, 2011). This finding suggested that although one-quarter of the residents understood the need to conserve water further and were willing to do something about it, another three-quarters of the population needed to be convinced that behavioural changes in water uses were necessary to maintain a sustainable water supply.

Given the challenges that the City faced in terms of convincing residents to change their water use habits to become more sustainable, a continuum of program strategies was presented to the public. The continuum (Figure 6.8) includes a range of strategies from leading by example (based on making changes to the existing technology, processes and infrastructure) to participating in community outreach programs (in order to focus on changes in behaviour).



Source: NRCan 2007, 4

The WEP also introduced four key indicators to track the progress of the plan: (1) total annual diversion from the Bow and Elbow rivers, (2) universal metering installation, (3) per capita demand per day, and (4) peak day demand. City of Calgary staff report to city council on an annual basis using these indicators as a measure of success. Based on these staff reports from 2006 onwards, Table 6.3 provides the progress on each indicator until 2010.

Table 6.3 suggests that the City of Calgary is on track to meet its 2033 targets. It is difficult, however, to determine what percentage 41,800 customers represent in the Universal Metering (residential) indicator category and it is also unclear why a target for Single Family Residential Demand has not yet been determined.

TABLE 6.3: THE CITY OF CALGARY'S WATER EFFICIENCY PLAN PROGRESS, 2006-2010			
Indicator	2003 Benchmark	2010	Target
Total annual diversion from Bow and Elbow Rivers	212,500 ML	177,638 ML	Keep below 212,500 ML annually until 2033
Universal Metering (residential)	66% metered	41,800 flat rate customers left	100% metered by 2014
Per Capita Demand	Total (consumption) 500 litres per capita per day (lpcd) Single Family Residential: 326 sf lpcd	Total (consumption): 406 lpcd Single Family Residential: 273 lpcd	Total (consumption): 350 lpcd by 2033 Single Family Residential demand target analysis underway
Peak Day Demand	840 LM	648 ML	Keep below 950 ML until 2033

Source: City of Calgary 2010

6.5.1.2 The *imagine*Calgary Plan

The *imagine*Calgary Plan, a vision document completed in 2006 and based primarily on the input and ideas of the public, plays a supporting role in helping to achieve the overall goals of the WEP. A suite of goals and targets is provided for municipal responsibilities such as infrastructure, governance, energy, roads, water, and community engagement (City of Calgary 2006). The goals and targets that apply to water resources for the City of Calgary are provided in Appendix B of this dissertation. It should be noted that the language in this document is passive and not active. This approach means that even though targets exist, such as, “[b]y 2036, watershed health — as measured by loss of wetlands, water quality, non-compliance with pollution standards, in-stream flow and groundwater levels — improves”, there is no regulatory method for ensuring that the targets can be achieved (City of Calgary 2006, 9). The use of words, such as “supporting”, “encouraging”, and “providing”, are also examples of passive language. This document is also not legally binding, but it was formally recognized by City Council in 2006 (City of Calgary 2006). Therefore, many of the goals and targets are not mandatory and act as guidelines rather than prescription for behaviour. In addition, the onus for implementation of the goals and targets rests with the partner organizations that have their own mandates and agendas.

6.5.1.3 The Municipal Development Plan

A lead document with significant legal authority is the Municipal Development Plan (MDP) (similar to what is commonly referred to as an Official Plan in Ontario). The MDP, approved in 2009 (consolidated in 2012), is a land use plan that guides development and growth over the long term (a 30-year period) (City of Calgary 2009; 2010). The MDP provides policies for how to achieve “sustainable growth” and is meant to align with the goals and targets of the *imagine*Calgary document. Sustainability is defined in the glossary of the MDP using the 1987 Brundtland definition (City of Calgary 2012, 6-8) and also refers to the eleven council-approved Sustainability Principles for Land Use and Mobility (City of Calgary 2007).

The Sustainability Principles are:

- (1) create a range of housing opportunities and choices;
- (2) create walkable environments;
- (3) foster distinctive, attractive communities with a strong sense of place;
- (4) provide a variety of transportation options;
- (5) preserve open space, agricultural land, natural beauty, and critical environmental areas;
- (6) mix land uses;
- (7) strategically direct and manage development opportunities within existing areas;
- (8) support compact development;
- (9) connect people, goods and services locally, regionally, and globally;
- (10) provide transportation services in a safe, effective and affordable manner that ensures reasonable accessibility to all areas of the city for all citizens; and,
- (11) utilize green infrastructure and buildings (City of Calgary 2007, 1).

The Sustainability Principles capture the general spirit of good planning and it is through the policies in the MDP that these principles are to be met. A companion plan, also approved in 2009, is the Calgary Transportation Plan (CTP), created to ensure that land use planning and transportation policies were aligned and integrated (City of Calgary 2010a). Appendix C of this dissertation provides the text from the MDP related to water resources. The WEP, and the goals and targets of the *imagine*Calgary document, are not mentioned in any policy in the MDP, which if done would have given these related goals and targets an increased possibility of success in terms of implementation. Also, the language used at the beginning of each policy favours words such as “protect”, “design”, “develop” or “promote”, which are not conducive to effective implementation as they do not clearly state how, through a measurable target or monitoring program, the goal is to be defined and achieved (pers. communication 2010, 2011).

6.5.2 Summary

At the City of Calgary, six staff work directly on water management policy development and implementation within two main departments that support this work. Internal corporate departments and external partner organizations (University of Calgary, Calgary Board of Education, Pembina Institute) support the policy development and implementation process. The three central documents that provide guidance, direction, and in one case legislative authority, on water resources management at the municipal level are the Water Efficiency Plan, the *imagine*Calgary visioning document, and the Municipal Development Plan. These documents are meant to act in concert to create a governance structure and institutional environment that facilitates sustainable growth and improved water conservation behaviour.

The previous sections provided the context for how water resource policy is created, interpreted and implemented at the municipal level. The following sections provide the results of the interviews in this case study area. Insights and discussion about the interviewees’ perspectives and how they may or may not relate to the results of the literature review follow in Chapter Eight, when the two case study areas will be compared and contrasted. Table 6.4, below, provides the first three questions in the questionnaire that was provided to the interviewees in both case study areas. These questions provide the basis for insights and discussion of the Results – Part One sections. As a reminder, Chapter One provides a detailed overview of the methodology and the interview questions.

**TABLE 6.4: FIRST THREE QUESTIONS FROM
THE CASE STUDY QUESTIONNAIRE**

Question	Possible Responses	Ethical Framework
1. What is your involvement and interest in water resources? Please indicate the category that most applies.	Water manager Water engineer Policy researcher Policy maker Academic Other (please specify)	N/A
2. How many years experience do you have regarding the interest identified in the above question?	Open-ended question	N/A
3. According to the following points please choose five (5) that most define how you make decisions in your professional life. Please rank in order of most important (1) to least important (5).	1. Greatest good for the greater number of people 2. We are all responsible for all our actions, past, present, and future 3. All elements of an ecosystem, animate and inanimate, have value 4. The environment is a creation of a divine being 5. Resources are a means to an end 6. Believe in balancing economic, environmental and social elements 7. The environment is not just an object for human exploitation 8. Humans and nature are intimately linked 9. Resources are protected purely because of human need 10. Thoughts about the environment can be traced to indigenous thought 11. Economic needs are more significant than environmental needs	1. Utilitarianism 2. Consequentialism 3. Intrinsic Value 4. Theism 5. Utilitarianism 6. Consequentialism 7. Intrinsic Value 8. Consequentialism 9. Utilitarianism 10. Theism 11. Utilitarianism

6.6 Results – Part One – Exploring Underlying Ethical Frameworks As Applied To Decision-Making

The following sections provide the results of the interviews that were conducted with policy-making staff at the provincial and municipal levels of government in Calgary, Alberta. As a reminder, this research is exploratory and aims to shed light on possible underlying ethical frameworks that may be applied to water resource management decision-making. As such, while a complementary goal of this research is to introduce a proposed water ethic that could be implemented at the municipal level of government, I can only comment on the intent and not the implementation of water-related policy from an ethical perspective. The focus of the interviews and the results was not to analyse the follow-through of the policies and plans, but merely to analyse intentions as expressions through policy documents. Future research could build on the follow-through of policies and plans.

Table 6.5, Table 6.6, and Figure 6.9 refer to Question #3 in Table 6.4 and provide the rankings for how decisions are made in an interviewee's professional life. In order to rank what ethical frameworks might influence decisions the most, the responses were given a point value. In this case, the scale had a one- through-five point system, where the first ranked response received the most number of points (five) because it equates with the strongest amount of influence in decision-making, while each subsequent ranked response was given one point less. The values for each ethical framework were then summed and the ethical framework with the most points has the highest rank.

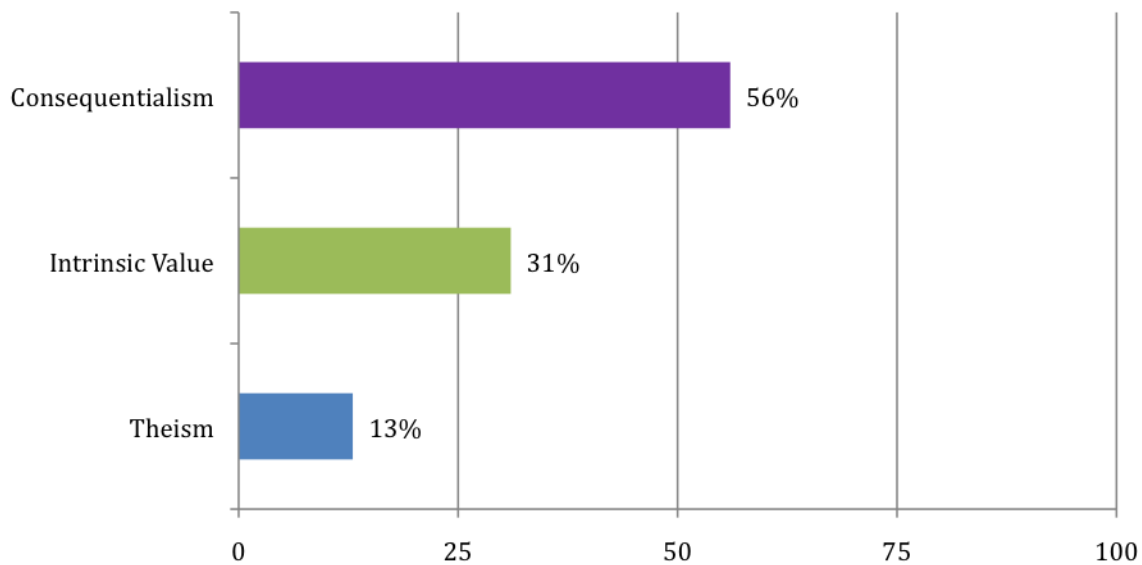
As shown in Table 6.5, Interviewee A for example, ranked as #1 a statement from the list of statements for Question #3 in Table 6.4, which corresponds with a Consequentialist ethical framework and therefore received the maximum five (5) points for this first ranked response. The subsequent statement chosen from the list in Question #3 in Table 6.4, corresponded to a Theistic perspective and was given four (4) points; ranked response three applied an Intrinsic Value framework and was given three points; ranked response four applied a Utilitarian framework and was given two points; ranked response five corresponded again with an Intrinsic Value framework and was given one point. In total for Interviewee A, the Consequentialist ethical framework dominated with five points, followed by Theism (two chosen statements from the list in Question #3 in Table 6.4, which total four points) and Intrinsic Value (four points), and finally Utilitarianism (two points). Table 6.6 provides a summary of the overall ranked results for each interviewee. Figure 6.9 shows the overall ranked results (Table 6.6), in percentages. A legend, showing the colour that corresponds with the ethical framework, is provided and may be used to assist the reader reference the individual responses from each interviewee and the associated major ethical framework, for Tables 6.5 and 6.6.

Legend	
	Utilitarianism (U)
	Consequentialism (C)
	Intrinsic Value (IV)
	Theistic Value (T)
	No Answer Given (N/A)
<i>Please note that the values contained within Tables 6.4 and 6.6 are not statistically significant, but rather this information is being interpreted in conjunction with other evidence (i.e., interview responses and document support) in order to draw conclusions.</i>	

TABLE 6.5: RANKING FOR THE CALGARY, ALBERTA CASE STUDY INTERVIEWS																
Interviewee	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Rank #1 (5 points)	C	IV	C	C	C	T	T	C	C	IV	C	C	IV	T	C	C
Rank #2 (4 points)	T	IV	T	C	T	T	IV	IV	T	IV	T	C	T	T	IV	IV
Rank #3 (3 points)	IV	T	IV	U	IV	IV	IV	N/A	IV	T	IV	U	IV	IV	IV	IV
Rank #4 (2 points)	U	C	C	IV	C	C	C	N/A	U	C	C	IV	C	C	C	T
Rank #5 (1 point)	IV	C	IV	C	N/A	C	U	N/A	IV	C	IV	C	N/A	C	U	C

TABLE 6.6: OVERALL RANKING FOR THE CALGARY, ALBERTA CASE STUDY INTERVIEWS																
Ethical Framework/ Interviewee	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
Utilitarianism	2 points	0 points	0 points	3 points	0 points	0 points	1 point	0 points	2 points	0 points	0 points	3 points	0 points	0 points	1 point	0 points
Consequentialism	5 points	3 points	7 points	10 points	7 points	3 points	2 points	5 points	5 points	3 points	7 points	10 points	2 points	3 points	7 points	6 points
Intrinsic Value	4 points	9 points	4 points	2 points	3 points	3 points	7 points	4 points	4 points	9 points	4 points	2 points	8 points	3 points	7 points	7 points
Theism	4 points	3 points	4 points	0 points	4 points	9 points	5 points	0 points	4 points	3 points	4 points	0 points	4 points	9 points	2 points	2 points

Figure 6.9: Overall Rank Results in % for Alberta Interviewees



One issue that emerges from examining the colour variation in Table 6.5 is the noticeable variation across answers. In five circumstances (A and I, B and J, C and K, D and L, and E and M), there were matches in ranking; however, this result does not necessarily mean that the matching interviewees chose identical statements. The other six interviewees were unique in their ranking. While it is unclear what this variation is directly attributed to, some possible considerations are differences in education background, upbringing, professional allegiances, age, and/or gender. Also, the variation could arise from different interpretations of the questions and concepts and/or from differences in underlying ethical positions.

As a group, 56% (9 of 16) of the interviewees indicate the intent to apply a Consequentialist ethical framework when making decisions. The two main points of this ethical framework are as follows:

- We are all responsible for all our actions, past, present and future; and,
- We must integrate consideration of economic, environmental, and social elements to enhance prospects for lasting wellbeing.

The results may indicate that policy makers in Calgary apply the Consequentialist ethical framework when crafting, writing and implementing water resource management policy and/or legislation.

A main point of this ethical framework relates to Brundtland's definition (1987) for sustainable development (e.g., "development that meets the needs of the present without compromising the ability of future generations to meet their own needs"). Assuming, based on the answers of the case study participants, that policy makers in Calgary apply the Consequentialist ethical framework, a component of the Consequentialist ethical framework evident in this case study is contained within the overarching goal of sustainability that is clearly stated in the WEP, as well as in the visioning work conducted through *ImagineCalgary*, and in the MDP. The 2005 WEP's overall goal relates to "protecting the safety and

ensuring the long-term sustainability of its water supply. It aims to meet the needs of a growing population while balancing and considering economic, social and environmental impacts of its decisions, programs and actions.” The 2005 and 2010 WEPs also seem to reference a Consequentialist perspective by wanting to “foster a ‘culture of sustainability’ among Calgarians” with respect to municipal water resources.

The *imagine*Calgary’s plan uses the term “sustainable” or “sustainability” throughout the document relating to everything from its sub-title (“Plan for Long Range Urban Sustainability”), to economic well-being, housing, equity in governance, and most applicable to this research, water resources. For example, one of the long-term goals of this plan is to, “ensure current systems, policies and regulations are consistent with sustainable water use policies” (City of Calgary 2006, 77), but there is no indication, of where these sustainable water use policies are located. The *imagine*Calgary Plan, does, however, provide a definition of what is meant by ‘sustainability’ by stating (2006, 184), “[I]f we form communities to satisfy our common needs, then both the community itself and the role it plays meeting our needs has to be sustainable — healthy, resilient, long-lasting. This is what we mean when we refer to ‘sustainable’ communities: communities that satisfy people’s needs now and in the future (Hallsmith, 2005). Sustainable community development is the process of working to meet and achieve balance between our economic, social, governance and environmental needs, an equitable distribution of both resources and opportunities and a balance between the needs of current generations and those of the future.”

The MDP’s directive from City Council was to, “build a more sustainable city” (City of Calgary 2009, 1-2) and applied the 2007 Council adopted “Sustainability Principles for Land Use and Mobility” (City of Calgary 2009, 1-6) when crafting the MDP’s policies. These principles were presented in section 6.5.1.3 of this dissertation. The MDP refers to the terms “sustainable” “sustainability” and “sustainable development” over 50 times throughout the Plan, generally when referring to balancing environmental and economic elements.

The province’s *Water for Life* Strategy may also intend to apply a Consequentialist framework through its use of language, again through the use of the terms sustainable, sustainability, and future generations. Similar to the *imagine*Calgary plan, the sub-title of *Water for Life* is “Alberta’s strategy for sustainability” and one of this document’s overriding goals links water resources with the economy by stating a desire for, “reliable, quality water supplies for a sustainable economy” (Government of Alberta 2003, 8). This link is implied throughout the document by using phrases such as “water is managed and allocated to support sustainable economic development and the strategic priorities of the province” (Government of Alberta 2003, 8) and, “[A]lbertans will be assured that water is managed effectively to support sustainable economic development” (Government of Alberta 2003, 7). Both of these examples, and several others throughout the strategy, are consistent with the intent of the definition for sustainable development and may therefore reflect a Consequentialist framework.

The *Alberta Land Stewardship Act* (2009) (ALSA) may also reflect a Consequentialist ethical framework by stating that the legislation's purpose is "to provide a means to plan for the future, recognizing the need to manage activity to meet the reasonably foreseeable needs of current and future generations of Albertans, including aboriginal peoples" and "to create legislation and policy that enable sustainable development by taking account of and responding to the cumulative effect of human endeavour and other events." It would seem, however, that since the *ALSA* (2009) does not include or reference any serious effort to define what is to be sustained through measurable targets or what such a commitment to sustainable development entails, the intent may be to apply a Consequentialist ethical framework, but this could simply be words. There are grounds for questioning whether any serious application of Consequentialist ethics has been involved, given that should growth of economic activities, incomes and population be pursued in a more or less conventional way, sustainability is not necessarily the result. However, since the initial intent is recognized through words, there is, at the very least, the potential that Consequentialist ethics is applied to water resource management decision-making.

The provincial *Water Act* (2000) does not use the terms sustainable, sustainability, or future generations in its text and is not obvious in its references to a Consequentialist framework. However, on the Alberta Environment website, this legislation is described as a way to "ensure sustainability of Alberta's water by requiring a provincial water management planning framework" and that, "with this statute, the Government of Alberta has committed to protecting existing good standing water rights and water resources for future generations" (Alberta Environment 2011). As with the previous comment relating to the *ALSA* (2009), it is unclear whether the provincial government promotes a serious application of Consequentialist ethics in its water policy making. However, given that there is the suggestion of wanting to "ensure sustainability", there is the possibility that a Consequentialist ethical framework may have some influence in the way policy is developed and possibly implemented.

Within this same group of interviewees, 31% (5 of 16) of the answers indicated adoption of an Intrinsic value ethical framework when making decisions. The main points of this ethical framework that were included in the list for Question #3 in Table 6.4 are:

- All elements of an ecosystem, animate and inanimate, have value; and,
- The environment is not just an object for human exploitation.

Evidence of the application of an Intrinsic Value is found in the Municipal Development Plan (MDP) and in the *ImagineCalgary* document, particularly when these documents refer to the importance of ecosystem health. The MDP (City of Calgary 2009, 2-41) states that "land use planning and development, urban design and transportation planning processes should...support the ecosystem first – conserving the natural green elements is the priority." A target in the *imagineCalgary* plan (2006, 75) is to "value biodiversity and ecosystem services the same as other economic commodities." This target does not strictly adhere to an Intrinsic Value framework since it is missing the concept of an ecosystem having value

simply for existing, although there is an attempt to elevate the importance of ecosystem services albeit as economic commodities. However, later in the document, there is reference to how the Melbourne Principles were incorporated into the development of the goals and targets in *imagine*Calgary. The Melbourne Principles “recognize the intrinsic value of biodiversity and natural ecosystems and their protection and restoration” and were identified as a guiding concept for the Calgary plan (City of Calgary 2006, 187).

It should be noted that the City of Calgary’s WEP (2005 and 2010) does not mention the importance of ecosystem health, although it refers to ecosystems or the environment on a limited number of occasions, generally linking the term with providing balance for the customer base and the environment. For example, the WEP states that it “aims to provide safe, reliable drinking water that meets the needs of its diverse customer base while balancing the needs of the environment” (WEP 2005, 3) and that “Calgary’s continued prosperity depends in part on a secure water supply for our homes, businesses, farms and environment” (WEP 2005, 13).

Theism seems to play a minor role in the responses with an overall ranking of third, with 13% (2 of 16) of interviewees appearing to apply this ethical framework as the predominant source of influence. This is an assumption, however, since there is no evidence prior to these interviews that measured the influence of the theistic ethical framework on decision-making in the City of Calgary, nor is there any evidence in policy or legislation of reference to the theistic ethical framework. While Utilitarianism did not figure strongly in the overall ranking, each of the six interviewees (A, D, G, I, L and O) chose the statement, “greatest good for the greatest number” from the list provided in Question #3 in Table 6.4 as one of the their ranked statements.

6.6.1 Summary of Part One – The Potential Influence of Underlying Ethical Frameworks To Decision-Making

In Alberta, the self-reported evidence suggests that every interviewee relies on more than one ethical framework and nearly half indicated that they place more emphasis on non-Consequentialist options. Nevertheless, Consequentialism appears to be an important influence for policy-makers. There is consistency in thinking between the Consequentialist ethical framework with reference to statements in the *Water Act*, the *Water for Life* Strategy, the City’s WEP, the MDP, and the *imagine*Calgary document. The interviewees also seem to adopt an underlying Intrinsic Value ethical framework to their decision-making, although this claim is difficult to correlate with provincial and municipal documents. In the municipal strategies that guide growth and development in the City of Calgary (the MDP in particular), there is language that the environment (or ecosystem) should be the priority when making land use, urban design, and transportation planning decisions, but the priority is linked with an ecosystem’s ability to enhance economic prosperity for human wellbeing. Further, there is not an evaluative framework at the provincial

or municipal level to prioritize ecosystem services, and the environment and the economy are not on equal levels. The following section of this chapter will focus on the results of the second part of the interview questionnaire.

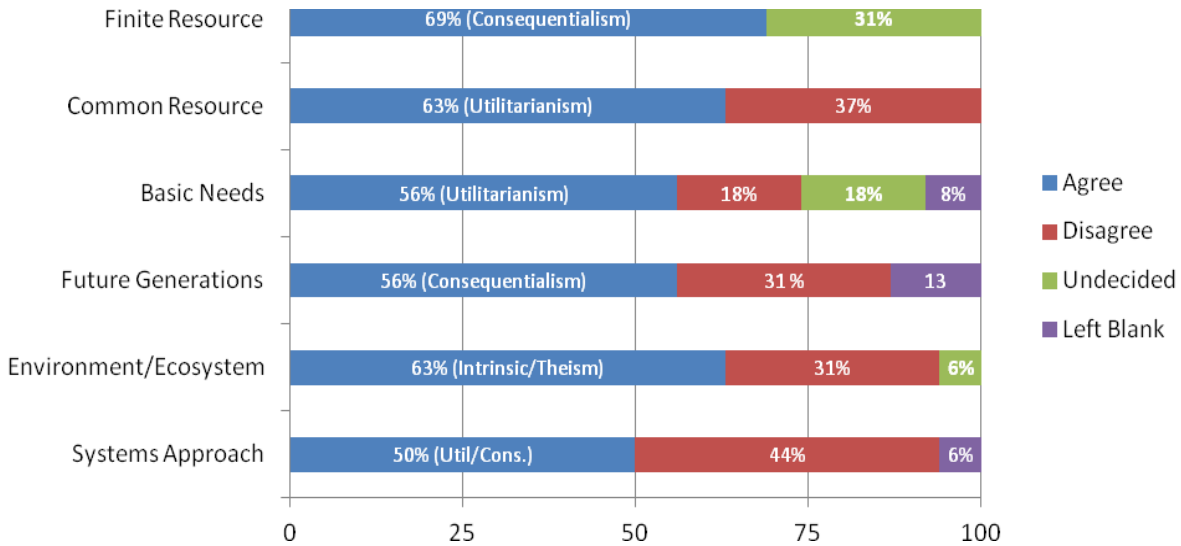
6.7 Results – Part Two – The Role of the Legislative Context

During the interviews, a second set of questions examined the role of the legislative context, in order to gain a better understanding of the interpretations of the legislation by the respondents, by asking:

- Do current legislation, policies or documents recognize the finite nature of water?
- Do current legislation, policies or documents recognize water as a common resource?
- Do current legislation, policies or documents address the idea that water should be ensured for all people to meet basic needs?
- Are future generations of humans addressed in current legislation, policies or documents?
- Is the environment, or ecosystem, addressed in current legislation, policies or documents?
- Do current legislation, policies or documents support a holistic, systems-oriented approach to water management?

Also included in these series of questions was how the interviewee thinks the current legislation, policies, documents or strategies are implemented in order to address the particular ethical concept and therefore, reflect a particular water management framework. For example, the question related to whether future generations are considered in current legislation is linked to a Consequentialist ethical framework. By reviewing the “future generations” category in Figure 6.10, the results show that 56% (9 of 16) of interviewees think that current legislation does address this concept while 31% (5 of 16) disagree and think that legislation does not address the idea that water resources are managed to plan for future generations. This set of questions was included to help determine if there is consistency between the major ethical frameworks that interviewees intend to apply in their professional lives and the legislation, policies, strategies and/or documents they helped to create to manage water resources.

Figure 6.10: Alberta – Ethical Frameworks Captured in Current Legislation/Policies/Documents in %



6.7.1 Do current legislation, policies or documents recognize the finite nature of water?

This question, always followed by asking how the interviewee thinks legislation and/or policy related to treating water as a finite resource is being implemented, highlights a Consequentialist ethical framework. As in the initial set of results regarding ethical frameworks that may be applied to decision-making (Tables 6.5 and 6.6), the majority of interviewees (69% or 11 of 16) indicate that water is regarded as a finite resource in current legislation and policy.

Interviewee A says, “no doubt it’s [water] now treated as a finite resource. Alberta has a 100 year history of believing it was not finite. Now the Bow River is over-allocated and closed to more licenses.” Interviewee G echoed this thought by stating that, “*Oh, yeah. In Alberta, we don’t have an abundance of water. We have so much drought throughout the province and because of this, we have to be forward-thinking on policies and legislation. The moratorium on Bow River licences is a good example of how we treat water as finite.*” Interviewee H simply stated that, “*the Water for Life strategy was driven by this concept.*” Evidence in the *Water for Life Strategy* that the finite nature of water provided the impetus for its creation is evident in the management principle from the strategy that states, “all Albertans must recognize there are limits to the available water supply” (GOA 2008, 7). In the City of Calgary’s WEP, the finite nature of water is considered a “driver” for the creation of the WEP, by stating that there is “a finite supply of fresh water within the Bow and Elbow watersheds. We currently withdraw about 46 % of the City’s total annual allotment but projections suggest sufficient water may not be available should the City need to access the unused portion of its allotment in

the future” (City of Calgary 2010, 3).

Some interviewees (31%) were undecided about whether or not this concept is captured in current legislation. Interviewee D thought that the finite nature of water “*is partially addressed, but not quite. We do not know enough about groundwater supplies in Alberta and so licenses continue to be given without full understanding of how much water exists.*” Interviewee F added to this view by stating that, “*with the Water Act, government enforces it, but there are always exceptions and there shouldn’t be. We need universal enforcement to work right. If there are rules in place, then follow them consistently.*” The ambiguity about whether or not the finite nature of water is captured in policy, legislation or documents is observed in the following statement from the *Water for Life Strategy* (2008, 15) that, “over the past 100 years, water has been withdrawn from Alberta’s rivers, lakes and aquifers and used for a variety of human purposes. Within each watershed, a limited amount of water can be withdrawn while still maintaining a healthy aquatic ecosystem. Fluctuating water supplies have created the need to shift how we use and allocate this renewable, but scarce, resource.” This statement suggests that on the one hand, water is considered limited, but on the other hand, it is renewable and always in sufficient supply.

6.7.2 Do current legislation, policies or documents recognize water as a common resource?

The second question in this series sought to determine if water is recognized as a common resource. Priscoli et al.’s (2004, 16) definition of a common good principle was used to describe this concept to interviewees. The principle states that, “the social conditions that allow people to reach their full potential. By almost everyone’s definition, water is a common good... [Water] is the vital facilitator to reaching full human potential and realization of human dignity.” As shown in Figure 6.10, this question relates closely to the Utilitarian ethical framework since water is seen from a purely human perspective and as a means to an end. The results show that 63% (10 of 16) of the interviewees think that water is treated as a common resource in current legislation, while 37% (6 of 16) disagree with this statement.

Several interviewees who agreed brought up the FITFIR (first in time, first in right) concept as a way of explaining why they think water is treated as a common resource. This is rather curious since FITFIR would seem to be the opposite of water as a common resource given that the system is predicated on a policy of exclusive private accesses. Interviewee B captures the confusion by stating that, “*in the Bow Watershed, it’s fairly accessible to anyone who needs it because of FITFIR. But, if you’re a new business, you’re not able to get access. Is this fair?*”

Those who disagreed offered some contrasting points. Interviewee D was particularly adamant in the opinion that, “*water is not treated as a common resource in Alberta so it’s tricky. There are tradable water rights in the province and there should be strict provisions in place for times of water shortages. These [provisions] don’t exist right now and that is extremely frustrating.*” Interviewee H spoke to the idea of risk and those who assume it when using

water, commenting that, “to some degree it [water] is treated as a common resource. But since there is not equal risk for everyone who uses the water, there isn’t equal rights.” These answers seem to reveal very different and incompatible interpretations of the concept of a common good, despite an explanation of what common good means in this context. As a result, it is challenging to report anything with confidence for this particular questions, other than to indicate confusion over the question’s interpretation.

6.7.3 Do current legislation, policies or documents address the idea that water should be ensured for all people to meet their basic needs?

Following a Utilitarian ethical perspective, this question asked whether legislation ensures that basic needs of people and the environment are being met regarding water resources. The interviewer explained that economic status, ethnicity, and/or religious background were not factors when addressing this concept. The answers to this question resulted in mixed responses, with 56% (9 of 16) agreeing that current legislation does ensure water for all, 18% (3 of 16) disagreeing, 18% (3 of 16) undecided and 6% (1 of 16) leaving the answer blank.

According to those who agree that current legislation does address meeting basic human needs, Interviewee C explained his/her perspective by saying that, “well, if you think of water, like I do, as a social good in that it’s used for basic human needs like cooking or staying alive, then yes legislation does address basic needs. The Water Act allows what we refer to as riparian owners to take a basic amount, and I’m not entirely sure what that amount is off the top of my head, without a licence.” Sections 21 and 22 of the *Water Act* (2000) do confirm Interviewee C’s comments by stating that, “a person who owns or occupies land that adjoins a river, stream, lake, natural watercourse or other natural water body (a) has the right to commence and continue the diversion of the water that adjoins that land for household purposes, whether or not that water is reserved under section 35, and (b) may not obtain a license for the diversion of water that adjoins that land for household purposes” and that, “a person who diverts water under subsection (1) or (2) may, without an approval, license or registration, pump or otherwise convey water to the point of use for household purposes.” These sections of the *Water Act* apply to both surface and groundwater.

Those interviewees who do not think that basic needs are addressed in legislation or policy did not provide any rationale for disagreement, but rather provided general comments such as, “it’s not obviously addressed. I think it’s implied, but I wouldn’t say just because we think it’s the right thing that’s really addressing the issue from a legislative point of view” (Interviewee B). In an article from the Calgary Herald (2007) and also on the Water Matters website (2007), Droitsch writes that, “we need a system that allows us to strike a balance between meeting basic human needs, protecting environmental flows, and considering the effects of global climate change and drought”, thus indicating that currently, this system is not in place. In a review of the applicable water legislation/policy in Alberta and from the City of Calgary, legislation does not recognize or give preference to a right to water, as suggested by the United Nations Committee on Economic, Social,

and Cultural Rights. Perhaps one reason for the variety of responses is, as Interviewee F states, “*the city hasn’t been stressed enough yet to be looking at providing water for only the basic needs.*” Another Interviewee (E) found it difficult to answer because, “*we are starting to have to make hard choices because of water shortages and so we’ll need to start looking at what basic needs are.*”

6.7.4 Are future human generations addressed?

The mention of future generations in this question is a deliberate reference to the definition of sustainable development by the Brundtland Commission Report in 1987. This question, drawing from a Consequentialist ethical framework, is meant to extract insight regarding whether or not future humans are considered in legislation. While sustainable development does focus on present and future generations, this question did not address current residents since it was assumed (rightly or not) that any policy, legislation or document would inherently consider this factor. Over half of the interviewees (56% or 9 of 16) agreed that consideration of the interests of future generations is included in policies and legislation. The rest either disagreed (31% or 5 of 16) or decided to leave the question unanswered (13% or 2 of 16), the latter for reasons attributed to not being familiar enough with legislation or not wanting to answer on behalf of their organization.

Regardless of the reasons, the interviewees provided some good insights into what they thought about the legislative context. Interviewee A said that regarding the consideration of future generations, “*interestingly, yes. Water for Life has this at its core, although Water for Life tries to look mid-term, not long-term.*” Interviewee G agreed with this assessment and stated that, “*if rules are enforced, then this statement might be true, but it’s not a long-term vision that I see is included in current legislation.*” Interviewee H observed that, “*I tend to think that if future generations are addressed in the Water Act or the Water for Life strategy or in the new provincial land use legislation, it’s all encompassed under the umbrella of sustainable development or trying to achieve some level of sustainability. I mean, in Calgary, we definitely address the idea of sustainability and making sure we have enough for now and the future and the importance of this issue came through loud and clear in the imagineCalgary process. I think it’s the overriding goal of the Water Efficiency Plan, whether it’s stated that clearly or not, and it’s just in everything that we do now. So yes, I think it’s addressed, for sure.*” The results from Part One of this chapter verify the comments of this interviewee, since sustainability, sustainable development and/or future generations are addressed in the *Water Act* (2000), the *Alberta Land Stewardship Act* (2009) the *Water for Life* Strategy, the Municipal Development Plan, the WEP, and the *imagineCalgary* Plan.

6.7.5 Is the environment, or ecosystem, addressed in current legislation, policies or documents?

The fifth question in this series explored the possibility that the environment is considered in current legislation. This question falls into the Intrinsic Value and Theistic major ethical frameworks since it gives

value to animate and/or inanimate beings as well as providing the idea that nature and humans are intimately linked (humans cannot survive without the environment and the resources).

The results show that 63% (10 of 16) of the interviewees thought legislation does address the environment and 31% (6 of 16) think that it does not. However, given the explanations provided by those who agree, there is some uncertainty regarding how interviewees believe the environment is addressed. For example, Interviewee P remarked that, “*legislation recognizes the value and benefits of the environment, but that’s about it. I wouldn’t consider having a statement saying something like ‘we value the environment’, only in more legislative or policy language, as being anything more than acknowledging. There’s definitely no prioritization of the environment over anything else.*” Another Interviewee, C, had a similar thought, saying that, “*it’s considered, but weighting isn’t where I’d like it to be. We have to work harder on that end.*” These explanations suggest that while the majority of respondents agreed that the environment is considered, it is done so primarily through words and not through any kind of substantial action.

The mini case study in Box 6.1 provides an example of how the value of the environment/ecosystem is being sidelined in the City of Calgary and reinforces some of the previous comments by the interviewees. In addition, results from Part One identified specific cases where legislation addresses the importance of the environment/ecosystem in the context of managing water resources.

Box 6.1: Amending Water Licenses and Circumventing the Intent of Applicable Water Legislation and Policy

Applications to amend water licences as a means of obtaining water rights to allow for development that would not otherwise proceed is a new trend in the province of Alberta. These applications are being made to, and being approved by, the provincial government. This is being seen by some organizations, such as Water Matters, as contrary to the sustainability and environmental protection vision, goals and objectives of the Water Act (2000) and the Water for Life Strategy (and associated 2009 Action Plan).

An example of such an application was before the City of Calgary in 2011. The City has applied to amend its water licence to enable the City to provide treated wastewater to a new powerplant being built by a company called Enmax. “In the City of Calgary’s Alberta Utilities Commission hearing, Enmax characterized this arrangement as ‘the most environmentally responsible’ alternative because it requires ‘no increase in potable water withdrawal from the Bow River’” (Donahue 2011, 2). However, some organizations, such as Water Matters and the Bow Riverkeepers, think this transfer of water will result in decreased return flow to the river.

Ecologically, this proposal is no different from a new diversion of water from the Bow River and could result in less water being returned to the North Saskatchewan and Bow Rivers. However, because amending a water licence does not require public environmental hearings to investigate potential environmental impacts, Enmax and the City of Calgary are circumventing the overall intent of the provincial water legislation.

Interviewee F, who disagreed with the statement that the environment or ecosystem is addressed, said that the legislation “*doesn’t allow for tough decisions to be made. This is where there is the least amount of attention in current*

legislation, but the area where it is needed the most.” This is one perspective, but it does not take into consideration the idea that legislation is only an enabling tool. In meeting minutes from the AWC (2011, 7), a Government of Alberta representative addressed this issue, when discussing the separation of water and land in the *Water Act* (2000) by saying that, “the *Water Act* contains a lot of enabling legislation, which may or may not be turned on. If we want to use the tools, we still need to develop the thinking, even if the enablers are in the *Act*. We could develop a new process that is not enabled by the *Act* and that would have to be addressed. Legislation is simply an enabler once the strategic direction is set.” The issue of enabling the implementation and use of the proposed water ethic will be addressed in the penultimate chapter of this research.

6.7.6 Do current legislation, policies, or documents support a holistic, systems-oriented approach to water management?

The final question asked whether legislation supports a systems-approach to water management. This concept stems from the Utilitarian/Consequentialist major ethical frameworks, and reflects a relatively rigid, human perspective towards water resources where they are protected purely for human use. Of all the questions, the results to this one provided the starkest contrast – 50% (8 of 16) agreed that legislation does support a systems-oriented approach while 44% (7 of 16) disagreed (6% chose not to answer).

Typically, the interviewees who agreed that a systems-oriented approach is being taken tempered their responses with statements like, “*there is the recognition in legislation, yes. But, we need to do more*” (Interviewee J) or, “*we are heading there with the public saying you can go further, can go faster to get there*” (Interviewee K). It would seem, then, that the contrast in results is not the full story and that there is some ambivalence regarding the effectiveness of the systems-oriented approach and/or the extent of its implementation.

Among those who disagreed that legislation considers a systems-oriented approach, the common view was that it was primarily a lack of information that prevented this type of consideration. Interviewee A said that, “*there isn't enough knowledge yet to be systems-oriented.*” Interviewee L, when asked about whether or not a systems-oriented approach is being taken, said, “[N]ot yet. *There will be cumulative effects legislation tabled sometime so we're getting closer.*” The Alberta Water Council meeting notes support Interviewee L's comments by stating that “*Alberta Environment is looking at these issues [managing water within limits of the ecosystem] as part of its water allocation management system review and cumulative effects management system approach*” (AWC 2011, 4).

However, some evidence in the *imagine*Calgary Plan and the provincial Land Use Framework (LUF) (2008) contradicts the opinions of these latter interviewees in that these documents suggest that they employ a systems-oriented approach. The methodology section of the *imagine*Calgary plan states that, “an understanding of systems and the ability to think systemically were recognized as key components of the *imagine*Calgary project. The complexity of cities, their sustainability and the requirements of participants to comprehend and work with this complexity were also recognized as key success factors” (City of Calgary

2006, 188). This plan then goes on to define the systems approach as being, “fundamentally different from traditional forms of analysis. Systems thinking looks at the whole, and the parts, and the connections between the parts, studying the whole in order to understand the parts. It is the opposite to reductionism, the idea that something is simply the sum of its parts. A collection of parts that do not connect is not a system. It is a heap” (City of Calgary 2006, 188). The provincial LUF specifically mentions taking a systems approach to developing the framework and for integrating new and updated information into the land use decision-making process. The definition of systems approach in the LUF states, “[A]n approach to integration that recognizes the interdependence and interaction of parts of a system. It views systems in a holistic manner” (Government of Alberta 2008, 53).

6.7.7 Summary – Results Part Two – Legislative Context

Based on the results from responses to the six questions, the evidence suggests that the interviewees perceive the influence of multiple ethical frameworks in current legislation. This finding is consistent with the finding from Section 6.6.1 where several ethical frameworks seem to influence decision-making for all interviewees. Many factors influence how people think and the way they act that it is not surprising that the majority of interviewees thought that components reflecting principles from all four major ethical frameworks are evident in current legislation, policy and implementation. While these results prevent drawing definite conclusions, the ideas presented are valuable for the next section on shaping an implementation framework for the principles of the proposed water ethic.

6.8 Results – Part Three – Principles of a Proposed Water Ethic

The final series of questions posed to the interviewees related to the principles identified through a literature review on water ethics. The six proposed principles, introduced and discussed in Chapter Four, were presented to each interviewee and they were then asked to rate (out of five, with five being the strongest level of agreement) the principles according to their strength of agreement or disagreement whether each principle should be included in a shared water ethic. The interviewees then had an opportunity to add to or delete any of the six principles given to them and provide an opinion on what would need to change within their governance and institutional arrangements in order to implement such an ethic. The principles were presented as follows, in no particular order of importance:

- Meet basic human needs and enhance equity today and for the future;
- Safeguard ecosystems by allocating sufficient water to maintain ecosystem integrity, including the preservation of ecosystem services;
- Encourage efficiency and conservation;
- Establish open and participative decision-making processes;
- Respect system complexity and emphasize precaution; and,

- Seek multiple sustainability benefits from water-centred initiatives, including enhancements of livelihood opportunities, health, education, and security.

The results of ratings are presented in Table 6.7. In order to determine the overall rating of each ethical principle, the rating for each was added and then divided by the total number of interviewees (16). Based on the overall average ratings and consistent with the comments provided, every principle was deemed relevant, with Principle #2 (safeguard ecosystems) rated the highest and Principle #5 (respect complexity) rated the lowest. None of the interviewees thought any of the proposed principles should be deleted, although some general comments were made about implementing a water ethic. The general comments provided about the principles included one by Interviewee B who stated that *“the green stuff always gets cut first so we need to somehow make sure this changes and this type of ethic could do that, if implemented correctly.”* This type of sentiment by a policy-maker could bode well for the acceptance of such principles into future legislation, policies and more importantly, practice. Or, it could indicate that policy-makers do not have as much power as I assumed prior to the interviews. Interviewee N provided further support for the six ethical principles by stating that, *“as a society, we need to think of the value of water and build-in this type of conservation ethic within us. Education is the key.”* Education may not be the only tool to help implement a water ethic and as Interviewee L noted, *“we need to recognize that we must develop the science and data to better understand everything and until we have that, develop interim limits rather than knee-jerk reactions when bad things happen.”*

Specific comments about the principles provided insights into how participants interpret the water ethic. When referring to the principle on meeting basic human needs and equity (Principle #1), Interviewee D firmly believed that *“we need to look at water quality when looking at enhancing equity otherwise it doesn’t make sense to have this principle.”* This observation about water quality could be added to this principle in the form of wording related to water security, since the goal of this principle is to have sufficient water quality and quantity. While the principles relating to safeguarding ecosystems (Principle #2), encouraging efficiency (Principle #3), and seeking multiple sustainability benefits (Principle #6) scored the highest overall ratings, interviewees did not elaborate on their importance except to say that *“there is so much room for improvement in terms of efficiency and conservation”* (Interviewee M). I am not sure what conclusion to draw from this lack of elaboration.

The principle about open and participative decision-making (Principle #4) generated an expected response from policy makers who rely on feedback from the public – that this principle is necessary, but that there are limits to how effective it can be, particularly if the participants are not well informed about the topic. Interviewee P said that, *“it is extremely difficult to educate people to the same level so that they can all participate effectively. I’m not saying it’s unimportant, because I think open and participative processes are very important, it’s just hard.”*

**TABLE 6.7: PROPOSED WATER ETHIC PRINCIPLES
RATED ACCORDING TO STRENGTH OF AGREEMENT**

Proposed Principle	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Average	Rating
Principle 1: Meet basic human needs	3	5	5	4	4	4	5	4	4	5	5	5	3	3	4	5	4.25	4
Principle 2: Safeguard ecosystems	5	5	5	4	5	4	5	5	5	4	4	5	5	5	5	5	4.75	1
Principle 3: Encourage efficiency	5	5	5	5	4	4	5	4	5	5	5	5	4	5	4	4	4.625	2
Principle 4: Participative decision-making	4	5	4	5	5	3	5	3	3	4	5	4	3	4	5	5	4.1875	5
Principle 5: Respect complexity	4	5	3	3	4	4	5	2	4	4	5	4	3	5	4	5	4.0	6
Principle 6: Seek multiple benefits	4	5	4	3	5	3	5	5	5	5	4	5	4	4	4	4	4.3125	3

Please note that the values contained within Table 6.7 are not statistically significant, but rather this information is being interpreted in conjunction with other evidence (i.e., interview responses and document support) in order to draw conclusions.

5=Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

Finally, regarding Principle #5 (system complexity and emphasizing precaution), there were some comments about the limitations of emphasizing a precautionary approach to water resources. Such views are curious because much of the information collected from the previous two sets of questions lead me to think that these policy makers are generally cautious and conservative. Interviewee G stated that *“emphasizing precaution is not always a good thing because then you can never get to take chances on trying new, innovative things. It’s a catch-22, huh?”* Interviewee C suggested that to enhance this principle, *“add ‘actively seek to understand’ to Principle #5 so that it takes it [the intent of the principle] that much further. It’s good to emphasize, but better to understand.”* This thought is perhaps the fundamental goal of this particular research – to understand how people think and to use this understanding when crafting future ethically enhanced policy.

6.8.1 Summary Results – Part Three – Principles of a Proposed Water Ethic

Presenting a set of proposed principles for a water ethic, based on a summary of international declarations, various statutes and relevant water-based documents, to be rated by “on the ground” policy makers is new, since such research has not yet been conducted before (to the best of this researcher’s knowledge). Therefore, this research provides baseline information about what ideas and concepts should or should not be included in future policy in Alberta. The results from this case study suggest that the majority of participants in the Calgary case study agreed with the inclusion of all suggested principles, with some slight modifications. This finding lends credence to the possibility that a proposed water ethic could be implemented at the municipal level of government in Alberta. The participants did provide their thoughts on how this might be possible and these views will be presented in the final chapter of this research.

The next chapter will follow a similar structure as this case study chapter, but will focus on the City of Guelph, Ontario. The chapter will open with an overview of the city and will then move into the results of the interviews. After the results of the Guelph study are presented, the subsequent chapters will consider the significance of the findings from both case studies relative to what was learned from the literature review and the findings’ implications for possible changes to water management at the municipal level.

Chapter Seven: Guelph Case Study

7.1 Introduction

The first section of this chapter will provide a summary of the state of water resources in the province of Ontario, including an overview and analysis of relevant federal, provincial and municipal legislation. Unlike the Calgary case study, the Province of Ontario (Ontario) does not have an overall water resources management strategy (i.e., comparable to the *Water for Life Strategy* in Alberta), but rather an assortment of acts and agreements that facilitate water resource management in Ontario. These acts and agreements will be introduced in the first part of this chapter and their significance for water management will be assessed, partially fulfilling objective three of this research. The second section of the chapter will focus on the City of Guelph as the second case study. As with the first case study, the intent is to provide a summary of the issues, concerns and comments from interviews with provincial and municipal decision-makers to explore, through a series of standard questions, their underlying ethical perspective on the use of water resources and how this might influence their acceptance and implementation of a proposed water ethic. Newspaper articles, minutes from municipal council meetings and working groups, as well as mini-case study examples within the City of Guelph, will also be used to either support or challenge information provided in the interviews.

Ontario provides an interesting case study in water resources management because of the different types of approaches by municipalities to manage water resources. Supported by province-wide legislation, such as the *Water Opportunities and Water Conservation Act*, 2010 and the *Clean Water Act*, 2006, municipalities, such as the City of Guelph, are adopting water management strategies focused on conservation and the use of high efficiency technologies. Other municipalities, such as the Region of Waterloo, also take a conservation-based approach to water resources management while continuing to pursue large infrastructure projects, such as pipelines to the Great Lakes system. The City of Guelph, located in southern Ontario, has a provincial and national reputation as being a conservation-focused municipality due, in part, to various recent water management decisions (Binstock 2010). Unlike the previous case study in Calgary, Guelph is water-rich and has experienced very little in the way of significant water shortages and was thus chosen as a contextual contrast. Before moving into a summary and assessment of the relevant acts and agreements for water management in Ontario, an overview of water distribution, uses and management regimes is provided.

7.2 Ontario Water Resource Management Overview

7.2.1 Water in Ontario

Ontario is approximately 895,000 square kilometers in area and is the second largest province in Canada. According to Ontario's Ministry of the Environment (2011), Ontario borders on four of the five Great Lakes and has more than a quarter of a million lakes, rivers and streams and rich groundwater resource. There are three major watersheds within Ontario, shown on Figure 7.1: (1) the Great Lakes watershed, which drains to the Great Lakes system then into the St. Lawrence River; (2) the Hudson Bay watershed, which drains north to Hudson Bay; and, (3) the Nelson River watershed which drains west to Manitoba. Each watershed is further divided into 17 secondary divisions and then subdivided again into 144 tertiary divisions. These divisions consist of large river systems or small coastal streams.

Figure 7.1: Primary Watersheds in the Province of Ontario



Source: MNR 2008

Ontario struggles with the perception that the province contains an infinite supply of freshwater due in large part to the Great Lakes (Figure 7.2). For the most part, however, the Great Lakes are non-renewable. They were carved out by retreating glaciers and filled by meltwater thousands of years ago. On average, only 1% of the water in the Great Lakes is renewed annually by precipitation and inflow from rivers and groundwater. This seeming water abundance belies the fact that only a small portion - the renewable portion - is available for use each year (Sierra Club 2011). Sprague (2007, 31) states that this “misconception surrounding water supply has deep implications for government decisions, as a number of political representatives have made statements indicating that they buy into the notion of mythical abundance. A misplaced belief that Canada has an excess of water will likely lead to decisions that will be detrimental to the country throughout future decades.”

Figure 7.2: Map of the Province of Ontario including the Great Lakes (red star indicates Guelph, Ontario's location)



Source: Government of Ontario, 2012

7.2.2 Water Uses in Ontario

As with the Alberta case study, Ontario's lakes and rivers are characterized by multiple human uses. Over 95% of Ontario's population lives and takes its water from the Great Lakes Basin (Figure 7.3) (MNR 2008), while the remaining 5% draws water from groundwater sources. According to the Ministry of Natural Resources (MNR) (2008) and the Great Lakes Commission (2010), 94% of Ontario's water withdrawals from the Great Lakes Basin are used for the generation of hydroelectricity, 5% is used in the cooling processes for nuclear power plants, and 1% is used for municipal, irrigation, agricultural, fossil fuel and domestic purposes.

Figure 7.3: The Great Lakes Basin
(red star indicates Guelph, Ontario's location)



Source: U.S. Army Corps of Engineers 2007

7.2.3 Water Regimes in Ontario

Unlike the Calgary case study, Ontario does not subscribe to the “first in time, first in right” approach to water allocation. Rather, Ontario’s water management system is based on English common law principles under which only those whose land adjoins a watercourse may use water for domestic and livestock purposes and have a restricted right to use water for irrigation and industry. These restrictions include not noticeably altering the quality or quantity of a watercourse’s natural flow, not infringing on the rights of other riparian landowners, no transferring of water to non-riparian users, and conforming to statute laws (e.g., the *Ontario Water Resources Act* with respect to the Permit to Take Water program) (MNR 2008). The common law approach to water management also means that water is not typically subject to ownership and is therefore seen as a common good (MNR 2007).

The Permit to Take Water program (PTTW) governs water takings in Ontario and is administered through the Ministry of the Environment (MOE) as part of the *Ontario Water Resources Act* (see Table 7.2). A permit is required for anyone taking more than 50,000 litres of water a day from a lake, stream, river or groundwater source. A permit is not required for emergency fire fighting, watering of livestock, or water taking that are 50,000 litres or fewer per day (Government of Ontario 2012).

The PTTW program adheres to several principles, including protecting the natural functions of the ecosystem, preventing unacceptable interference with other water users, and fair sharing and conservation of the resource (MOE 2010). These principles are used in the evaluation of an application for a PTTW, as are criteria such as the type, size and location of the proposed water taking, and the condition and demand on the water source. Different levels of review exist based on the classification of risk (there are three levels of risk) for causing adverse environmental impacts or interference (MOE 2005).

In addition, through the *Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement* (2005) together with the Water Taking and Transfer Regulation (Ontario Regulation 387/04), “permits for new or increased takings that remove water from the watershed, where that watershed already has a high level of use, will be refused. Water transfers out of the three water basins of Ontario...are prohibited” (see Figure 7.3) (MOE 2005, 1). The maximum duration for a permit is ten years, at which time the permit holder is required to apply for a permit renewal, but the MOE can determine the duration of each permit according to the characteristics of the application.

7.2.3.1 Federal Government

As outlined in Chapter Five, the *Constitution Act, (1982)* identified the roles and responsibilities for water resource management at the provincial level of government. The Federal government retains authority over fisheries, navigation, shared boundary waters, water on federal land, First Nations’ reserves, the territory of Nunavut and Northwest Territories, as well as national policies on the environment and health-related initiatives. The federal statutes that influence provincial and municipal water resource decision-making are summarized in Table 7.1.

**TABLE 7.1: FEDERAL LEGISLATION RELEVANT
TO ONTARIO WATER MANAGEMENT**

Legislation	Description	Significance
Canada Water Act, 1985	Provides for federal-provincial agreements on water inventories, data collection, management and implementation of water resource plans	Has resulted in increased monitoring of river flows and data gathering on water uses, but produced no substantive changes to water allocations or water usage at the municipal level.
Fisheries Act, 1985	Includes protection of fish habitat, prohibition of obstruction of fish passage, and rules against water pollution	Has been instrumental in triggering environmental assessments of projects.
Navigable Waters Protection Act, 1985	Designed to protect the public right of navigation on all waterways deemed navigable by the Minister of Fisheries and Oceans; it can apply to any permanent work on any provincial waterway	Amendments to this Act in 2009 eliminate the need for environmental assessments on Canadian water ways (Lake Ontario Riverkeepers 2009) Waterways are categorized according to their level of protection; this classification system may be drafted by Cabinet without public consultation and without any scientific basis.
Canadian Environmental Assessment Act, 1992	Requires that an environmental assessment be undertaken before a federal authority carries out a project, before it provides financial assistance for a project, and before it transfers administration or control, sells, or leases federal land to allow a project.	The environmental assessment process has provided environmentalists, Aboriginals, and other groups key input into many water projects, even though the federal government has not always followed the assessments' recommendations. It was recently announced that the controversial 'Ring of Fire' mining project in Northern Ontario would undergo a comprehensive EA process to investigate issues related to water (Mining Watch 2011).
Canadian Environmental Protection Act, 1999	Aimed at protecting the environment and human health by managing toxic substances, marine pollution, disposal at sea and other sources of pollution.	Allows the federal government to take action in matter of international water pollution should the affected province not be addressing the issue. In the case of environmental emergencies, the Act governs if no other federal or provincial regulations exist.

7.2.3.2 Ontario's Water Legislation

The various departments and agencies within the government of Ontario play key roles in the creation and implementation of water resource legislation and policy. As previously discussed in Chapter Five, the province has legislative powers over water supply, pollution control, authorization of water use development, water levels and flow regulation, natural hazards (floods, droughts), and thermal and waterpower development (MNR 2011). Two ministries, however, play more significant roles in the management of Ontario water resources: the MOE and the MNR. The MOE is primarily responsible for protecting drinking and freshwater resources, while the MNR is responsible for maintaining a healthy and sustainable environment (MNR 2011).

The MOE, primarily through the Water Policy Branch, is responsible for administering and enforcing the *Ontario Water Resources Act* (1990), the *Municipal Water and Sewage Transfer Act* (1997), the *Nutrient Management Act* (2002), the *Safe Drinking Water Act* (2002), the *Clean Water Act* (2006), the *Sustainable Water and Sewage Systems Act* (2007) and the *Water Opportunities and Water Conservation Act* (2010). The MNR, through the Lands and Waters Branch, administers the *Conservation Authorities Act* (1990), the *Lakes and Rivers Improvement Act* (1990), and the *Public Lands Act* (1990) and is also a key partner in the delivery of the *Ontario Water Resources Act* (1990), the *Planning Act* (1990), and the *Safeguarding and Sustaining Ontario's Water Act* (2002). Table 7.2 summarizes the most important provincial legislation relevant to Ontario's water management and indicates the significance of these acts for municipalities.

Water resources are affected by land use decisions, particularly as population pressures are increasing within Ontario. Urban growth can influence water resources in various ways. First, increased population means that more water is needed to support communities. Second, increased urbanization can reduce the area of permeable surfaces, thereby reducing water recharge into the basin (ECO 2009). Third, growing populations and expanding urban areas generate pollution loading in surface and groundwater systems. The Environmental Commissioner of Ontario (ECO) discusses the relationship between land use planning and water resources protection, and concludes that natural features of the landscape – such as large moraines with significant hydrologic functions – should be used as the starting point to guide municipal land use planning decisions (ECO 2009).

TABLE 7.2: PROVINCIAL LEGISLATION RELEVANT TO ONTARIO WATER MANAGEMENT AT THE LOCAL LEVEL

Legislation	Description	Significance
Conservation Authorities Act, 1946	Last amended in 1990, the legislation provided the means by which the province and the municipalities of Ontario could join together to form a Conservation Authority within a specified area - the watershed - to undertake programs for natural resource management. Three fundamental concepts of this new approach were embodied in the Act, including cost sharing, watershed jurisdiction and local initiative.	<ul style="list-style-type: none"> - Provide science-based advice, services and programs including input and review to municipal Official Plans and planning processes to approximately 400 municipalities across Ontario; the Grand River Conservation Authority works with the City of Guelph. - Develop and implement watershed plans and/or studies
Planning Act, 1990	Establishes the ground rules for land use planning in Ontario and describes how land uses may be controlled, and who may control them.	<ul style="list-style-type: none"> - Promote sustainable economic development in a healthy natural environment within a provincial policy framework - Provide for a land use planning system led by provincial policy - Integrate matters of provincial interest into provincial and municipal planning decisions by requiring that all decisions shall be consistent with the Provincial - Policy Statement when decision-makers exercise planning authority or provide advice on planning matters - Provide for planning processes that are fair by making them open, accessible, timely and efficient - Encourage co-operation and coordination among various interests - Recognize the decision-making authority and accountability of municipal councils in planning.
Ontario Water Resources Act, 1990	Last amended in 2009, the legislation addresses technical management issues of Ontario's waters, such as permitting for discharge of pollution, water transfers, well construction, and sewage works.	<ul style="list-style-type: none"> - Requires each municipality to be responsible for ensuring that water of adequate quality is delivered to the consumer - Administers the Permit to Take Water Program - Focuses on surface water and groundwater resources - Ontario Regulation 285/99 (the Water Taking and Transfer Regulation enacted under the <i>Ontario Water Resources Act</i>) requires that consideration be given to ecosystem function and the public interest when proposed water takings are being reviewed.
Safe Drinking Water Act, 2002	Last amended in 2009, the legislation addresses technical management issue of Ontario's waters, such as permitting for discharge of pollution, water transfers, well construction, and sewage works.	<ul style="list-style-type: none"> - Sets out treatment and testing requirements for water systems and addresses matters concerning distribution of drinking water - Similar to the Clean Water Act, this legislation was enacted in response the Walkerton Inquiry. - Consolidates legislative and regulatory requirements regarding the treatment and distribution of drinking water in Ontario
Clean Water Act, 2006	Last amended in 2009, this act is designed to help communities identify risks to their drinking water and reduce these risks through the work of local, multi-stakeholder source protection committees. The act sets out a basic framework for municipalities in developing an approach to protecting their municipal water supplies	<ul style="list-style-type: none"> - Designed to promote voluntary initiatives, but does require specified mandatory actions - Requires municipalities to identify existing and potential threats to their water and implement actions necessary to reduce or eliminate significant threats - Empowers municipalities to take action to prevent threats from becoming significant (as defined through Regulation 287/07 and the MOE's Director's Technical Rules) - Requires public participation on every local source protection plan - Requires that all plans and implementation actions are based on sound science (as defined through Regulation 287/07 and the MOE's Director's Technical Rules)
Safeguarding and Sustaining Ontario's Water Act, 2007	This legislation amends the Ontario Water Resources Act (1990).	<ul style="list-style-type: none"> - Addresses Great Lakes Basin cooperative management issues, such as the prohibition on new and increased intra-and inter-basin transfers (i.e., cannot have a pipeline supplying water from Lake Erie to Guelph, Ontario unless that water is returned directly to the same source) - Creates the legal authority to implement the commitments made under the Great Lakes-St. Lawrence River Basin Sustainable Water Agreement (2005, see -below for more detail). - Allows the province of Ontario to charge consumptive water users for the costs of water management programs, with the hope of improving the PTTW program. - Applies the precautionary principle in implementing the Act.
Water Opportunities and Water Conservation Act, 2010	This act is designed to promote better water technologies and practices, create clean and green technology jobs, encourage conservation of Ontario water resources, and avoid the promotion of privatization of water utilities.	<ul style="list-style-type: none"> - Introduces a Water Technology Acceleration Project (WaterTAP), to function as an incubator-type business model for the creation of new water and wastewater efficient technologies. - Requires municipalities to prepare water sustainability plans, including asset management and financial planning information, water conservation plans, risk assessment, and customer service strategies. It is not clear how these water sustainability plans will be coordinated with the <i>Clean Water Act</i> source water protection plans, nor how the cost of implementing the plans will be coordinated with the costs to meet the new federal <i>Fisheries Act</i> wastewater system regulations - Allows the MOE to set water indicators and "aspirational" targets for municipalities with an obligation on municipalities to measure and report on their performance. - Amends the <i>Building Code Act</i> (1992) to require a 5-year review by the Ministry of Municipal Affairs and Housing to ensure consideration of water conservation. Also ensures an enhanced mandate for the Building Code Energy Advisory Council to include water conservation as a consideration. - Transfers regulation-making authority for water efficiency standards from the Green Energy Act (2009) to the Ontario Water Resources Act (1990). - Amends the <i>Green Energy Act</i> (2009) to expand its guiding principles in order to consider the efficient and wise (not defined) use of water when constructing, acquiring, operating, and managing government facilities.

Land-use planning in Ontario is influenced by, the *Planning Act* (1990), the *Provincial Policy Statement* (2005), the *Places to Grow Act* (2005), and the associated *Growth Plan for the Greater Golden Horseshoe* (2006) (Growth Plan) (in which Guelph is a member municipality). The goals of the *Places to Grow Act* (2005) are to sustain a robust economy, build complete and strong communities that use land, resources and existing infrastructure efficiently, and promote a healthy environment and a culture of conservation (MPIR 2006). This Act is another tool for implementing a sustainability perspective, by trying to balance economic growth, environmental values, and social equity in the context of significant population growth and resource depletion. Specific items regulated by this Act include achieving density targets in identified Urban Growth Centres (for which Guelph is identified), implementing transit-oriented development practices, planning for mixed-used communities (also known as ‘complete communities’), and ensuring that land use practices encourage a culture of conservation (MPIR 2006). Not defined in this Act and associated Growth Plan, however, is a “culture of conservation” or how to incorporate conservation into decision-making at the municipal level.

As a final point regarding federal and provincial legislation, Aboriginals’ rights to water are not yet explicitly and legally acknowledged in any provincial or federal legislation. However, the federal government is responsible for managing their water supplies. The 1987 *Federal Water Policy* (Environment Canada, 1987) acknowledges Aboriginal interests in water, but this has not generally been reflected in provincial allocation decisions. Provincial or territorial policies and strategies also do not apply or include Aboriginal reserves or communities (Government of Ontario 2011).

7.2.3.3 Ontario’s Water Treaties, Agreements, and Agencies

Several agreements, treaties and agencies also play important roles in managing, implementing and enforcing Ontario’s legislation related to water resources, including the *Environmental Bill of Rights* (1993), the GLWQA (1972), the *Canada-Ontario 2002 Agreement Respecting the Great Lakes Basin Ecosystem and Annexes, the Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement* (2005), the *Boundary Waters Treaty* (1909), the International Joint Commission, and Ontario’s Conservation Authorities. Guelph falls within the Great Lakes Basin and its water supply is therefore influenced by these agreements, treaties and agencies, all of which are explained in the following paragraphs.

As identified in Chapters Two and Four, the value of environmental and ecosystem services is pertinent to a proposed water ethic, and the *Environmental Bill of Rights* (EBR) (1993) plays a role in trying to advance the importance of these services. The EBR requires ministries participating in any form of environmental management to develop Statements of Environmental Values (ECO 2008). The intent of these statements, such as the MOE adopting, “...an ecosystem approach to environmental protection and resource management” (MOE, 2010), is that they be put into practice when making decisions affecting the environment. However, no process or weighting within the decision-making framework for the Statement of Values has been provided. The MOE has also committed to considering the cumulative effects on the

environment and implementing the precautionary principle. Consideration of cumulative effects and the precautionary principle is supposed to apply as the ministry develops acts, regulations, and policies, but this commitment has yet to be realized in further legislation or policy.

In response to the deteriorating water quality of Lake Erie in the 1970s, Canada and the United States signed the GLWQA in 1972. This Agreement, overseen by the International Joint Commission (IJC), requires governments, industry, agriculture, and residents on both sides of the border to aid in the restoration and elimination of persistent toxins in the Great Lakes. The GLWQA also addresses concerns such as runoff, contaminated sediment, airborne pollutants, contaminated groundwater and non-native invasive species and requires the preparation of remedial action plans for areas in which there are restrictions on fish consumption, bird or animal deformities, and beach closings (ECO 2008). The *Canada-Ontario 2002 Agreement Respecting the Great Lakes Basin Ecosystem* has set out the means by which both Ontario and Canada must meet their commitments under the GLWQA. The *Canada-Ontario 2002 Agreement Respecting the Great Lakes Basin Ecosystem and Annexes* (COA) (replacing the 1994 Agreement of the same name) commits the federal and provincial governments to collaborate on understanding, restoring and protecting the “environmental quality of the Great Lakes Basin ecosystem” (ECO 2003). The COA identifies the roles and responsibilities for cleaning up the Great Lakes and applies to the waters that drain into the five Great Lakes, as well as the St. Lawrence River. As stated in the 2004-2005 Biennial Progress Report on the *Canada-Ontario 2002 Agreement Respecting the Great Lakes Basin Ecosystem*, “[t]he challenges to the Great Lakes ecosystem cover issues which are under the jurisdiction of a number of federal, provincial and municipal agencies.” The mitigation of these challenges, including rapid urbanization and aging municipal infrastructure (e.g., sewage treatment plants), can be dealt with at the municipal-level of government and therefore the *Canada-Ontario 2002 Agreement Respecting the Great Lakes Basin Ecosystem* applies to the City of Guelph.

In 2005, the governments of Ontario, Quebec and the eight U.S. states that border the Great Lakes signed the *Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement* to strengthen protection of the waters of the Great Lakes Basin. The Agreement establishes a decision-making standard for new or increased water takings that requires water to be returned to its source watershed, cause no significant individual or cumulative impacts on water quality, quantity or water-dependent natural resources, and consider “environmentally sound and economically feasible” water conservation practices through the development of basin-wide water conservation objectives (established in 2007 as Regional Water Conservation and Efficiency Objectives) (ECO 2009; MNR 2011). The *Great Lakes – St. Lawrence River Basin Sustainable Water Resources Agreement* also limits water diversions out of the Great Lakes Basin, and bans most new large-volume water diversion schemes. This is particularly relevant to this case study since Guelph, unlike other neighbouring municipalities, has chosen not to rely on the Great Lakes for future water supplies.

The IJC is a bilateral body that monitors the Boundary Waters Treaty of 1909. The Treaty “provides the principles and mechanisms to help resolve disputes and to prevent future ones, primarily those concerning water quantity and water quality along the boundary between Canada and the United States” (IJC 2011, 1). The IJC employs an ecosystem approach in its function as primarily a dispute resolution agency, and makes non-binding recommendations on issues that affect both Canada and the United States. In 1999, the governments of Canada and the United States referred Great Lakes water consumption and diversion questions to the IJC. The IJC recommended that states and provinces inform one another of major water taking proposals, and that approvals take into account practical alternatives, cumulative impacts, and water conservation. The IJC called for a Basin-wide water conservation program, and improvements in water use data collection, Great Lakes science, groundwater monitoring, and climate change mitigation (MNR 2011). These recommendations are implemented to differing degrees within each member state and province, and ultimately, at the municipal level of government. These recommendations may have implications for the City of Guelph, particularly with respect to water conservation and groundwater monitoring.

Ontario has 36 Conservation Authorities (CAs), which are “local, watershed management agencies that deliver services and programs which protect and manage water and other natural resources in partnership with governments, landowners and other organizations” (Conservation Ontario 2011, 6). CAs promote an integrated watershed management approach and are funded by various sources, including municipalities, federal grants, and by the Province (Conservation Ontario 2011). As mandated by the *Clean Water Act* (2006), municipalities are required to develop Source Protection Plans (SPPs) and put policies in place (i.e., in official plans) to reduce the risks to current and future sources of drinking water. As part of the process for developing SPPs, Assessment Reports are prepared by CAs and municipalities to delineate areas most vulnerable to contamination and overuse. Within these identified vulnerable areas, technical studies are conducted to identify possible future land use activities that are threatening or could threaten municipal water supplies. The Guelph case study falls under the jurisdiction of the Grand River Conservation Authority (GRCA) and is located within the Grand River Source Protection Area (GRCA 2011). The Source Protection Planning process for this case study area is being led by a multi-stakeholder steering committee called the Lake Erie Region Source Protection Committee, and the committee’s chair is a staff member of the GRCA. Staff hydrogeologists at the Region of Waterloo are spearheading the development of the policies for this particular Source Protection Plan (pers. comm., 2012).

7.3 Commentary on Ontario's Water Resource Management Framework

Ontario manages water resources through a web of legislation, associated regulations, agreements, treaties, and with the help of Conservation Authorities. In the absence of an overarching framework, such as Alberta's *Water for Life Strategy*, Ontario has a piecemeal approach to managing water resources. Smith (1990, 172), summarizing Mitchell's comments from a CWRA workshop, submitted that "there is no water policy in Ontario; rather, there are policies for specific aspects of water management." Based on a review of current water legislation in Ontario, this perspective is valid more than two decades later. Mitchell contended that "the problem with this approach is that 'edge' or 'boundary' problems are endemic because of the number of divergent interests concerned with water issues" (Smith 1990, 172).

An example of how legislation or regulations are created on an ad-hoc basis in Ontario is illustrated by the Walkerton tragedy in 2000. This water contamination event triggered Ontario to look more closely at the protection of drinking water resources. The government consequently adopted several new statutes, including the *Safe Drinking Water Act* (2002), the *Sustainable Water and Sewage Systems Act*, 2002, the *Nutrient Management Act* (2002), the *Drinking Water Systems Regulation* (O. Reg. 170/03), and the *Clean Water Act*, (2006). While these acts are all steps towards bridging a policy gap, unfortunately their efforts are limited to drinking water and do not fall under one consistent legal framework.

An example of divergent interests is clear regarding implementation of the source water protection directives provided in the *Clean Water Act*, 2006 while at the same time having to adhere to Ontario's Provincial Policy Statement (PPS) and the *Aggregate Resources Act*. Under the PPS, municipalities are required to allow aggregate operations to locate as close to markets as possible without consideration of need and to disallow development that would hinder or prevent aggregate operations from expanding or continuing to operate even in sensitive environmental areas. The *Clean Water Act*, 2006 requires municipalities to, among other things, protect drinking water from sources of contamination. Where these two acts and provincial policy work at cross-purposes is when the process of drilling for mineral aggregates can create pathways for contaminants to follow and foul groundwater supplies. The Region of Waterloo is currently appealing modifications made by the Province of Ontario to new Regional Official Plan (2010) policies that would prevent mineral aggregate extraction below the water table within the municipality's most sensitive environmental areas. The Province's perspective is aggregate extraction does not pose a threat to groundwater resources. The Province's perspective is that aggregate extraction is essentially a clean industry, and in some cases may actually facilitate groundwater recharge. The MNR released a study (*State of the Aggregate Resources in Ontario*) in 2010 that concluded aggregate extraction does not pose a threat

to groundwater. The Region of Waterloo's position is more supportive of the *Clean Water Act* and staff submit that aggregate extraction may have deleterious effects on groundwater resources due to the removal of overburden, changes in groundwater flows, and potential contamination from post-extraction uses (personal communication, 2011). This issue is expected to go before the Ontario Municipal Board in 2013.

The next section of this chapter will first provide an overview of the second case study area, the City of Guelph. This section will then examine the results of the interviews, using supplementary information such as City Council minutes, working group minutes, newspaper articles and mini-case studies related to several decisions related to water resources. As mentioned in Chapter One, one reason Guelph was chosen as a case study area is because it is in a water-rich area and provides a contrast to Calgary. Guelph also has a history of water resources planning and as explained further in this section, has made some progressive decisions about the future of their water resources.

7.4 The City of Guelph Overview

Guelph, a mid-sized city in southwestern Ontario, is part of an area known in the Province's Places to Grow legislation as the Greater Golden Horseshoe (Figure 7.4). In 2011, the City's population was approximately 115,000. Its annual rate of growth is approximately 2% and is one of the highest in Canada (City of Guelph 2008a, 12; Statistics Canada 2011). Guelph's drinking water is supplied by 23 groundwater wells and a shallow groundwater collector system. Guelph's wastewater is discharged into the Speed River, which has an assimilative capacity of 73.3 million litres per day. This capacity, to be reached in 2024, is one of the key determinants of Guelph's capacity to grow beyond its current population. City Council's responses to provincially mandated population growth projections (175,000 by 2029) and the resultant water supply challenges associated with such growth are pragmatic. De Loë et al. (2002) state that due to Guelph's political commitment, "continual and multidimensional" citizen involvement, linkages with outside agencies, and institutional arrangements, the City has one of the strongest capacities to protect local groundwater resources in comparison to other nearby municipalities.

Figure 7.4: The Greater Golden Horseshoe



Source: Ministry of Public Infrastructure and Renewal 2006

The Environmental Services department manages the City’s water resources, through various water policies, described below. While this is a large department in terms of human resources, staff specifically dedicated to the development and implementation of water policy is limited to fewer than six professionals, all with an engineering or science background. Consultants, typically from firms with an engineering focus, are usually hired to conduct larger-scale studies, such as the ones described below.

In the early 1990s, Guelph conducted a study of its water system and determined that water conservation programs would be necessary to allow Guelph to rely on groundwater resources over the long term. By 1999, a year after the commencement of the Guelph Water Conservation and Efficiency Study (WC&ES), the gross water demand (total billed water supplied divided by population) was approximately 508 litres per capita per day (L/capita/day). This total included residential, industrial, institutional and commercial uses. The Canadian average at the time was 638 L/capita/day (Water Governance 2011). As noted by Shrubsole and Draper (2007, 42), “to place these data [referring to Canadian municipal water use] in context, the generally accepted minimum amount of fresh water required for human survival is

approximately five litres per capita per day (lcd). To meet additional basic needs such as sanitation, food preparation, and bathing, Health Canada recommended 60-80 lcd, and Gleick (1996) suggested a minimum of 50 lcd.” In 1999, the residential single-family water demand (total billed residential single family water supply divided by single family population) in Guelph was 250 litres per day, compared to the Canadian national average of 326 litres per day. For comparison, the 22 other member countries of the Organization for Economic Co-operation and Development (OECD) had an average per capita consumption in 2000 of about 176 L/capita/day. When staff at the City of Guelph presented the WC&ES to city council, the councilors did not support implementation of the measures identified in the study due to lack of information about the cost and consequences of implementation, and the recommendations were not funded to the extent suggested by the study consultants. The WC&ES remained in a partially implemented state until the completion of the Water Supply Master Plan (WSMP) (2006).

Before summarizing the City’s plans, policies and strategies that apply to the management of municipal water resources, it is first necessary to provide an overview of the governance structure and institutional arrangements for water management in Guelph.

7.4.1 City of Guelph Governance Structure and Institutional Arrangements

Chapter Five and the first part of this chapter explained the responsibilities of the federal, provincial, and municipal levels of government related to managing water resources. To summarize, the federal government is responsible for broad legislative direction related to navigation of oceans and rivers, international and interprovincial water relations, fisheries, and water resource management for the Aboriginal people of Canada. In Ontario, the provincial government is responsible for legislation and policy that pertain to water supply, resource management, and governance. As stated earlier in this chapter, many statutes relate to water resource management in Ontario, but there is not one overarching vision. Various ministries also contribute to the arguably fragmented state of water resources management, but the MOE and the MNR are the two more prominent agencies that develop and implement legislation, such as the *Conservation Authorities Act*, 1990, the *Clean Water Act*, 2006, and the *Water Opportunities and Water Conservation Act*, 2010. Approximately 25 full-time equivalent staff members work within the Ontario government and contribute to the development of provincial legislation (pers. comm. 2010). Although the province does not have partner organizations such as the Alberta Water Council, advising and assisting government staff in the creation of legislation and policy, organizations such as Pollution Probe, the Canadian Environmental Law Association, Sierra Club Canada, the Pembina Institute and the Environmental Commissioner of Ontario offer their comments and expertise.

At the municipal level and as with the Calgary case study, staff at the City of Guelph report to 13 elected councilors (including the mayor), representing six wards. Guelph staff are also responsible for fulfilling the legislation and policy requirements of upper levels of government with respect to municipal water treatment, distribution, and conservation. Guelph’s water resources are managed by the Planning

and Building, Engineering, and Environmental department. As the name suggests, this department integrates land use planning functions with engineering functions and as such, has a large staff of over 200 people (pers. comm. 2010). However, the Environmental Services division (Water Services sub-division) is predominantly responsible for the management of Guelph's water resources, and is the lead department for drafting policies for the City of Guelph's contribution of the Lake Erie Source Protection Plan.

Approximately three full-time equivalent staff members (including a water supply project manager and a water conservation project officer) are also responsible for developing the City's Water Supply Master Plan and the Water Conservation and Efficiency Strategy. To provide drinking water to the residents of Guelph, the Environmental Services department operates and maintains 23 groundwater wells and a shallow groundwater collector system, approximately six kilometres of water supply aqueduct, five underground storage reservoirs, three water towers, approximately 532 km of buried watermains, and approximately 39,000 water meters (City of Guelph 2011, 5-6). The Planning and Building department also has a role to play in the creation and implementation of water-related policies. This department has an environmental planner who is currently responsible for helping the Environmental Services division draft policies for source water protection (City of Guelph 2011) as well as staff responsible for updating the City's Official Plan, a legally-binding document containing policies related to all land-use within the municipality. Approximately three full-time equivalent staff members are devoted to crafting these policies and consulting with internal staff and external agencies on the direction of these policies.

Other external organizations and stakeholders influence the governance and institutional arrangements in Guelph, including the province, the GRCA, Wellington Water Watchers (WWW) and the Guelph Civic League (GCL). The GRCA is very involved with the creation and/or implementation of provincial and municipal legislation, particularly with respect to the *Clean Water Act*, 2006 and associated source protection plans and the City's Water Supply Master Plan. There are approximately 100 staff at the GRCA and of those, two to three staff work closely with municipal staff to shape water policy (pers. comm., 2010). The GCL and the WWW are both volunteer-led organizations with executive councils and each dedicated to improving the quality of life in Guelph. The GCL has a broader mandate and its members advocate on behalf of issues such as greater recognition of arts and culture, heritage, economic development, and ecological preservation (GCL 2011). The WWW has a narrower mandate, focusing on advocating for the protection of local water resources as well as the application of the precautionary principle in water-related decision-making (WWW 2011). The GCL and the WWW maintain contact with staff at the City of Guelph and the GRCA and were instrumental in removing the Great Lakes pipeline option from the Guelph's WSMP. The following sections describe and analyze the municipal documents that guide the management of water resources in Guelph, including the WSMP and the WE & CS.

7.4.1.1 Water Supply Master Plan

To meet future water supply requirements to service and sustain projected community growth, the City of Guelph initiated the development of the WSMP in 2004. The WSMP was completed in 2006. Through the development of the WSMP, an enhanced WC&ES (renamed Strategy from Study), infrastructure enhancements, and education/policy/water rate-based reviews were identified as the preferred short-term options to reclaim critical supply capacity in concert with optimization and rehabilitation of supply-based infrastructure. With a finite groundwater source and uncertainty regarding the availability of further groundwater sources or impact of additional water taking from current sources, the finalized 2006 WSMP identified sustainable growth potential contingent upon the success of aggressive water conservation and efficiency programs.

As part of the 50-year horizon of the WSMP, water conservation, rather than an infrastructure-based solution such as a pipeline to Lake Erie, was identified as a preferred short-term source of water supply. According to the City of Guelph (2006), “water conservation is the most cost-effective and immediate source of new water supply and wastewater treatment capacity. It is anticipated that water savings to be gained through the new conservation strategy will allow for the possible deferral of future water supply and wastewater treatment infrastructure needs”. The WSMP (2006) recognized the following water reduction targets:

- 10% reduction (5,300m³/day) in 2006 total average day water use, by 2010
- 15% reduction (7,950m³/day) in 2006 total average day water use, by 2017
- 20% reduction (10,600m³/day) in 2006 total average day water use, by 2025

The total potential for water savings of 13,661m³/average day to 2025 is predicated on 100% participation rate in all conservation programs and extensive funding through to 2025. Further, this outcome also assumes that residential single-family water demand use will drop from 230 litres/day to 153 litres/day, between 2007 and 2025.

According to WSMP bulletins and updates provided by City Council and staff, between 2006 and 2009 the City achieved a saving of 883m³ per average day, far short of the 2010 goal of 5,300m³/day. However, the City of Guelph has stated that an achievable water savings of an additional 8,774m³/average day by 2019 is possible, through the implementation of the recommendations provided in the update to the 2009 WC&ES (see below). This result would mean that a total combined savings of 9,657m³/average day (883m³/average day + 8,774m³/average day) is anticipated by 2019 and the goals of the WSMP are realistic, according to City staff. Furthermore, a 20% drop in the residential single-family water demand occurred between 1999 and 2010, from 250 litres/capita/day to 210 litres/capita/day “due to solid demand-side management initiatives” (Aquanomics, 2010).

Upon Council's approval of the WSMP in 2006, full implementation of the 1999 WC&ES was undertaken with enhanced annual financial support granted to the City's Water Conservation and Efficiency Program in support of pursuing the above targets. According to the 2009 WSMP Strategy Update, Guelph's water efficiency program capital costs of \$20 million to cover a ten-year period (2006-2016) will be necessary to implement the WSMP (City of Guelph 2009, 8).

7.4.1.2 Water Conservation and Efficiency Strategy

In June 1998, the City of Guelph initiated a Water Conservation and Efficiency Study to develop a Water Conservation and Efficiency Strategy (WC & ES) for the City's residential, industrial, commercial and institutional sectors. The study was completed in 1999 and identified a number of recommendations, including:

- Prepare regular reports on the status of the City's water supply and wastewater treatment capacity;
- Continue allowing only lawn watering on odd or even days, depending on residential address;
- Direct City staff to require individual metering, where feasible, in all new multi-residential housing;
- Complete a water rate study to assess peak period and conservation pricing;
- Undertake a water audit of City facilities and lead by example by installing water conservation and efficiency fixtures;
- Continue to pursue opportunities to use the water bill as an educational tool;
- Continue the policy of charging full water and wastewater rates for all water used; and,
- Establish an implementation committee to oversee the development of the Water Conservation and Efficiency Plan.

With the emergence of regulatory and technology advances since the completion of the original 1999 WC&ES, City staff, with the help of local consultants, began updating the Study in 2008. The goal was to identify preferred program, policy and resource alternatives to best meet the three water reduction targets identified (above) in the WSMP (2006). Another purpose of the update was to meet newly identified targets through City's Corporate Strategic Plan (2007, 18) and the Community Energy Plan (2007, 13) that state the City will be "a leader in conservation and resource protection/enhancement" as well as "use less energy and water per capita than any comparable Canadian city."

Public consultation and community involvement was a critical component of this update and a Public Advisory Committee was established, a series of Public Information Centres were held, focus groups were formed, and a customer survey was completed. The customer survey asked 400 randomly selected residents scaled, open- and closed-ended questions regarding water use. The information covered demographics, general public knowledge, participation and satisfaction with water efficiency programs, water use behaviour indoors and outdoors, as well as willingness and desired/required incentives for implementing water saving mechanisms. The recommendations from the 2009 update include:

- Introduce rebate programs for single family/multi family residential home owners, builders of new residential homes or industrial/commercial/institutional facilities who replace 13 litre toilets with low flow toilets; install water efficient clothes washers, humidifiers and floor drain covers; install grey water reuse systems; purchase and install outdoor watering timers; convert outdoor property to water efficient landscapes and/or install a rain water harvesting system.
- Design and implement five district meter areas per year for three years in order to locate, quantify and repair leaks within the water distribution system;
- Complete municipal property water use audits;
- Complete a City Building Water Efficiency Plan that will include appropriate water reduction targets;
- Increase public education programs; and,
- Adopt a water reduction philosophy of maintaining average day water production below the 2006 value (53,000m³/day) for a five-year period (to 2014);

7.4.1.3 Wastewater Treatment Master Plan

Infrastructure deferral is also a priority in Guelph's wastewater treatment operations and is reflected in the most recent draft of the city's Wastewater Treatment Master Plan (WTMP). Guelph's overall strategy for wastewater has focused on improving operator efficiency, through both training and operational reforms. This approach has resulted in fewer bypasses where wastewater flows directly into the Speed River (GRCA 2008). Guelph's WTMP also calls for further study into urban wastewater reuse and strategies to adapt to the potential impacts of climate change (CH3M Hill 2009). As of late 2008, Guelph had deferred \$11 million in wastewater infrastructure costs with another \$20 to \$30 million expected in future savings as a result of the city's WTMP (City of Guelph, 2010).

The previous sections of this chapter provided context about the governance structure and institutional arrangements in the City of Guelph related to water management, and also briefly summarized several municipal water-related plans. The following sections provide the results of the interviews in this case study area. Similar to the Calgary case study, insights and discussion about the interviewees' perspectives and their relevance to the literature follow in Chapter Eight.

7.5 Results – Part One - Determining Underlying Ethical Frameworks Applied To Decision-Making

The following sections provide the results of the interviews conducted with policy-making staff at the provincial and municipal levels of government in Guelph, Ontario. To reiterate, the purpose of this research is exploratory and one of the primary objectives is to obtain some insights into the possible underlying ethical frameworks that may be applied to water resource management decision-making. As with the previous case study chapter, I will be commenting only on the intent of the interviewees, as the

responses to the questionnaire only afford me that latitude. Future research into implementation of the policies and plans would be a useful endeavour.

Table 7.3, Table 7.4, and Figure 7.5 refer to Question #3 in Table 6.4 and provide the rankings for how decisions are made in the interviewee's professional life. As with Chapter Six, in order to determine what ethical frameworks may influence decisions the most, the responses were given a point value, according to a ranking system (one through five, with five points corresponding to the statement ranked first and each subsequent ranked statement give one less point). The point values for each ethical framework were then summed and the ethical framework with the most points has the highest overall rank.

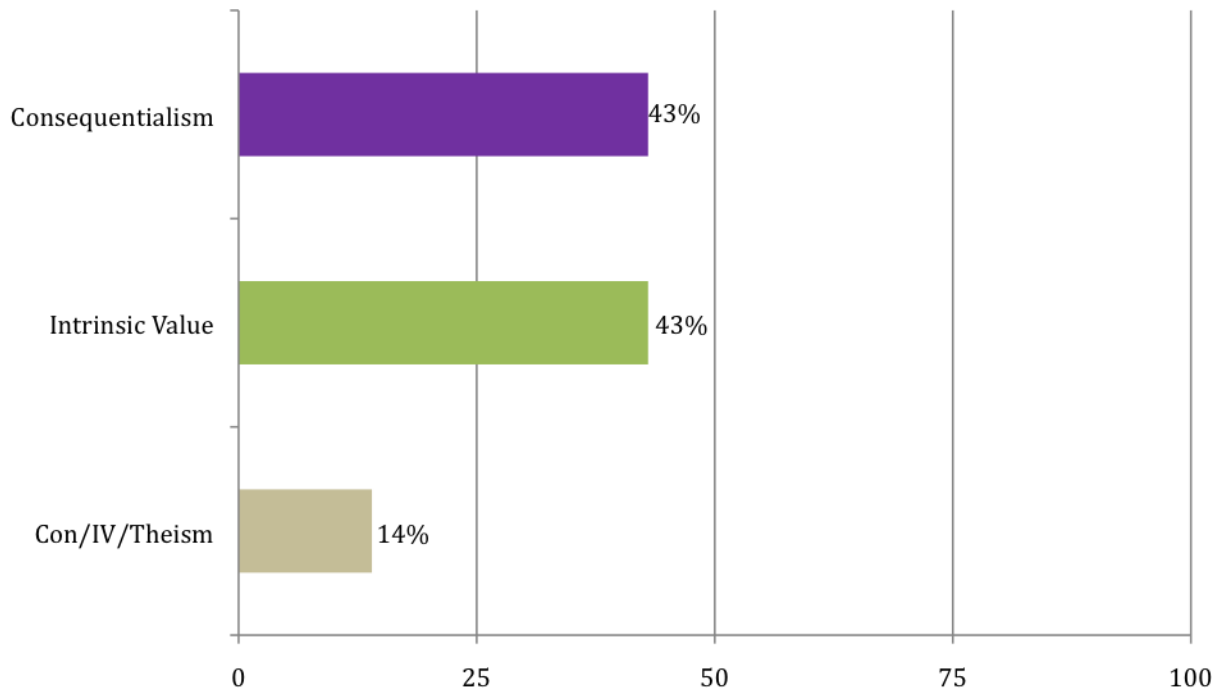
In this case study (see Table 7.3), Interviewee E, for example, ranked as #1 a statement (refer to Question #3 in Table 6.4) that corresponded with an Intrinsic Value ethical framework. This first ranked statement therefore receives the maximum five (5) points. The subsequent statement chosen from the list of statements in Table 6.4 corresponded to a Consequentialist ethical framework and was therefore given four (4) points; ranked response three applied a Utilitarian ethical framework and was given three (3) points; ranked response four a Theistic framework and given two (2) points; and ranked response five applies a Consequentialist framework and was given one (1) point. The overall rank (Table 7.4) indicates that the Intrinsic Value framework received seven (7) points, Consequentialism received six (6) points, and Utilitarianism received three (3) points.

Legend	
	Utilitarianism (U)
	Consequentialism (C)
	Intrinsic Value (IV)
	Theistic Value (T)
	Cons/Intrinsic/Theism
<i>Please note that the values contained within Tables 7.3 and 7.4 are not statistically significant, but rather this information is being interpreted in conjunction with other evidence (i.e., interview responses and document support) in order to draw conclusions.</i>	

TABLE 7.3: RANKING FOR THE GUELPH, ONTARIO CASE STUDY INTERVIEWS														
Interviewee	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Rank #1 (5 points)	C	T	IV	T	IV	C	IV	C	T	IV	T	IV	C	IV
Rank #2 (4 points)	IV	C	T	IV	C	IV	T	IV	C	T	IV	C	IV	T
Rank #3 (3 points)	T	C	C	IV	U	T	C	T	C	C	IV	U	T	C
Rank #4 (2 points)	U	U	U	C	IV	C	C	U	U	U	C	IV	C	C
Rank #5 (1 point)	C	IV	IV	C	C	IV	T	C	IV	IV	C	C	IV	T

TABLE 7.4: OVERALL RANKING FOR THE GUELPH, ONTARIO CASE STUDY INTERVIEWS														
Ethical Framework/ Interviewee	A	B	C	D	E	F	G	H	I	J	K	L	M	N
Utilitarianism	2 points	2 points	2 points	0 points	3 points	0 points	0 point	2 points	2 points	2 points	0 points	3 points	0 points	0 point
Consequentialism	6 points	7 p points	3 points	3 points	5 points	7 points	5 points	6 points	7 points	3 points	3 points	5 points	7 points	5 points
Intrinsic Value	4 points	1 points	6 points	7 points	7 points	5 points	5 points	4 points	1 points	6 points	7 points	7 points	5 points	5 points
Theism	3 points	5 points	4 points	5 points	0 points	3 points	5 points	3 points	5 points	4 points	5 points	0 points	3 points	5 points

Figure 7.5: Overall Rank Results in % for Ontario Interviews



Similar to the Calgary case study, there is a pronounced variation in responses, and therefore in colour, in Table 7.3. However, with this set of interviewees, everyone had a match (A and H, B and I, C and J, D and K, E and L, F and M, G and N), which resulted in no unique set of general responses. As with the previous case study, the reason for these variations in responses is not known; however, it is possible to speculate that education, age, gender, professional allegiances, different interpretations of the questions and concepts, differences in underlying ethical positions, and/or upbringing may be factors.

As a group, the responses from Table 7.3 indicate that all respondents' answers point to reliance on at least three ethical frameworks. This group also shows an even division between 6 of 14 interviewees (43%) whose answers suggest that they may initially apply a Consequentialist ethical framework and the same number who may initially apply an Intrinsic Value ethical framework. For the third contingent of respondents, 14% (2 of 14) fall into a mix of Consequentialism/Intrinsic Value/Theism frameworks, which suggests respondents make decisions using a simultaneous mix of all three ethical frameworks. Utilitarianism did not factor into the overall rankings (Table 7.4) as an ethical framework used in decision-making; however, as discussed later in the results section, this framework does have some influence.

Based on the literature review from Chapter Two, the two main points of a Consequentialist ethical framework include:

- We are all responsible for all our actions, past, present and future; and,
- We must integrate consideration of economic, environmental, and social elements to enhance prospects for lasting wellbeing.

The 43% (6 of 14) of respondents who seem to indicate the application of the Consequentialist ethical perspective may use this way of thinking in crafting, writing and implementing water resource management policy and/or legislation. As stated in Chapter Four, the first main point of this ethical framework references Brundtland's definition of sustainable development and being able to meet "the needs of the present without compromising the ability of future generations to meet their own needs" (WCED 1987, 43). As discussed in Chapter Two, although sustainable development and sustainability are not identical in meaning, they both represent balancing economic, environmental, social, and cultural elements, which is the crux of the second main point of the Consequentialist ethical framework. Various provincial and municipal legislation and policy all reference an intent to achieve sustainability and balance potentially competing elements, including the *Water Conservation and Water Opportunities Act, 2010*, the *Ontario Water Resources Act, 2007*, the *Places to Grow Act, 2005*, the *Places to Grow Growth Plan for the Greater Golden Horseshoe, 2006*, *Community Energy Plan (2007) Local Growth Management Strategy (2009)*, the City of Guelph's 2009 WC&ES Update, and the city's Official Plan Update (2011).

The newest provincial legislation, as summarized earlier in this chapter, is the *Water Conservation and Water Opportunities Act, 2010* (WCWO Act) which references sustainability (and therefore potentially intends to apply a Consequentialist ethical framework) within the stated purpose, which is to:

- "foster innovative water, wastewater and stormwater technologies, services and practices in the private and public sectors;
- create opportunities for economic development and clean-technology jobs in Ontario; and,
- conserve and sustain water resources for present and future generations" (2010, c. 19, Sched. 1, s. 1 (1)).

The purpose of the *Ontario Water Resources Act* (2007, c.12, s.1(1), also intends to apply a Consequentialist ethical perspective by stating that it will "provide for the conservation, protection and management of Ontario's waters and for their efficient and sustainable use, in order to promote Ontario's long-term environmental, social and economic well-being", while the *Clean Water Act* (2006, c.22, s.1) must "protect existing and future sources of drinking water." These quotes could demonstrate the province's proclivity towards a Consequentialist ethical perspective, illustrated by the consistent references to the concept of sustainable development/sustainability (defined in Chapter Two).

The *Places to Grow Growth Plan for the Greater Golden Horseshoe*, 2006, references a sustainable intent in a variety of policies, including the following:

- “Ensure sustainable water and wastewater services are available to support future growth” (MPIR 2012, 8);
- “Existing or planned infrastructure required to accommodate the proposed expansion [to settlement areas] can be provided in a financially and environmentally sustainable manner” (MPIR 2012, 20); and,
- “All municipalities will play an important role in ensuring that future growth is planned for and managed in an effective and sustainable manner...” (MPIR 2012, 40).

Further evidence of the intent to apply a Consequentialist ethical perspective at the municipal level is found in Guelph’s *Local Growth Management Strategy* (2009), for which the purpose, as stated by staff, is to “explore options and capacity for sustainable growth.” In addition to the purpose, the Strategy also recommended lobbying the provincial government to lower the population projection (as identified in the Growth Plan) for the City of Guelph to 165,000 by 2031 since this threshold ensures that “water supply options are environmentally sustainable” (City of Guelph 2009, 7). City staff acknowledged in a 2008 staff report (City of Guelph 2008b, 11) that, “[T]he City’s philosophy is to ensure that an environmentally sustainable, socially, culturally and fiscally responsible approach to development is taken.”

The City’s 2009 WC & ES also appears to intend to apply a Consequentialist framework in only one part of the Strategy. For example, the conclusion of the Strategy points to “[T]he implementation of this strategy by the City of Guelph will ensure financially and environmentally sustainable water resources for today and future generations” (City of Guelph 2009, 12). The Community Energy Plan states that, “Guelph will create a healthy, reliable and sustainable energy future by continually increasing the effectiveness of how we use and manage our energy and water resources.” By linking energy and water resources, this document broadens the myopic approach that municipal plans usually take and instead takes an integrated approach to managing these resources.

Within this same group of interviewees, 43% (6 of 14) indicate they apply an Intrinsic Value ethical framework when making decisions. The main points of this ethical framework included in the list for Question #3 in Table 7.4 are:

- All elements of an ecosystem, animate and inanimate, have value;
- The environment is not just an object for human exploitation.

Based on a modified manifest and latent content analysis of relevant legislation, regulations, policies, and strategies, evidence of a direct link between what the interviewees indicate and what the documents declare is not apparent. There are some possible hints that the Official Plan (a legally-binding document), the *Community Energy Plan* (2007), and the *Local Growth Management Strategy* (2009) may intend to apply an

Intrinsic Value ethical framework, but the evidence is rather indirect.

For example, a stated goal of City of Guelph's Official Plan (2011, 5) is to respect and encourage "the protection and enhancement of the natural environment, other distinctive features of the landscape and the associated ecological functions to support a healthy and diverse ecosystem both within and beyond the City limits." Another goal in the Official Plan (2012, 6) says that Guelph must "utilize an interdisciplinary approach to planning whereby decisions are made with an understanding of the ecological, social, cultural and economic implications for any particular course of action." These are perhaps not an obvious recognition of Intrinsic Value, but the language does suggest that the City values the ecosystem and its importance beyond jurisdictional borders. The references to ecological functions and implications could be interpreted as a possible indication of intrinsic value recognition, but the details regarding how the stated plans and strategies intend to implement this recognition are yet to be revealed. If the only concern for staff is to maintain the delivery of free ecosystem services for human needs, then no intrinsic value is involved.

The City of Guelph also demonstrated a commitment to an Intrinsic Value ethical perspective during the approval of its WSMP in 2006 with respect to what is purposefully absent from the Plan. Box 7.1 provides a mini case study into the City's decision to focus on water conservation and efficiency efforts rather than infrastructure investments with potentially significantly higher financial and environmental costs.

Box 7.1: Mini Case Study -The City of Guelph's Decision to Focus on Water Efficiency Efforts

The City of Guelph is unique among its municipal counterparts with respect to its guiding philosophy on water resources. While neighbouring municipalities such as the Region of Waterloo and the City of Brantford have a proposed water pipeline to the Great Lakes as a form of water supply in their respective Water Supply Master Plans, and are in the process of negotiating a route and future infrastructure needs to accommodate a pipeline, the City of Guelph chose to take a different route. The Great Lakes pipeline, a major infrastructure investment with an anticipated cost of approximately \$1.5 billion dollars for the Region of Waterloo alone and unknown environmental costs, is currently not considered as an option for the City of Guelph.

During the development of the City's Water Supply Master Plan (2006), the citizens of Guelph voiced their dissatisfaction with the idea of going outside municipal boundaries for future water supply and identified the pipeline as being inconsistent with the fundamental goal of community sustainability. Citizens of Guelph united in the Guelph Civic League, whose goal is to "encourage the formation of citizen-led groups, promote dialogue between citizens, organizations, and local government" (Guelph Civic League 2009). This volunteer-led group, along with other community members, focused their efforts on maintaining a strong presence in the public consultation process and on eliminating the pipeline option to Lake Erie in the Water Supply Master Plan.

The citizen-led groups were successful in their efforts and as a result, in 2007, City Council "clarified their position that they did not support a Great Lakes water supply option for a number of reasons, primarily due to environmental sustainability and energy cost considerations (City of Guelph 2008c, 9). City Council agreed with staff that the Water Supply Master Plan should focus on water conservation and efficiency

strategies rather than large infrastructure-based initiatives. By making this decision, the community, city staff, and politicians took a stand to show that the needs of the citizens of Guelph and the needs of the environment are equally important.

A member of a local volunteer organization was quoted as saying, “this is truly a case where persistent and informed public participation really made a difference. We stood up for what we believed in, including saving the environment from harm, and in some ways, we won” (pers. comm. 2010). In addition to achieving the no pipeline goal, local environmental organization members also cited communicating the limits of the city’s groundwater supplies to the average citizen as a turning point in their campaigns to vote in a more environmentally conscientious city council during the 2006 municipal election.

While ethical positions associated with Utilitarianism did not figure strongly in the overall ranking, instances exist where this particular ethical framework does influence some decision-making. In particular, the point that decisions are made in order to ensure “the greatest good for the greatest number” was highlighted the most in the interview responses.

7.5.1 Summary of Part One – Influences of Underlying Ethical Frameworks As Applied to Decision-Making

In Ontario, the responses by the interviewees suggest that there is a reliance on more than one ethical framework and an equal number of interviewees (86% of total interviewees) indicate a tendency to adopt either Consequentialist and/or Intrinsic Value options. There seems to be a consistency in intent between the responses of the interviewees and statements in the *Water Conservation and Water Opportunities Act, 2010*, the *Ontario Water Resources Act, 2007*, the *Places to Grow Act, 2005*, the *Places to Grow Growth Plan for the Greater Golden Horseshoe, 2006*, *Local Growth Management Strategy*, the City of Guelph’s 2009 WC&ES, the city’s Official Plan, and the *Community Energy Plan* with respect to the Consequentialist ethical framework. This consistency between the responses of the interviewees and provincial and/or municipal legislation and policy was not as evident for interviewees who seem to favour the Intrinsic Value framework, although a conclusive reason for why this is the case is not evident. What this outcome could suggest is that the interviewees who favour an Intrinsic Value ethic are driving the policy making and implementation process in different directions than the directions provided to them by provincial and/or municipal legislation. If this is the case, further research into such a finding could present some interesting results.

7.6 Results - Part Two – The Role of the Legislative Context in Ontario

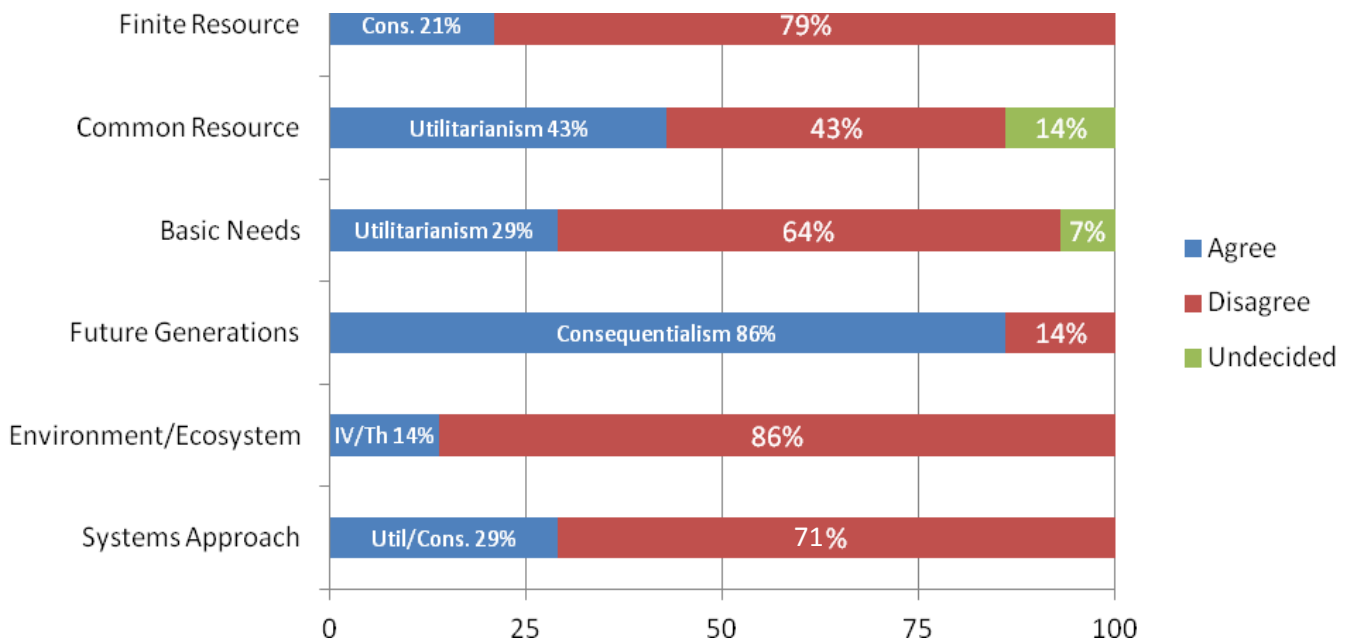
As with the Calgary case study, a second set of questions examining the role of the legislative context in Ontario was asked of the interviewees to help gain an understanding about how the interviewees interpret legislation, policies, or documents. The questions were as follows:

- Do current legislation, policies or documents recognize the finite nature of water?
- Do current legislation, policies or documents recognize water as a common resource?
- Do current legislation, policies or documents address the idea that water should be ensured for all people to meet basic needs?

- Are future generations of humans considered?
- Is the environment, or ecosystem, considered in current legislation, policies or documents?
- Do current legislation, policies or documents support a holistic, systems-oriented approach to water management?

Also included in this series were questions about how the interviewee thinks the current legislation, policies, documents or strategies are being implemented in order to reflect particular ethical concepts and water management frameworks. For example, the question related to whether future generations are considered in current legislation is linked to a Consequentialist ethical framework, due to its reference to Brundtland’s definition of sustainable development (WCED 1987, 43). Figure 7.6 summarizes the response results (in %), and the responses are colour-coded according to the major ethical framework corresponding with the question’s theme.

Figure 7.6: Ethical Frameworks Underlying Current Legislation/Policies/Documents in % for Guelph, Ontario



7.6.1 Do current legislation, policies or documents recognize the finite nature of water?

This question highlights a Consequentialist ethical framework since recognizing the finite nature of water aligns with this particular framework. According to the responses to this question, 21% (3 of 14) of the interviewees agreed that current legislation, policies or documents recognize the finite nature of water while the majority, 79% (11 of 14), do not agree. Interviewee D thought of his or her response in terms of the balance between acknowledgement of an issue and the policy’s intent by stating that, “it’s always a

question of enforcement versus encouragement when it comes to the finite nature of water – this resource should never be taken for granted and I think the legislation recognizes that if we thought of water as infinite then there would be no legislation.”

For approximately 79% (11 of 14) of interviewees who do not perceive water being treated as finite within legislation and policy, there was nevertheless acknowledgement that some movement has occurred in this direction. Interviewee I said that, *“I would have to say no, the finite nature of water is not recognized. There have been some encouraging discussions regarding water pricing and the soft path, but we haven’t got to talking about justifying the need for more water. Do we really need more, even with increases in population? It’s not always a mathematical approach of supply and demand.”* Interviewee H added that, *“in terms of relevant legislation, etcetera, much of it is fragmented and it may or may not work together to manage water as a finite resource. I guess because I just said that it may or may not, I should just say it doesn’t because if I can’t tell and I’m using this stuff [legislative documents and policies], then it’s not obvious enough.”*

Despite the majority of interviewees who do not think water is recognized as a finite resource, at least in recent law and policy, a few examples in relevant legislation, policies, or documents suggest otherwise. The City of Guelph’s Official Plan (2011, 6), for example, does recognize that water supplies are finite and that it must “recognize and sustainably manage the finite groundwater and surface water resources that are needed to support our existing and planned growth.” The WC & ES Update (2009, 12) refers to finite resources once throughout the document by stating that, “[W]ith a finite groundwater source, and uncertainty regarding the availability of further groundwater sources or impact of additional water taking from current sources, the finalized 2006 WSMP identified sustainable growth potential in the City contingent upon the success of aggressive water conservation and efficiency programs.”

Guelph is located within the Great Lakes Basin and the preamble to the *Great Lakes-St. Lawrence Basin Sustainable Water Resources Agreement* (part of the *OWRA*, 2005), states that, “the waters of the Basin are a shared public treasure and the parties to the Agreement as stewards have a shared duty to protect, conserve and manage these renewable but finite waters.” This latter statement suggests, then, a slight disconnect between what the policy and decision-makers perceive in general in Ontario water policy and practice and what is actually written into a few exceptional examples of law and policy.

There could be several reasons for the incongruity between what interviewees perceive and what is presented in text. Some interviewees may perceive implicit recognition of the finite nature of water supplies, reasoning that because legislation and water management protocols exist, water resources are therefore seen as finite. Interviewee B states that, *“If it [water] were infinite or unlimited, we wouldn’t be working within a legislative framework that tries to manage water resources through allocation and conservation. So, by default, I think we do understand that water is finite even if it isn’t so obvious in the language of the laws and policies that we use.”* Or, as Interviewee C suggests, *“one’s philosophy also plays a role in terms of how one interprets the wording of a policy.”*

Interviewee G spoke in frustration about the difference between the inclusion of appropriate language and the implementation of the intent of the law and/or policy by saying, *“in terms of implementation,*

water is not recognized as a finite resource, but it is recognized in the language. This isn't enough though – it needs to be followed through to implementation. For example, the Provincial government has committed to implementing a water conservation strategy and has linked this to the finite nature of water and they also explicitly recognize that only 1% of the water in the Great Lakes is renewable. But there exists a conflict between the MOE water policies, which are progressive, and the MPIR and the MMAH policies that do not take into account water limits. This inconsistency is what plagues even the possibility of good implementation.” This observation suggests that policies are located in one ministry and effective decision-making happens elsewhere, under authorities with different and effectively conflicting mandates.

7.6.2 Do current legislation, policies or documents recognize water as a common resource?

There was an even split between those who agreed that water is recognized as a common resource in current legislation, policies or documents and those who disagreed with this assessment. For this question, 43% (6 of 14) of interviewees agreed, 43% (6 of 14) of interviewees did not agree, and 14% (2 of 14) were undecided. As shown in Figure 7.6, this question's theme of common resources relates to the Utilitarian ethical perspective, as it points to the resource from a purely human perspective and as a means to an end. There is some indication that this perspective influences current legislation and/or the underlying ethical perceptions of those who interpret law and policy. For example, Interviewee J may not necessarily agree with the intent of the legislation, but does acknowledge that *“common law, and seeing water as a common resource, is geared towards protecting the rights of landowners and tenants rather than the resource and these are stronger than any environmental protection laws or policies. Increasingly, policies are making headway in terms of reversing the influence of these common law principles, particularly because of instances like Walkerton, but there is still a long way to go before the environment is put before the rights of landowners and property owners.”*

With respect to the interviewees who gave a positive answer to this question, the general consensus was that, *“on a national and provincial level, yes, it is treated as a common resource. Water is seen as the property of all Canadians. I mean, I think the Federal Water Policy, which goes back years, talks about water as property and so if it's considered property, then it's a common resource.”* This interviewee was alluding to the Federal Water Policy's statement that, *“the underlying philosophy of the policy is that Canadians must start viewing water both as a key to environmental health and as a scarce commodity having real value that must be managed accordingly.”*

The PTTW system was the most often cited example to illustrate how water is treated as a common resource. As explained in the first section of this chapter, the PTTW system allows for more than 50,000 litres per day of water to be extracted by those who obtain a permit; the limit is higher for commercial PTTW holders. The philosophy behind this system is that everyone should have access to water, but that it needs to be fairly distributed and the way to do this is through a permitting system. As Interviewee B

said about the system, *“the pieces are in place, but nothing’s perfect. Some parts of this system fall short. The Permit to Take Water system doesn’t really address cumulative impacts, for example. So, while you can have this system where anyone can apply to take 50,000 litres/day and water is treated as a common resource, the causes and effects of this system aren’t very well understood on the environment. I mean, you can’t expect to take that much water out of the ecosystem without some negative consequences, can you?”*

This perspective, regarding possible negative environmental consequences, is also echoed in various reports by environmental organizations, such as the Canadian Environmental Law Association. The crux of the issue is that the province lacks a method to assess cumulative impacts of water takings through the PTTW. Justice O’Connor, the Commissioner of the Walkerton Inquiry, addressed this criticism by recommending that PTTWs should be consistent with source water protection plans. Justice O’Connor recommended that watershed-based source protection should include, at a minimum, a water budget for the watershed or a plan for developing a water budget where sufficient data are not available. Justice O’Connor also recommended that the total amount of water allocated under a PTTW should not exceed the amount of water sustainably available, according to the watershed-based source protection plan. As of March 2011, cumulative impacts were not addressed in the PTTW. The ECO, in his annual report (2010, 121) and commenting on a case in Peterborough County stated, “there is no specific requirement that instruments (such as PTTWs) issued by the MOE must be consistent with the plan, watershed plans, conservation plans or water budgets. Given that the intent of the plan is to protect water resources...this is a significant oversight. MMAH and MOE should make appropriate amendments to the plan and PTTW policies to ensure that all PTTWs are consistent with the plan and local watershed plans.”

The Province’s decision regarding Nestle Waters Canada PTTW application, and the related City of Guelph’s and County of Wellington’s actions, are a good example of how contentious this issue can be within an environmentally aware community. Box 7.2, below, presents another mini case study to provide a summary of the situation.

Box 7.2: Mini Case Study #2 - Nestle Quick

Nestle Waters Canada is a water bottling company located just out of the City of Guelph in the Town of Aberfoyle. This company holds a commercial Permit to Take Water and extracts its water resources from an aquifer in the Mill Creek subwatershed, which is part of the larger Grand River watershed. Nestle accounts for 35% of the total water-taking from the Mill Creek subwatershed, with mineral aggregate washing accounting for the highest water-taking. The City of Guelph does not obtain its groundwater supplies directly from the Mill Creek subwatershed, but it does from the Grand River watershed.

At issue was Nestle’s application to the province for a 5-year permit renewal. In 2007, Nestlé Canada Inc., operating as Nestlé Waters Canada, requested the province of Ontario, through the PTTW system, to renew its permit to extract 3.6 million litres of water a day for water bottling purposes. In addition, Nestle placed a second request through the Environmental Registry to truck 1.1 million litres of water a day from Hillsburgh, Ont. to the bottling plant that would also last for the next 5 years.

A 30-day public review and comment period began mid-April 2007, spurring citizens of Guelph to mobilize under various organizations, especially the Wellington Water Watchers, against the renewal of these permits. In partnership with the Grand River Conservation Authority, the City of Guelph commissioned a local consulting company, Golder Associates, to study the geology of the region.

This consultant's report initiated concerns over the potential link between the aquifer situated in Aberfoyle and the Amabel aquifer underlying the City of Guelph, its source for municipal tap water. Many professionals in the field agreed that to correctly analyze the hydrogeology of an area is a difficult task, especially when attempting to predict future trends.

The campaign against Nestlé followed the successful 2006 mobilization of Guelph citizens against the potential construction of a pipeline from Lake Erie to Guelph. City Council considered the pipeline as a future source of water under the City of Guelph Master Water Supply Plan and this issue became a major election issue in the fall of 2006. Under a newly elected council, the pipeline was removed from the plan. A year later, Nestlé's requested permit would account for 7 % of the city of Guelph's daily average demand from 1997-2003.

Due to the anticipated population growth in the City of Guelph over the next 20 years and because Guelph has been identified in provincial legislation as an Urban Growth Centre, Guelph's future supply to satisfy increased demand has come under scrutiny. The City of Guelph's Water Supply Master Plan, 2006, recommends "that the City improve its water supply and build up some extra groundwater sources to hold in reserve, including sources outside the City but within Wellington County."

In early May 2007, City of Guelph staff and consulting hydrogeologists found no direct competition between the Aberfoyle and Guelph aquifers. As a result, the City of Guelph through City Council, despite its lack of political power over Nestlé's operations, recommended a two-year permit renewal, instead of the originally requested five-year renewal.

One of the major issues in this mini case study relates to the lack of legislation directed at the effects of bulk water removal on watershed balance. The *Great Lakes-St. Lawrence River Basin Sustainable Water Resources Agreement* (2005, Article 201(1)a states that, "all water withdrawn from the basin shall be returned, either naturally or after use, to the Source watershed." According to this clause, the use of water outside its watershed of origin is not allowed.

The Guelph chapter of the Council of Canadians, a national organization formed to, among other things, protect the bulk transfer of Canadian water resources, has taken an interest in this case. It cited the Ministry of the Environment's Environmental Bill of Right's Guiding Principle of taking an "ecosystem approach" as a reason for not renewing Nestlé's permit. An ecosystem approach would not, for example, support water being shipped out of a watershed in plastic bottles, as this disturbs the water cycle of an area.

Over 8,000 citizens responded to the Environmental Registry in relation to Nestlé's permits. As a result of the public involvement, the province decided to renew the permit for three, rather than the requested five, years.

In March 2011, after the three-year permit had lapsed, Nestle submitted another request to the Province for a 10-year renewal of its permit to take water. Local organizations are once again mobilizing to fight against this permit renewal. The City of Guelph has gone on record stating that "Guelph is not opposed to Nestlé's operation" but indicated that due to "future unknowns" related to drinking water supplies and Places to Grow legislation, has supported a motion before the Lake Erie Source Protection Committee to restrict the Nestle permit for two years, subject to the completion of a water budget. "Under Places to Grow legislation, Guelph will see its population grow significantly. Its water supply will be placed under

greater strain. Restricting water-taking operations might be necessary”. It will be interesting to see if the Province of Ontario decides to renew this permit since the Director of Corporate Affairs for Nestle Canada has stated that “except under extreme circumstances, which have already been fully enunciated by the province, commercial water-taking permits will continue to be approved and renewed, respecting environmental considerations with first-come, first-served common law foremost” (Guelph Mercury, March 9, 2011).

7.6.3 Do current legislation, policies or documents address the idea that water should be ensured for all people to meet their basic needs?

This question is associated with a Utilitarian ethical perspective and asks whether legislation ensures that basic needs of people are being met. As with the City of Calgary interviews, it was made clear to the interviewees that economic status, ethnicity, and/or religious background were not factors when addressing this concept. The results are that 29% (4 of 14) agree that current legislation, policies, or documents address basic needs, 64% (9 of 14) disagree, and 7% (1 of 14) are undecided.

According to those who agree that legislation does address meeting basic human needs, interviewee E stated that, *“yes, we do address this issue, but it’s not deliberate. I mean, I don’t think we sat there and said we should ensure that water is available to everyone. It just got in there without any discussion.”* The reference to “in there” was not specific, but there is some supporting evidence in the following quote from the *Federal Water Policy*, which states that, “the objective of the federal water policy is 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.” The reference to “equitable” could apply to meeting basic human needs. However, little else in provincial or municipal legislation obviously refers to meeting basic human needs as a priority or guiding principle.

Interviewee G was clear in his/her disagreement by stating, *“No! That’s for sure.”* when asked the survey question. He/she explained this emphatic statement by saying that, *“I’d like to think that we are a nation or province that is consistent with all the stereotypes we hear of Canada being fair and equal and kind and all that, but when it comes to water, I disagree. We just aren’t. For good reasons or bad, I just don’t think we, as a governmental community, infuse in our legislation a sense of meeting basic human needs...a sense of basic decency not just for humans but for the environment, too.”* Interviewee C also does not think that water is considered as a basic need in legislative frameworks and states that it is, *“a function of bureaucracy. It’s difficult to put in place a perfect system. It’s an evolution that we need to keep working on. Permitting [referring to the PTTW] doesn’t recognize benefits of things set up in an non-economic framework, but this is the framework that we live in. Nothing is done, no decisions are made, without looking at the economics of the situations and how much money will be lost or gained. It’s sad, it’s certainly not very progressive or ethically-minded, but it’s a fact.”*

There also is some global evidence related to the UN’s General Assembly (UN 2010) historic declaration about “the right to safe and clean drinking water and sanitation as a human right that is

essential for the full enjoyment of life and all human rights” which supports the concept that meeting basic human needs should be included in national legislative frameworks, but there is nothing requiring nations to ensure the right is respected in practice.

The responses to this question suggest that it is difficult to meet basic human needs because, *“unless there’s consistent policy put onto all users by the province, it is difficult for municipalities to make good decisions”* (Interviewee A). Another respondent (Interviewee D) added that the struggle lies with valuing water, and asked, *“what can we do to make sure water is valued properly so that we’re not getting it for free but not limiting financially-challenged groups?”*

7.6.4 Are future generations of humans considered?

The mention of “future generations” is a deliberate reference to the definition of sustainable development, as defined by the Brundtland Commission in 1987. This question, drawing predominantly from a Consequentialist ethical framework as discussed in Chapter Two, gathers insight into whether or not future humans are currently considered in legislation. This question generated the strongest agreement, with 86% (12 of 14) of respondents believing that legislation does address future generations. In contrast, 14% (2 of 14) disagreed that future generations are considered.

The majority of interviewees who agreed did so with a caveat about how reference to sustainable development and future generations in legislation and policies merely promotes the status quo. For example, Interviewee B says that, *“it’s not just about maintaining, but should be about enhancing, and sustainable development is generally only referred to in legislation with the understanding that is only about maintaining the resource for future generations. So, yes, we do consider future generations but only as it relates to humans and only as it means keeping the status quo and I just don’t think that’s where we should be. We need to go further. Push the boundaries more.”*

Interviewee E had a similar perspective about the status quo and said that, *“Places to Grow legislation reflects this statement because it includes population projections and relates it to servicing needs. But, this legislation also assumes status quo, particularly with the type of infrastructure we’ll need and use in the future so this is probably a case of where the legislation is trying to do one thing, but everything that falls out of it does another. It’s a classic case of one hand doing one thing while the other hand is doing the exact opposite.”* Interviewee D said that *“the Ministry of the Environment has a statement of environmental value and there is talk about this concept of sustainable development and future generations – I think it’s even specifically referenced in some preambles to legislation and policy – but it is not clear in the implementation of the Acts how this value should be reflected and I’m not sure if it even is in the policies that we currently use.”* The Statement of Environmental Value that Interviewee D is referring to is from the Ministry of the Environment. The value states that, *“the Ministry considers the effects of its decisions on current and future generations, consistent with sustainable development principles”* (Environmental Registry 2011).

One respondent explained that, *“in Guelph, with the creation of the Official Plan and the Local Growth Management Strategy, there was an emphasis on examining what was sustainable for the community and for the environment. Since we get so much of our water from groundwater resources and use the Speed River for wastewater services, we needed to*

know the assimilative capacity of the River and then work from the limitations of what that tells us and not the other way around. By that, I mean, we wanted to see what our community and environment could handle without basing this on the population projections mandated by the Province. In the end, we had to be consistent with the legislation, but we at least tried to negotiate with the Province in terms of lowering the numbers to respect what our system can handle. We're trying to be more progressive with how we consider the needs of the environment, but sometimes, we are so constrained by provincial legislation."

Guelph's Official Plan's principle of environmental sustainability recognizes, "that the quality of life is directly related to the integrity of natural systems (air, water, soil, wildlife, plants) and that there is a responsibility on the part of the community to maintain and improve the integrity of natural systems so as to not compromise the ability of future generations to meet their needs."

Research into how staff and council at the City of Guelph attempted to renegotiate population projections with the province supports the interviewee's assessment. A Guelph City Councillor is quoted online as saying that "with the province's Places to Grow regulations, we were originally required to increase our population to more than 200,000. Because we were able to demonstrate to the province that neither our water resources nor our river systems could handle that large an influx of people, we were permitted to drop our population target to 175,000 – the only municipality in Ontario allowed to do so" (City of Guelph, 2011). While the information provided by the Councillor is not accurate with respect to being the only municipality in Ontario permitted to renegotiate the population target, negotiations did take place. However, the population projections were altered for reasons unrelated to the carrying capacity of the Speed River. The altered projections were based on a redistribution of population between the County of Wellington and the City of Guelph (personal comm. 2010).

Of the two people who disagreed with the position in this question (14% or 2 of 14), there was consensus that mentioning future generations in introductions and preambles of legislation and policy is not the same as providing meaningful consideration of this idea. Interviewee F said that politicians and decision-makers "*need to be much more cognizant of the sustainability of the system and look at water budgets holistically.*" Interviewee A followed this line of thought by saying that, "*we need to find the weak links in the system now and in the future. So, we think about future generations, but finding the weak links is our weak link. We're not so good at doing that.*" Interviewee F summed up by saying, "*we are running to stay in one spot.*"

7.6.5 Is the environment, or ecosystem, considered in current legislation, policies or documents?

Question five corresponds to the Intrinsic Value and Theistic ethical frameworks since the question addresses the idea of giving inherent value to animate and/or inanimate beings. The responses indicate that 14% (2 of 14) agree that the environment is considered in legislation while 86% (12 of 14) disagree.

Of those who agree that the environment is considered, there was reference to particular legislation and municipal policy documents, such as the *Clean Water Act*, the *Ontario Water Resources Act*, the PTTW

system, the City of Guelph's Official Plan, and Guelph's WC&ES and how value is placed on the environment in each of them. Upon further examination of the language in these statutes, examples were found that support these assertions. For example, changes in the mid-2000s (Valiente 2004) to Ontario's PTTW system place 'ecosystem function' as the "highest priority" in terms of criteria for determining if a permit is approved or extended. However, confusion still remains over how to prioritize ecosystem functions since the PTTW does not address implementation of them. In the source water policy direction contained within the *Clean Water Act*, drinking water is given "highest priority." In the MOE's Statement of Environmental Values, the preamble states that, "the people of Ontario recognize the inherent value of the natural environment."

Interviewee H prefaced agreement with the question by saying that consideration of the environment is, "*based on the limitation of the federal and provincial legislation frameworks we are working in right now. The legislation is limited in how far it is able to measure the priorities of the environment above those of humans. But, it still does recognize that the environment must be respected.*" Interviewee F said Ontario is "*starting to [consider the value of ecosystems] with the PTTW and looking at hydrological impacts but there is still a lot of room for improvement, particularly when it comes to science and research.*"

Of those who responded that the legislation does not consider the environment (86%), Interviewee C summarized the responses by saying, "*it comes back to the myth of abundance and its influence in how we, policy makers, decision makers, think about how much water we have. Are you better off connecting with human needs or environmental needs, where we value the environment as having its own intrinsic value? I suspect the reality is we need to connect with human interests to capture the attention, but that just lands us right back where we are right now and that's just not far enough.*"

Although there are examples, provided above, in which legislation does reference the environment and ecosystems as being valuable and important in decision-making, it seems that the dissenting segment of respondents think these are token references. "*I mean, we [those who create and implement policy] all know, or at least should all be aware, that when it comes time for political elections, polls indicate that 'the environment' is usually in the top three issues that are important to Canadians. So, when developing policy, it is incumbent upon us or we're told to if it's not already there, to make sure we use language that reflects how much we value the environment right up front in the introductions or preambles or executive summary. I suspect, though, that you'd be hard-pressed to find solid policy that actually implements these values that actually even attempts to provide a framework for this. It sounds cynical, I know.*"

One example where the provincial government references taking an ecosystem approach is in the MOE's Statement of Environmental Values. This statement stipulates that the MOE will adopt an "ecosystem approach to environmental protection and resource management." In addition, the statement specifies that the MOE will exercise a precautionary approach in its decision-making process. Justice O'Connor recognized this statement in his Part Two Report of the Walkerton Inquiry, and reiterated the need for the precautionary principle to play an integral part in decisions affecting the safety of drinking

water (Government of Ontario 2002, 21). To date, however, the Ministry has not defined and/or operationalized how the ecosystem approach and the precautionary principle will be incorporated into its decision-making process.

The ECO (2009) has noted that unless the ecosystem approach mandated by the *Ontario Water Resources Act* (regulation 285/99) is “incorporated into guidance documents, key ecosystem considerations such as the impact on the baseflow of rivers, habitat, exacerbation of droughts, turbidity and water body oxygen levels may not be incorporated into decision-making.” The ECO has also expressed a concern that “ecosystem protection may be threatened because MOE staff are issuing permits for new water takings without access to fully complete or accurate information on existing water takings.”

7.6.6 Do current legislation, policy, and documents support a holistic, systems-oriented approach to water management?

The final question asked whether current legislation supports a systems-approach to water management. This concept can be associated with the Utilitarian/Consequentialist ethical frameworks insofar as it takes an anthropocentric perspective towards water resources in which they are protected purely for human use. A systems-oriented approach was described to interviewees in both case study areas as a knowledge-based approach that “considers entire systems, parts and interrelationships” and “emphasizes a scientific understanding of ecosystems” (Mitchell 2005, 1339). Within this group of interviewees, 29% (4 of 14) agree that legislation incorporates a systems-oriented approach, while 71% (10 of 14) disagree with this question.

Interviewee D referred to the *Clean Water Act*, 2006 as an example of legislation taking a systems-oriented approach and said that, “*Walkerton moved us in this direction...this multi-barrier approach, watershed planning set-up. I'm not convinced, though, that it's entirely 'integrated' in the sense that we look at the bigger picture and look beyond what science and numbers tell us. Obviously, Walkerton was a huge wake-up call and I am supportive of a watershed planning approach, but it seems like we're now so focused on 'data' and 'science' that we sometimes forget that a large part of our job should be focused on people and trying to get them to change their behaviour towards water use. So, yes, there's a systems-oriented approach, but I don't necessarily think that's where it should stop.*” Interviewee A also agreed that a systems-approach is incorporated in legislation and policy, but that “*the concept is not completely understood; it's understood in pockets. We do everything so incrementally that it's only natural that our information and how we apply that to decision-making and policy creation is also incremental.*”

Interviewee G, when disagreeing that current legislation supports a systems-based approach, said that, “*I think the key word here is 'support', but I wouldn't say it's anything beyond that. I don't think it's required in legislation and nor do I think it should be. I don't think a systems-oriented approach is the direction we should be heading because it's far too rigid and relies too heavily on science as the predominant determinant of decision-making.*” Interviewee I also noted that, “*there is some recognition, but not enough for me to agree with this question. It's only in watersheds that*

are stressed and that have a municipal water supply. It's really the limitation of the framework we are working in now. It's just not holistic and definitely not systems-oriented. I guess that's a good thing because I'm not sure this is even the best approach to water management. Even a systems-approach has significant limitations, perhaps even more than we are working with now."

A review indicates that there is some recognition of a holistic, systems-oriented approach in municipal legislation, policy and strategies. For example, the WC & ES (2009, 53) stated that leading up to the release of the Strategy, "the study followed an integrated approach considering not only water use objectives, but also technical and regulatory requirements and public acceptability." When referring to promoting "environmentally sustainable development", the Official Plan (2011, 17) states that the City will continue, "to move towards planning policies that are based on the principles of watershed planning, ecological systems planning and natural heritage systems planning, taking into account both landscape and ecosystem values." An objective of the natural heritage features section in the Official Plan (2011, 79), in which streams, lakes, and rivers are included, is, "to establish a comprehensive systems approach to the protection and enhancement of natural heritage features." The Official Plan (2011, 80) also explains that, "[W]atershed/subwatershed planning systems enable a holistic examination of the natural environment across municipal boundaries and man-made features. The results of these systems' studies serve as an ecological basis for defining development 'envelopes'. In this way sustainable growth is promoted, with natural areas and their associated ecological functions being protected."

7.6.7 Summary – Results Part Two – Legislative Context in Ontario

The answers to this set of six questions are helpful because, in many instances, whether the interviewees may have agreed or disagreed that legislation and policy reflected a particular concept, such as a systems approach, respondents then voiced their opinion on whether this should continue to be the direction of future law and policy. In so doing, many were implicitly reflecting their perceived ethical perspective as it relates to water management. Based on the results from the responses to the six questions, the evidence suggests that the interviewees do not consistently apply a single ethical framework. However, the interviewees who seem to favour Consequentialist and Intrinsic Value ethical frameworks also indicate that these same ethical frameworks are present in various provincial and municipal statutes, policies and strategies; evidence from these provincial and municipal statutes, policies and strategies seems to corroborate this perception. This finding could then suggest that the interviewees are driving the policy making and implementation process in a similar direction as the direction provided to them in legislation. However, as with the previous case study, this is merely a supposition and further investigation into this finding, through a future research project, is necessary.

7.7 Results – Part Three – Principles of a Proposed Water Ethic

As in the Calgary case study, the final series of questions asked the interviewees to consider principles identified through a literature review on water ethics (Chapter Four). The six proposed principles, introduced and discussed in Chapter Four, were presented to each interviewee. Each was then asked to rate (out of five, with five being the strongest level of agreement) the principles according to their strength of agreement or disagreement regarding whether each should be included in a water ethic. The interviewees then had an opportunity to add to or delete any of the six principles given to them and provide an opinion on what would need to change regarding institutional arrangements in order to implement the preferred ethic. The principles were presented as follows, and they did not represent a ranking of any kind:

- Meet basic human needs and enhance equity today and for the future;
- Safeguard ecosystems by allocating sufficient water to maintain ecosystem integrity, including the preservation of ecosystem services;
- Encourage efficiency and conservation;
- Establish open and participative decision-making processes;
- Respect system complexity and emphasize precaution; and,
- Seek multiple sustainability benefits from water-centred initiatives, including enhancements of livelihood opportunities, health, education, and security.

The results of ratings are presented in Table 7.5. To determine the overall rating, the rating for each principle was added and then divided by the total number of interviewees (14).

Based on the overall average ratings (last column) and consistent with the comments provided in the interviews, the strength of agreement for each principle of the proposed water ethic is as follows:

- Meet basic human needs and enhance equity today and for the future;
- Safeguard ecosystems by allocating sufficient water to maintain ecosystem integrity, including the preservation of ecosystem services;
- Encourage efficiency and conservation;
- Establish open and participative decision-making processes;
- Seek multiple sustainability benefits from water-centered initiatives, including enhancements of livelihood opportunities, health, education, and security; and,
- Respect system complexity and emphasize precaution.

TABLE 7.5: PROPOSED WATER ETHIC PRINCIPLES RATED ACCORDING TO STRENGTH OF AGREEMENT																
Interviewee	A	B	C	D	E	F	G	H	I	J	K	L	M	N	Average	Rating
Principle 1: Meet basic human needs	5	4	5	4	4	5	5	5	5	4	5	5	3	3	4.43	1
Principle 2: Safeguard ecosystems	5	4	5	4	4	5	5	5	5	4	4	4	4	4	4.43	1
Principle 3: Encourage efficiency	5	4	5	4	4	5	3	3	4	5	5	4	5	5	4.36	3
Principle 4: Participative decision-making	3	4	5	5	4	5	5	4	3	3	4	4	3	5	4.07	4
Principle 5: Respect complexity	4	3	5	3	3	5	4	2	5	4	4	3	4	5	3.86	6
Principle 6: Seek multiple benefits	4	4	5	3	4	4	3	4	4	5	5	4	4	3	4.0	5
<i>Please note that the values contained within Table 7.5 are not statistically significant, but rather this information is being interpreted in conjunction with other evidence (i.e., interview responses and document support) in order to draw conclusions.</i>																

5=Strongly Agree 4=Agree 3=Neutral 2=Disagree 1=Strongly Disagree

There were relatively minor changes to the relative ordering of these principles compared to the order in which they were presented; Principle #5 changed positions with Principle #6. Overall, interviewees agreed with keeping all principles as part of a proposed water ethic and, as interviewee C stated, the principles “*are all important to the success of a water ethic.*” They also did not propose any new principles. Interviewee H was quick to point out that “*it’s a very complex issue, getting into people’s heads about water use*” and Interviewee G noted that, “*we have an arrogance with our human nature where we think we are at the top of the food chain so where we may solve one problem because we adhere to one particular idea, we tend to create another because we don’t think beyond the box, what we’re used to doing.*” Interviewee D recognized that implementation is the key to the success of any proposed water ethic and said that, “*the trick is to drill down and how to realize a water ethic through actions in policy, not just language and words.*”

Interviewee H identified four reasons why water resources management, or resource management generally, had difficulty changing course, and stated that “*the supply-oriented norms and traditions need to change, the myths of water abundance still exist, climate change denial is prevalent and an arrogance about the importance of technological solutions [still continues] and that for these reasons, a new water ethic is difficult to introduce. The suggestion for altering a state of denial and arrogance by some is because when there is room to maneuver, we do, but when we hit a wall and we will very soon if we don’t change our ways, we need to become more dictatorial.*” This interviewee subscribes to a highly regulatory way of practicing water management, due to past (failed) experiences implementing and enforcing water policy.

In terms of specific comments about the proposed principles of the water ethic, all respondents agreed that the six principles should be reflected in policies, statutes and regulations related to water management. Interviewee C said that, “*when I think of vision for water use, this is what I think of.*” Interviewee G stated that, “*I don’t know how you’d even get rid of any of these principles because they’re all so interconnected, and that’s good. That’s what we’re missing in current legislation – this sense of togetherness. We currently work in fragments so something like this water ethic, if implemented, would be so helpful.*”

Comments related to each principle were few in number, but reflected that the respondents were generally in agreement with the overall proposed direction and implementation. The only principle that sparked a frustrated response was for “establishing open and participative decision-making” (principle #3). While the respondents agree with transparency and collaboration between professions and amongst affected communities, there was hesitancy about how time consuming this process can become. As Interviewee C said, “*just because we can be open, doesn’t mean we should be so wide open that it impinges on our ability to get our job done. I want to engage people and politicians and my colleagues just as much as the next person, but only if it’s meaningful and helps make whatever policy or strategy I’m working on stronger. I don’t want to get mired down in process just for the sake of process.*”

7.7.1 Summary Results – Part Three – Principles of a Proposed Water Ethic

As in the Calgary case study, presenting the set of proposed principles for a water ethic to interviewees in Ontario provides more baseline information about what ideas and concepts should or should not be included in future policy in Guelph, Ontario. The results from this case study suggest that the interviewees support the proposed principles and one participant went so far as to indicate that the principles as presented are what they would like to see implemented at the municipal level of government. There were some minor modifications to the relative order in which the principles were presented to the participants, but overall, the response to the content and intent of the principles was positive.

The penultimate chapter will draw from the findings and suggestions in the literature and from the interviewees. This next chapter will compare and contrast the Calgary and Guelph case study areas, and provide recommendations for the implementation of the proposed water ethic at the municipal level of government.

Chapter Eight: Discussion and Recommendations

8.1 Introduction

The goals of this research have been to identify and understand the underlying ethical frameworks that may influence water policy creation and decision-making in Canada, as well as to identify an implementable water ethic for the municipal level of government. This chapter has several purposes. The first purpose is to compare the two case study areas based on the underlying ethical frameworks that emerged from an analysis of relevant legislation, policy, strategy, and public documents. The second purpose is to compare the rating of the principles of the proposed water ethic to determine if any significant changes need to be made prior to discussing implementation of these principles. The task is to offer recommendations for facilitating and implementing a water ethic at the municipal level of government in Canada.

8.2 Comparison of the Case Study Areas

Ethical ideas, explicit and implicit, underpin all legislation and policy. This is understandable since values and beliefs influence perceptions, attitudes and behaviour that influence those who develop statutes and policies (Atwood et al. 2007; Janmaat 2007; Wolfe and Elton 2009). Identifying specific ethical framework(s) fulfills part of the second research objective. Based on a comparison of practice and experience in Calgary and Guelph and how this correlates with the research literature, some similarities were identified regarding the perceived degree of influence of some underlying ethics, but there are even more differences than similarities between the two cities. Where these case studies converge and diverge provide valuable information and insight for guidance on implementation for the municipal level of government for the water ethic proposed in this dissertation.

As a reminder, each case study was chosen for various reasons, but also for a particular reason; Calgary is a relatively water-scarce area, while Guelph is a relatively water-rich area. This difference is critical for the implementation component of this research as it allows for the recommendations, provided later in this chapter, to be examined to see if they potentially apply to any area across Canada, water wealthy or not. Based on a high-level summary provided in Table 8.1, the most general conclusion is that all four ethical frameworks identified in Chapter Two may influence decision-making in both case study areas. There is some divergence, however, in the perceived degree of influence that each ethical framework may play in the decision-making process. As noted on Tables 6.5, 6.6, 6.7, 7.3, 7.4, and 7.5, the values contained within Table 8.1 are not statistically significant, but rather this information is being interpreted in conjunction with other evidence (i.e., interview responses and document support) in order to draw conclusions.

TABLE 8.1: A COMPARISON OF THE OVERALL RANK IN % BY CASE STUDY AREA		
Major Ethical Framework	Calgary, Alberta	Guelph, Ontario
Utilitarianism	N/A	N/A
Consequentialism	#1 (56%)	#1 (43%)
Intrinsic Value	#2 (31%)	#1 (43%)
Theism	#3 (13%)	N/A
Cons/IV/Theism	N/A	#3 (14%)

According to the overall ranking, the **Calgary** respondents indicate a tendency towards the application of a Consequentialist ethical framework and way of thinking (56%). This conclusion can be explained by the manner in which existing legislation, plans, documents and strategies seem to promote the values underlying this ethical framework through language (Beveridge 2006). And as a result, value positions associated with Consequentialism become even more ingrained. An alternative explanation is that Consequentialist positions are starting to lose their hold on current policy and decision makers and the influence of Intrinsic Value and Theism are exerting greater influence in Calgary’s institutional arrangements. It is difficult to determine the scenario that is more likely since this is inaugural research; however, the path that Guelph, Ontario has taken may shed further insight on this matter.

In **Guelph**, while respondents seem to indicate the application of a Consequentialist position (43%), the value positions associated with Intrinsic Value framework have a seemingly equal influence on policy makers (43%). Elements of a Consequentialist framework manifest through the language of legislation, plans, documents and strategies developed by both provincial and municipal levels of government. However, the ethical considerations of the Intrinsic Value framework are not as obvious in the language and intent of applicable legislation, plans, documents, and strategies. This finding seems to suggest that the staff driving the process of policy development and implementation may not be following the direction provided to them in the legislation. The precise reasons for this are not obvious. It is possible, however, to infer, based on the interview results and feedback, relevant literature and anecdotal information, the factors that may contribute to such an outcome. For example, the explicit understanding of the relationship between water resources and land use planning, exemplified through legislation such as the *Places to Grow Act* (2005) and the *Growth Plan for the Greater Golden Horseshoe* (2006), coupled with an awareness of environmentally-related issues, may contribute to the influence of the Intrinsic Value ethical framework. The following sections highlight the similarities and differences in responses and discuss these results.

8.2.1 Discussion of the Similarities and Differences between the Case Study Areas

The discussion in this section follows a similar structure as the case study chapters by first focusing on “A Comparison of the Overall Ranking in % by Case Study Area” (Table 8.1), then on a comparison of the “Ethical Frameworks Captured in Current Legislation/Policies/Documents” (Figures 6.10 and 7.6)

responses, ending with a comparison of the ratings of the proposed water ethic principles (Table 8.2). The final section provides recommendations for an implementation plan for the proposed water ethic at the municipal level of government in Canada.

8.2.1.1 A Comparison of the Overall Ranking By Case Study Area

When comparing the Overall Rank Results in Percentages in Table 8.1, the findings suggest that respondents perceive the Consequentialist ethical framework having the most influence over decision-making in both Calgary (56%) and Guelph (43%), with Calgary respondents seeming to adopt a greater allegiance to this particular philosophy. As shown in the Calgary case study chapter, the intent of the language in Alberta's *Water for Life* Strategy, the City's Municipal Development Plan, and the Water Efficiency Plan support the interview results. Similarly, in Ontario, the Province's *Water Conservation and Opportunities Act*, 2010, the *Clean Water Act*, 2006, and the City of Guelph's Official Plan, 2011, and Water Conservation and Efficiency Strategy, 2009, echo an intent to follow elements of a Consequentialist position.

Several reasons suggest why Calgary respondents may apply the ethical ideas of Consequentialism. Historically, many Albertans identified themselves with a frontier philosophy that promoted "manipulating the water cycle to whatever degree engineering know-how would permit" (Postel 1992, 23) in order to always achieve more control. Also, despite Alberta's characterization as a water-scarce province, it is rich in other natural resources such as oil, and this reality may make it harder to dispel the "myth of abundance" (Beveridge 2006; Sprague 2007; Shrubsole and Draper 2007). As a result, the governance structures and institutional arrangements patterned on past and present legislative frameworks have generally been reactive rather than proactive during times of water shortages, a perspective supported by D'Ombrain (2002) and Bakker (2003).

For example, the *Water for Life Strategy* and the *Alberta Land Use Stewardship Act* were created because of immediate necessity, not because of any more broadly conceived ethical impetus. Calgary's supply of water was running out faster than officials could figure out ways to find new sources or replenish the supply. Calgaryans and Albertans are trying to manage their limited water resources and because of this, recognizing the intrinsic value of environmental and ecological services within legislation and policy, beyond introductory statements and principles, is not yet an imbedded priority (Beveridge 2006).

The reasons for Guelph's possible application of the Consequentialist ethical framework (43%) are similar to Calgary's, particularly with respect to the "myth of abundance" concept (Beveridge 2006; Sprague 2007; Shrubsole and Draper 2007). Many Ontarians live in close proximity to the Great Lakes and the psychological consequences of proximity to large bodies of water have played a huge role shaping belief in infinite access to water for consumptive purposes (Sprague 2007; Sproule-Jones et al. 2008). This proximity, layered with the fact that residents of Guelph rely heavily on underground "invisible" sources, makes it difficult to shed the myth. Another reason is that the concept of sustainable development has

been generally accepted in a political (and policy) context. Phrases such as “balancing social, economic, and environmental concerns”, “planning for a sustainable future” and “aiming to develop in a sustainable manner” are now standard statements in legislation, policy and guiding documents at all levels of government in Canada (Corkal and Diaz 2010). Inclusion of these phrases may indicate intent to apply components of a Consequentialist ethical framework, but it does not necessarily mean that the more specific substance of the laws and policies is consistent with this framework. Nor does it necessarily indicate that because of the inclusion of these statements, there is an effective sustainability commitment.

The two case study areas seem to diverge in ethical thought once one goes beyond exploring the #1 result for the Overall Rank. Whereas the potential influence of the Intrinsic Value ethical framework starts to show in Calgary as a second-place finisher in the “Overall Rank Result in Percentage” (31%), Guelph’s participants seem to apply the Intrinsic Value framework in a more pronounced fashion and this framework shares an equal amount of influence (43%) with Consequentialism in this case study area. As explained in Chapter Seven, Guelph has been recognized as an environmentally progressive community and for having many residents and municipal staff who are well-informed and well-organized when advocating for legislation and policy that goes beyond the status quo (de Loë 2008; Binstock 2010). Consequently, some recent actions by municipal staff and council, at the urging of the community, demonstrate an ethical shift with the potential to affect future water use and behaviour.

For example, by choosing to emphasize water conservation and water efficiency measures rather than infrastructure (supply) solutions for water supply, Guelph demonstrates that Intrinsic Value positions are not only important, but also a priority (see Box 7.2). Similarly, provincial legislation and policy, at least on paper, is starting to reflect some ideas that reflect an Intrinsic Value ethical framework. One example where this framework is reflected in Ontario’s Permit to Take Water system and the addition of “ecosystem function” as the highest priority, perhaps only for human ends. Another example where an Intrinsic Value ethical framework is reflected is in the Ministry of the Environment’s Statement of Environmental Value that states “the people of Ontario recognize the inherent value of the natural environment.”

While provincial legislation and policies inside and outside of Alberta and Ontario (e.g., Nova Scotia’s *Water Resources Protection Act (2000)*, Quebec’s *Water Policy (2002)*, Saskatchewan’s *Water Management Framework (1999)*) recognize the benefits of viable ecosystems and the importance of maintaining ecosystem integrity, they remain unclear about when ecosystem purposes have priority over extractive human uses (Matthews et al. 2007). Furthermore, they do not recommend processes, criteria or rules for establishing trade-offs among conflicting interests (Kreutzwiser et al. 2004; Brandes et al. 2005; Matthews, et al. 2007). This absence in direction must be addressed when discussing the implementation of a proposed water ethic.

8.2.2 Summary of the Overall Rank Results in Percentages

The most obvious finding from the interviews in both case study areas is that the interviewees report adherence to positions that are associated with several different ethical foundations. Based on the results of the comparison between case study areas, interviewees in Guelph indicate predominant subscription to positions related to an Intrinsic Value ethical framework, yet have significant Consequentialist undertones. Calgary interviewees in contrast are heavily influenced by Consequentialist positions with Intrinsic Value and Theistic ethical undertones.

8.3 Discussion of the Principles of a Water Ethic

This part of the research contributes to the third research objective, which was to present a set of principles for a proposed water ethic based on a synthesis of the literature. The set of principles was rated by the policy makers and implementers in both case study areas to determine (a) if the proposed principles are worthy of implementation and (b) which implementation techniques are necessary to put the water ethic into practice. As stated in Chapter Four, all principles are considered valuable and must be seen as a package of components that need to be addressed together. This dissertation will not prioritize the principles since achieving consensus on a set of ethically-based principles while also evaluating trade-offs is beyond the scope of this dissertation. Nevertheless, Gibson et al. (2005) outline an approach to managing potential trade-offs between principles that could be used by decision-makers when applying the proposed water ethic. These sustainability decision-making trade-off rules are:

- *Maximum net gains* - any acceptable trade-off must favour achievement of the most positive feasible overall result, while avoiding significant adverse effects;
- *Burden of argument on trade-off proponent* - the burden of justification falls on the proponent of the trade-off;
- *Avoidance of significant adverse effects* - a significant adverse effect on any sustainability requirement area cannot be justified unless the alternative is acceptance of an even more significant adverse effect.
- *Protection of the future* - avoid displacement of a significant adverse effect from the present to the future;
- *Explicit justification* - all trade-offs must be accompanied by an explicit justification based on openly identified, context specific priorities as well as the sustainability decision criteria and the general trade-off rules; and
- *Open process* - proposed compromises and trade-offs must be addressed and justified through processes that include open and effective involvement of all stakeholders.

As explained in Chapters Six and Seven, in both case study areas respondents unanimously decided that the intents of all six proposed principles are important and necessary for effective water resources management and while some minor wording changes were recommended, no additions or deletions to the principles were identified. In other words, the proposed water ethic is supported by the interviewees.

According to feedback from the interviewees in both case study areas, and perspectives from academic literature regarding policy language and successful policy implementation, I have revised the proposed water ethic principles. The rationale for changing the principles based only on the apparent ethical preferences of professionals interviewed in two cities relates back to the idea that this is exploratory research and offers one of many possible perspectives. This particular perspective simply incorporates the feedback of the interviewees, which arguably, strengthens the legitimacy of their involvement in this research. To reiterate, though, the order of the principles is unimportant given that the need for all principles of the water ethic must be pursued at once during the implementation stage. The interviewees provided feedback on the principles of the proposed water ethic incorporating their underlying ethical preferences, but also using their professional experience developing and implementing policy. The revised principles of the water ethic are as follows:

1. Allocate sufficient water to maintain and enhance ecosystem integrity;
2. Establish conservation and efficiency measures as a priority over new supply initiatives in water resources planning;
3. Meet basic human needs and enhance equity;
4. Establish open and participative decision-making processes;
5. Identify and seek to obtain multiple sustainability benefits from water-centered initiatives; and
6. Explicitly acknowledge system complexity and emphasize precaution.

Based on previous statements in this chapter regarding trade-offs, the revised principles represent a package and each principle is valuable – principle #1 does not prevail over principle #2. In order to resolve any potential conflicts, applying Gibson et al.'s (2005) approach to trade-offs may be necessary in any given Canadian municipality that wishes to attempt to implement this proposed water ethic. Given that all the responses related to ethical frameworks and the principles of a water ethic have been collected, analyzed, discussed, and revised, the final stage of this research pulls all the information together into specific recommendations for the implementation of the proposed water ethic.

8.4 A Guide to the Implementation of the Proposed Water Ethic

There is a wealth of academic and pragmatic literature on the implementation of policies, plans and legislation (Sabatier and Mazmanian 1989; Carrington 2002; Good 2003; Bullain and Toftisova 2005; Elson 2006). There is a generally supported framework to follow that involves four generic steps:

- Identifying and clarifying the roles and responsibilities of those involved in the decision-making process;
- Identifying the compliance of internal and external target groups with decisions;
- Identifying the real and perceived consequences of the policy decision and implementation; and,
- Revising the original policy based on political feedback and monitoring (Sabatier and Mazmanian 1989; Carrington 2002; Good 2003; Bullain and Toftisova 2005; Elson 2006; Seasons 2009).

These generic steps relate best to the implementation of existing law and policy, but do not recognize the special implementation of new ethical considerations into law and policy. With respect to the endorsed water ethic, steps such as determining the differences between the existing governance structures and institutional arrangements and one that would be able and/or willing to incorporate the new ethic, identifying the general and particular changes needed within the existing structures and arrangements, building support for the new ethical package, educating the political population as well as the general public, and including a mechanism to discuss trade-offs, are all additional steps that could be added to this generic framework.

The nature of policy development is complex and involves many stakeholders, a variety of decision-makers, political actors and processes, multiple governance structures and institutional arrangements, and of course, underlying ethical considerations. This research began with the idea, supported by Elson (2006) that policy developers at the municipal levels of government are the main implementers of provincial or municipal policy. However, at least for water management, the implementation process positions municipal planners and engineers, for example, as key policy implementers, even if they may not necessarily be the policy developers. This is why the selection of the interviewees in the case study areas focused on those with direct influence on the entire policy process – from development to implementation. Including community leaders, elected councillors, land developers, and environmentalists would have not provided such focused results, hence their exclusion from this research. This is not to suggest, however, that these players are not important in the decision-making process, nor does this suggest that they do not provide overall direction and terms of policy-making and implementation. Future research into the application of underlying ethics at the municipal level should include the insights and opinions of these individuals. The result was a very small group of individuals and yet they may have significant influence on the language and ethical intent of policy. This choice can either be viewed as a limitation, or as I choose to posit, a strength.

8.4.1 Recommendations for Implementing the Proposed Water Ethic at the Municipal Level of Government in Canada

This section provides a guide for successful implementation of a proposed water ethic and thus addresses the fourth research objective. The criteria for effective implementation of water-related policy were presented in Table 3.2. As a reminder, the criteria are: (1) flexibility/adaptability; (2) administrative simplicity; (3) equity (4) effectiveness and efficiency in influencing water use behaviour towards desired ends; and, (5) transferability of knowledge. According to the professional experience of this researcher in a municipal government environment, personal communications with professional planners and water policy professionals in the Region of Waterloo who were asked by the researcher to review the recommendations in draft form, insights from the interviewees, as well as relevant literature (Kemper 2003; Annandale et al. 2004; Mitchell 2005; Minton et al. 2007), these criteria are reasonable and can be applied towards the

effective implementation of the proposed water ethic.

The recommendations from this research are pragmatic, but are not necessarily to be interpreted as standard rules. Rather, as section heading 8.4 suggests, the recommendations are meant to act a guide for the implementation of the endorsed water ethic. These ethical principles, if implemented as a package, could lead to both transitional and transformative changes within existing governance structures and institutional arrangements with respect to developing water policy. Transitional change may not require a significant shift in the culture and behaviour of an organization of citizens, but can result in adopting new ways to existing water policy challenges; transformative change can emerge from the continual shifts in culture and behaviour and result in a permanent change towards more ethically-based water policy.

The recommendations have been devised by using information provided by the interviewees in both case study areas, elements from research regarding policy implementation and evaluation (Sabatier and Mazmanian 1989; Carrington 2002; Bullain and Toftisova 2005; Dobers 2005; Elson 2006; Seasons 2009), and most importantly, take into consideration the underlying ethical frameworks that policy makers indicate they apply and the institutional arrangements under which they operate. The recommendations have also been devised taking into account current planning practice and conservative corporate tendencies. In an ideal municipal environment, these recommendations would have been developed though a process with multiple iterative steps, with mutually influential initiatives at all stages and levels of decision-making, which would result in gradually building support and entrenchment in law, policy, leading practice, and eventual culture. However, this is not the case, and the recommendations presented below reflect recognition of the current state of affairs. The recommendations to implement the proposed water ethic successfully are, in no particular implementation order or order of importance:

1. Entrench the principles of the proposed water ethic vision in provincial and municipal legislation
2. Work, to the extent possible, from within existing governance structures and institutional arrangements
3. Use an incremental approach to change with respect to decision-making
4. Provide specific policy examples for each principle within the proposed water ethic and explain how each example corresponds to the relevant principle.
5. Include realistic and measurable targets within the policies and implementation plans
6. Accept that all six water ethic principles are unlikely to be adopted and implemented fully at once
7. Ensure the overall vision of the proposed water ethic, the principles, and associated example policies, and measurable targets are defensible
8. Acknowledge the importance of the public interest

The following sections elaborate on each recommendation. For each recommendation, it should be noted that provincial and municipal staff members are presented as the main implementers; however, there must

also be recognition that political actors, stakeholders, and the public are also important and involved in the successful implementation of the proposed water ethic.

8.4.1.1 Recommendation 1 – Entrench the Principles of the Proposed Water Ethic vision within Provincial and Municipal legislation

The vision of the endorsed water ethic must be entrenched in Provincial legislation that relates to land use planning as well as specifically to water resource management. Failure to provide for this connection between land use and water resources management will most likely result in failure to achieve desired behavioural changes regarding resource use (McKinney 2003; Vardy and Dunne 2003; Alberta Interviewee B, G, M and N; Ontario Interviewee C, E, G, J and L). In addition, entrenching the Water Ethic vision and specific policies (related to the proposed principles) into municipal legislation, such as an Official Plan or Municipal Development Plan, will enhance the likelihood of successfully implementing a municipally-relevant water ethic. Ontario's *Places to Grow Act* (2005) and the complementary *Growth Plan for the Greater Golden Horseshoe* (2006) (this document is the Implementation Guideline for the Act) provide an excellent example of how, after over a decade of policy advocacy, early application, and an acknowledgement that the cost of servicing sprawl was beyond government and public fiscal acceptability, entrenching principles and targets into provincial legislation is having significant influence on local land and resource planning (Ontario Interviewee G). Municipal governments are required to include the provincial land use targets (such as 150 people and jobs/hectare) in official plans, and subsequent infrastructure master plans must also align with these high-level provincial policies.

The case for a proposed water ethic could parallel the Places to Grow case. The results from the case studies suggest that achievement of this recommendation is entirely possible, given the shifting policy conditions in both Alberta and Ontario. Policy developers and implementers acknowledge the importance of ethically-minded water resources management and agree that the water ethic principles are appropriate and able to achieve behavioural changes in water use.

8.4.1.2 Recommendation 2 – Work, to the Extent Possible, from Within Existing Governance Structures and Institutional Arrangements

The second recommendation requires working from within current institutional arrangements rather than trying to reform them. The rationale is that taking the path of least resistance can bring about the most change in the shortest amount of time (Alberta Interviewee A, C, E, K, and O; Ontario Interviewee C, E, H, and M; pers. comm. Region of Waterloo 2012a). This research suggests that the Consequentialist ethical framework is relatively influential when preparing and implementing legislation and policy. It also suggests that components of the Intrinsic Value ethical framework are being applied to decision-making. So, the basic strategy should be to 'go with the flow' since this research indicates (see Chapter Seven) change is already occurring from within the current institutional system. Institutions do need to recognize that effective implementation of the proposed water ethic will require them to enhance awareness of their

own existing entrenched ideas and ethics, and then work towards making the necessary changes.

Previous research by Gleick (2000), de Loë et al. (2001), Maas (2003), Brandes and Ferguson (2004), and Brookes (2005), all suggest barriers, such as lack of political and/or institutional capacity, may prevent radical or innovative solutions to water resources management (such as the soft path approach), and are significant obstacles to implementation. These barriers to implementation were confirmed by the majority of respondents in both case study areas. This recommendation effectively accepts these barriers and promotes staying the course with only minor alterations to effect change, minimize conflict, and build trust and understanding between and among policy makers. The decision by the City of Guelph Council to not include the Great Lake pipeline as an option for future water supply is a good example of the application of this recommendation. Staff, working within existing governance structures and institutional arrangements, collaborated with well-organized citizen organizations to present a recommendation to City Council regarding the merits of focusing on water conservation and efficiency efforts and acknowledging the finite and intrinsic value of water (refer to Box 7.1). A similar path could be taken for implementing the proposed water ethic, particularly as this applies to maintaining and enhancing effective collaborative and public engagement aspects of policy implementation.

8.4.1.3 Recommendation 3 – Use an Incremental Approach to Change with Respect to Decision-Making

In keeping with Lindblom's (1959) perspective, most decisions, particularly in a municipal government environment, are incremental, and politicians typically avoid making what they may be perceived as "contentious" decisions regarding water resources management. This perspective is supported by Maas (2003) as well as Alberta Interviewees C, I, and L, Ontario Interviewees A, H, and M. The precautionary principle (UNCED 1992), which is one of the principles of the water ethic, also applies to this recommendation. The reality is that it is difficult for any level of government to engage the large groups of people needed to make necessary long-term behavioural changes because most politicians and people think short-term (Osborne and Gaebler 1992; personal. comm. Region of Waterloo 2012a; 2012b). This is part of the reason why mandated updates of legal documents (e.g., Official Plans) use five years as their benchmark. An incremental approach to decision-making allows for continuous transition periods within institutional arrangements, such as municipal governments, and more easily implements behavioural changes towards water use.

A good example of why an incremental approach is recommended is based on some of the findings in the case study areas. For example, a gap often exists between what people know they ought to do and what they actually do. This was exemplified in the Guelph's 2009 survey of residents regarding attitudes about water conservation. The majority of residents agreed with aggressive water conservation measures in principle, but they were not willing to do all the work to get there. This gap is also recognized by the research of de Loë et al. (2001) and Brandes and Ferguson (2004) when they state that there normally is

resistance from the public towards implementing certain water resource management measures. This recommendation, in partnership with recommendation #2, allows for incremental implementation of the water ethic, resulting in what could be a significant change in water use behaviour.

8.4.1.4 Recommendation 4 – Provide Specific Policy Examples for Each Principle of the Proposed Water Ethic

Implementation of the proposed water ethic must take its principles and articulate measurable goals and/or targets that can be monitored and evaluated over time (Alberta Interviewees D, H, and I; Ontario Interviewees B, F, M and N). Without this level of detail, implementation of the proposed water ethic will not happen. The case study areas, particularly at the municipal level, are already using this technique in their water efficiency plans (for example, by providing targets for the reduction of water consumption over time). However, the targets are limited to reducing demand; attaching goals and targets to plans for implementing the principles of the water ethic should improve the desired behavioural habits of water consumption.

In addition, those promoting implementation of the proposed water ethic would be wise to prepare a range of policy options offering varying degrees of potential success. This is necessary because, when working within institutional arrangements, options are essential, particularly for staff and politicians who must balance a number of competing interests (pers. comm. Region of Waterloo 2012b-d). However, the findings suggest it would be prudent for policy makers to ensure that options always advance the implementation of the principles of the proposed water ethic.

Presenting the options does not have to be lengthy and detailed. In fact, a policy product should provide a distillation of the essence of the options, their merits, and realistic and measurable targets (discussed below in Recommendation #5). As Seasons (2009) recommends, presenting each option as consistently as possible makes it easier for persons receiving the information to compare the options and more importantly, to draw conclusions based on this comparison. For example, a policy statement about how human survival depends on ecological services (Revenga et al. 1998;; Postel and Richter 2003; Smakhtin et al. 2003) may be too broad and overwhelming for the general public to digest and result in a loss of interest. Statements such as “must intrinsically value water resources” are difficult to turn into a positive “sound bite” and as a result, ecological and hydrological understanding has not been well integrated into policies, institutions, and practices (Revenga et al. 1998). Therefore, public policy statements must be written so they are understandable, relevant, and acceptable to the general public, particularly when the aim is to encourage behavioural changes to water use.

8.4.1.5 Recommendation 5 – Include Realistic and Measurable Targets within the Policies and Implementation Plans

Legislation, policy and implementation plans and/or guidelines that do not provide detail will usually lose favour and be discarded, sooner or later (personal comm. Region of Waterloo 2012 c; 2012e).

This occurred with Alberta's *Water for Life Strategy* (Beveridge 2006), for example, where some of the language in the document suggests a change in ethical considerations (i.e., towards more ecologically-focused awareness). However, the lack of detailed supporting information on implementation actions has made it very difficult to move forward (Alberta Interviewees A-D, H, J, and M-P).

Detailed implementation plans coupled with the use of action-oriented language are essential. Using words such as “encourage”, “promote”, “aspirational” or “where feasible” provide too much flexibility and discretion, and do not indicate a level of commitment necessary to affect behavioural change (Mount and Bielak 2011). Consider the difference between a traditionally vague policy (policy A) and a clearly stated policy with active language (policy B), written into an Official Plan:

- Policy A - “the City of WWW promotes the effective use of water resources and will implement aspirational targets to achieve the desired results”
- Policy B - “The City of WWW will reduce its overall water consumption by 10% per year by following the Water Consumption Implementation Guidelines”

One might expect that Policy B will produce different results than Policy A because there is a clearly stated action-oriented goal, a supporting implementation document (that should be entrenched within an official plan), and implicit consequences for failing to follow through with the policy (being in non-compliance with the legally-binding official plan).

8.4.1.6 Recommendation 6 – Accept that the Principles of the Proposed Water Ethic are Unlikely to be Adopted and Implemented Fully at Once

We must be willing to accept that not all principles of the proposed water ethic will be accepted at once, despite their presentation as a package. This recognition is simply part of being a realistic policy maker and part of working within the current institutional arrangements (Alberta Interviewees C, F, and O; Ontario Interviewees C, H, and K). For example, the principles of Neo-traditional planning, a concept introduced in the early 1970s, evolved into what is now known as New Urbanism (Congress for New Urbanism 1999). They are not the same concepts nor do they have identical principles, but the ultimate purpose remains the same. This type of policy implementation experience would not indicate failure to implement the water ethic – in fact, it could be a case of movement being made in the right direction.

In addition, parts of the principle may be lost when breaking it down into manageable and accessible pieces. These types of loss are common, but may be acceptable as long as the fundamental purpose of the proposed water ethic is maintained. One may feel as though he/she is repeating the message ad nauseam, as this researcher has experienced when working in a professional planning environment, but such repetition is required to ensure consistency and understanding in the long-term.

8.4.1.7 Recommendations 7 – Ensure the Water Ethic is Defensible

Effective policy development and implementation at provincial and municipal levels of government involve debate, compromise and, ultimately, collaboration. Much like any type of relationship, the process

of developing policy requires patience, understanding, and the ability to articulate and communicate the vision (in this case, of a water ethic) in order to achieve success.

Policy development and implementation related to water also involves, in almost all cases, varying degrees of interaction among engineers, health, and land use planners. This is a crucial relationship (Alberta Interviewees A, B, D, H, J, and N; Ontario Interviewees B, D, F, H, and M). Engineering professionals often develop the policy and provide direction regarding how to implement the policy. Land use planners generally play an advisory or facilitative role, despite their training in policy development, implementation and an interdisciplinary approach when dealing with complex planning challenges. Land-use planners are often among the first to identify and appreciate the consequences of good or bad water resources policy because of the close relationship between land and water (personal comm. Region of Waterloo 2012a-e).

This recommendation highlights that not only must engineers and planners start the process of implementing a water ethic together, but they must come to an understanding about the value of each principle. Both sets of professionals must be able to defend the vision of a water ethic to fellow staff, colleagues, councils, members of the public and outside agencies. In addition, it is crucial, as presented in one of the principles, that multiple, tangible benefits are attached to the policy direction such that a “win-win-win” outcome can be achieved (Gibson 2006). Also, tangible consequences must be identified because if sanctions or incentives are included, results are likely to be realized faster.

8.4.1.8 Recommendation 8 – Acknowledge the Importance of the Public Interest

This recommendation takes into consideration the importance of putting aside ego and personal beliefs in a professional decision making environment. The professional code of conduct and ethics for professional planners and engineers, for example, demand that work is completed in the public interest, where ego and personal beliefs seldom, if ever, have a role to play. This recommendation directs implementers of policy to complete an exercise in the community, with internal staff, and external agencies to prioritize and choose “winnable” principles (personal comm. Region of Waterloo 2012a), then proceed with implementing the principles, always under a Water Ethic heading. This approach is likely to achieve greater success than introducing ideas that will be resisted due to unfamiliarity, unwillingness to change institutional arrangements to accommodate ideas, or simply for political reasons (Alberta Interviewees C, F, and O; Ontario Interviewees A and G). One reason the interviewees were asked to rate the proposed water ethic principles was to determine their strength of agreement regarding each principle (Table 8.2). This rating could be different among municipal municipalities, depending on how they wish to address potential conflicts and trade-offs, and that is acceptable.

8.5 Chapter Position

A comparison of the two case study areas resulted in two major discoveries. First, interviewees in both case study areas indicate they apply all four ethical frameworks in their professional decision-making life. Consequentialism appears to be the dominant underlying ethical framework in both Calgary and Guelph. This similarity occurs despite the differences in water resources (one is water-scarce while the other is relatively water-rich) and in social, economic and environmental factors. This is the only aspect for which both case studies had common interview results, supported by content in legislation and policy or planning documents.

The second main finding is that the Intrinsic Value ethical framework influences policy makers within each case study area. The underlying ethical framework for Intrinsic Value is more prominent in the Guelph case study, but not as much within Calgary. This result could be due to a combination of factors such as economic drivers, historical and cultural background, legislative context, institutional arrangements, hiring practices, educational training and background, and levels of community environmental awareness. The key implication of these findings is that Guelph may be more readily able to implement the proposed water ethic. However, Calgary should, with time and tailoring of the suggested implementation recommendations to local conditions, be able to do the same.

The eight recommendations in this chapter, aimed at facilitating implementation of the proposed water ethic at the municipal level of government in Canada, are meant to be realistic. They reflect the current state of institutional arrangements and present a pragmatic view of policy formulation and implementation. The recommendations thus provide the necessary flexibility to be used within a water-rich or water-scarce environment, and they have been crafted with an understanding of the underlying ethical frameworks influencing policy makers and implementers.

The next sections of the following concluding chapter provide an overall summary of the research and highlight how each research goal has been fulfilled. The scholarly contributions to, as well as strengths and limitations of and future opportunities for, research focused on water ethics will also be presented.

Chapter Nine: Research Summary, Contributions and Conclusions

9.1 Introduction

The purpose of this final chapter is to accomplish the following tasks:

- Explain how the research objectives of this dissertation have been satisfied;
- Provide insights into the strengths and limitations of this research
- Consider the implications of the findings for the research literature;
- Highlight research contributions; and,
- Provide suggestions for further possible research into this topic.

The final paragraphs of this dissertation will provide some concluding remarks about the state of research into water and ethics.

9.2 Research Summary and Scholarly Contributions

The research objectives of this dissertation have been satisfied through a comprehensive literature review on theories, concepts and principles (Chapters Two, Three and Four), a discussion of the results of the interviews in two case study areas, and the identification of an implementation strategy for the water ethic for municipal levels of government in Canada (Chapters Six, Seven, and Eight). The following sections address how each research question has been answered.

9.2.1 The Influence of Ethical Theory

The first research question was:

1. *What major ethical frameworks have influenced decision-making about natural resources?*

The field of ethical theory is complex. The literature (Eckersley 1992; Taylor 1996a; Mills 1996; Cruz 1999; Miles et. al. 2001; Harremoes 2002; Harremoes et. al. 2002) suggests Utilitarianism, Consequentialism, Intrinsic Value, and Theism are some of the most well-acknowledge Western ethical frameworks that link ethics and environmental issues, specifically as ethics relates to the conservation of natural resources. Healey and Shaw (1993) and Armstrong (2006) both introduced frameworks to help explore the above-noted ethical frameworks' influence on the defining characteristics of a water ethic. A modification of the Armstrong (2006) framework was used in this research.

The literature suggests that essential considerations and defining characteristics exist for each Western ethical framework. These considerations and characteristics are summarized in Table 9.1 and Table 9.2. The literature review in Chapter Two concluded all four of the ethical frameworks may contribute to the formulation of a realistic water ethic with desirable, sustainable, and lasting effects; however, the degree of application of these frameworks may not be equal. Chapter Two also revealed that decision-making can be influenced to varying degrees by either a combination of perspectives or just one in particular. The case study analyses confirm these conclusions by showing that all respondents are

influenced by all four ethical frameworks, but interviewees indicate they apply a Consequentialist ethical position most often in both Calgary and Guelph. The questionnaire (Appendix A), and answers to these questions, were about positions that I, through a literature review, associated with the various framework and therefore, the results speak to the intentions of the interviewees and to their decision-making follow-through.

9.2.2 Comparisons and Contrasts of Water Management Frameworks

This section compares and contrasts the components of historical water management frameworks found in the literature. This answers the second research question:

2. *How have these major ethical frameworks affected water policy creation and decision-making in two Canadian case study areas?*

Chapter Three examined a set of successive water management frameworks in order to establish grounds for considering the potential value of a proposed water ethic. Table 9.2 and Table 3.1 summarize the characteristics of each water management framework that have been used in Canadian decision-making and discuss elements of these frameworks. The summary is based work by Foster and Sewell and Burton (1972), Mitchell (1990), Gleick (2000), Syme et al. (2000), de Loë et al. (2001), Biswas 2004; Brandes and Ferguson (2004), Shrubsole (2004), Brooks (2005), Brandes and Brooks (2005), and, Linkov et al. (2006), among others.

TABLE 9.1: ESSENTIAL CONSIDERATIONS AND DEFINING CHARACTERISTICS OF THE FOUR MAJOR ETHICAL FRAMEWORKS

Ethical Framework	Utilitarianism	Consequentialism	Intrinsic Value	Theism
Ethical Position	Originally proposed by Bentham (1789) and furthered by Mill (1861), it is the ethical doctrine that states the greatest good is whatever action brings the greatest happiness to the greatest number of people.	The moral tenet by which an action is deemed right or wrong depending on whether the outcome is good or bad. We should judge the rightness of an action by the desirability of its consequences and not to its conformity with some vague concept of virtue or honour.	The theory, predominant in some schools of environmental ethics, that all elements of an ecosystem, animate or not, have value within themselves, exclusive of any human value.	The natural world is the creation of a divine being and humans have a responsibility to that god for their use of creation
Basic Approach	<ul style="list-style-type: none"> - Identifies the environment as being useful to humans, therefore, water is valuable because we need it - Water is protected purely out of necessity - Relies purely on a human perspective - Incorporates the rights argument (Gleick 1999; UN Universal Declaration of Human Rights) 	<ul style="list-style-type: none"> - We are responsible for our actions, both present and future, therefore, we protect resources because they may be of value to our fellow human beings elsewhere or in the future - Core of sustainability/sustainability ethics - Difficult to define for whom we are responsible and once defined, how is this responsibility articulated? - Difficulties in defining what sort of responsibilities we might have to non-human creatures, or even to inanimate nature. 	<ul style="list-style-type: none"> - The environment has value of itself, not just as an object for human exploitation - Underlies the Land Ethic (Leopold 1949) - Biggest problem lies in articulating this value, which needs to be distinguished from the economic value often used in utilitarian arguments. - Difficult to see how the value of a concept as vague as an ecosystem can have rights 	<ul style="list-style-type: none"> - By adopting some of god's power over nature comes god's responsibility to care for nature – the beginnings of stewardship language - Supports a view similar to that of the intrinsic stance, in that the world is valued because it is created by, and loved, by god. - Humans and nature are intimately linked and this can be traced to indigenous thought about the environment.
Fundamental Question	How can we achieve the greatest good for the greatest number of people?	How do we assess the consequences of the action?	What good is it for nature/environment/ecosystems?	How can we protect and enhance our environment in order to 'serve' god?

TABLE 9.2: CHARACTERISTICS OF THE FOUR WATER MANAGEMENT FRAMEWORKS

Characteristic	Supply-Side Approach	Demand Management (DSM)	Integrated Water Resources Management	“Soft path” for water
Position	Water resources are viewed as virtually limitless. The primary constraint is our capacity to access new sources or store larger volumes of water	Water resources are viewed as finite and to be used efficiently. Conservation is key and economic cost-benefit analysis guides development strategies	Integrated management attempts to respect the full value of ecological services delivered by whole catchments. Rather than focusing only on particular water problems and sites, integrated approaches incorporate efforts to rehabilitate and preserve linked land and water systems throughout catchments to maintain important services such as free flood protection.	Water resources are viewed as finite and driven by ecological processes. The focus is on a fundamental re-evaluation of the way we develop, manage and use water
Basic Approach	REACTIVE Currently, the status quo approach – developing resources according to human needs and wants	INCREMENTAL Generally used as a secondary approach, complementing and deferring supply-side options or until future supplies are secured. However, when used in a comprehensive, integrated and long-term fashion, represents an incremental step towards a broader “soft path” approach.	LONG-TERM SYSTEMS APPROACH In the integrated management approach, the relevant factors include the full range of ecological, economic, social, cultural and technological considerations, and their interrelationships, plus the great diversity of interests that may be affected in some way and may have useful information and important perspectives to share.	PROACTIVE Long-term with potential for fundamental change in societal attitudes and resource use
Fundamental Question	How can we meet the future projected needs for water given current trends in water use and population growth?	How can we reduce current and future needs for water to conserve the resource, save money, and reduce environmental impacts?	How can we reduce current and future needs for water to conserve the resource while incorporating and serving at the same time the social, environmental and economic goals of society?	How can we deliver the services currently provided by water in the most sustainable way?
Primary Tools and Examples	Typically large-scale, centralized, expensive engineering solutions Examples include dams, reservoirs, treatment plants, pumping stations and distribution systems	Innovative engineering and economically-based solutions focused on any measure that increases the efficiency and/or timing of water use Examples include low-flow technologies, drip irrigation, conservation-based pricing, education, and policies and incentives to reduce use	Greater collaboration is required among experts in different fields as is greater acceptance of information from unconventional sources including Aboriginal and other long-time residents Full-cost pricing complemented by targeted subsidies (due to the recognition of water as an economic good) Regulatory restrictions Education tools	Encompasses the full suite of social sciences and generally relies on decentralized distribution coupled with management strategies aimed at ultra-efficient ways of meeting end-use demand. The focus is on any measure that can deliver the services provided by the resource taking full costs (including environmental and social) into account and identifying new options to provide services associated with water use

9.2.3 A Proposed New Water Ethic

This section discusses how a set of principles that comprise the proposed water ethic was identified through a review of literature and answers the question:

3. *Based on the analysis conducted for research questions (1) and (2), what would be an appropriate set of principles to comprise a proposed water ethic that is realistic, desirable and reflects sustainability and lasting well-being?*

The literature from Chapter Two indicates that an ethic is defined as a set of rules, guidelines, or principles of conduct for deciding what is right or wrong. From a water management perspective, this can be interpreted to mean an application of ethical principles, manifest in law, regulations, and/or policies, regarding the allocation, conservation and regulation of this resource and uses of it. Chapter Two also discusses the concepts of sustainable development, sustainability, sustainability ethics, and lasting well-being, in order to establish the basis for an appropriate set of principles. Requirements for moving towards sustainability, as defined by Gibson et al. (2005), center on socio-ecological system integrity, intra- and inter-generational equity, livelihood sufficiency, socio-ecological civility and democratic governance, precaution and adaptation, and intermediate and long-term integration. Chapter Four provides several examples of statements and principles, from organizations, such as the United Nations, the European Union, and the Canadian Water Resources Association, that provide more specific direction on how water should be used and managed. Using both the literature from Chapter Two and Chapter Four, an appropriate set of principles to comprise a proposed water ethic was developed and presented to case study participants for their feedback on the set of principles and its ease of implementation. In this way, the third research question was addressed and the final part of this study can now be discussed. The endorsed set of principles of the water ethic is as follows:

1. Allocate sufficient water to maintain and enhance ecosystem integrity;
2. Establish conservation and efficiency measures as a priority over new supply initiatives in water resources planning;
3. Meet basic human needs and enhance equity;
4. Establish open and participative decision-making processes;
5. Identify and seek to obtain multiple sustainability benefits from water-centered initiatives; and
6. Explicitly acknowledge system complexity and emphasize precaution.

9.2.4 Implementation of the Proposed Water Ethic

This section provides recommendations for implementing an endorsed proposed water ethic and answers the final research question:

4. *Having general endorsement of the principles of a water ethic, is it implementable at the municipal level of government in Canada?*

As stated at the beginning of this section, the participants of this study unanimously endorsed the principles of the proposed water ethic that emerged from research question #3, and suggested minor adjustments to the principles. There were no suggestions for additions to or deletions of the principles, and some participants stated that they could envision implementing such an ethic in their municipality.

The participants of the study provided some insights into their particular governance structure and/or institutional arrangement to illustrate how the water ethic may be implemented, despite several barriers. The main identified barriers were the absence of political will, lack of resources, and legislative requirements that can slow implementation of plans and strategies. The eight recommendations provided in section 8.4.1 are derived from these conversations, and are also based on policy implementation literature by Sabatier and Mazmanian (1989), Carrington (2002), Good (2003), Bullain and Toftisova (2005), Elson (2006), and Seasons (2009), as well as my experience as a professional planner. Based on the endorsement of the principles by those policy makers and the recommendations to facilitate the implementation of this particular water ethic, I conclude that there is excellent potential for municipal levels of government in Canada to adopt such a direction for water management.

9.3 Strengths and Limitations of the Research

This research is broad in its scope and its potential application, which creates both multiple opportunities and challenges. The main strength lies in its originality and its practical application of ethical theories for policy creation at the municipal level of government. There is a long and varied history of investigating the management of human uses of water resources, particularly at the global level. This particular research explored the literature in order to identify four underlying ethical frameworks that have influenced natural resource decision-making and then, through self-reporting interviews in case study areas, reflected on the level of influence these four ethical frameworks may have on water resources decision-making. This type of baseline research is in its infancy and there is much more that could be gleaned from further study into this topic. Another strength of this research is that, through a synthesis of the available and suggested principles of ethical water use, principles of a proposed water ethic were reviewed by the interviewees, and ultimately endorsed, in the case study areas.

The most significant limitation of this research hinges on the decision to focus specifically on those who have a direct influence on preparing, developing, and writing legislation, and not on the politicians who have the final decision-making authority. Although this was the goal of the research (to interview street-level staff), this decision resulted in a small pool of individuals to interview. Expanding the scope of possible participants beyond policy writers and implementers may provide further insights into the topic. In addition, the questionnaire was developed to generate the most specific pieces of information (as identified in Chapter One and Chapters Six and Seven), while recognizing the time constraints of the respondents. Therefore, the questionnaire did not include questions about the education, past

employment, or age of the interviewees, nor did the questionnaire explore the hiring practices of the participating organizations. Given that this research is about underlying ethical perspectives, demographic information about the policy makers may be useful to gather in future research.

A further challenge of this research relates to assembling credible evidence. Much of what I obtained from the interviews were statements of intent about underlying ethical positions. These statements of intent provide valuable insight into what policy makers and implementers believe, but it does not actually provide evidence into whether or not these individuals follow-through on their ethical intentions. There are likely disconnections between the values that an interviewee may hold and how, or if, these values are represented in a professional environment. I sought to triangulate these statements of intent by referring to legislation, policy, plans, regulations, and strategies to either support or refute the opinions of the interviewees. However, claiming that an entire strategy, for example, adheres to particular ethical frameworks based on the inclusion of ethical phrases and words is too much of an assertion. The most I can assert is that the legislation, policy, plans, regulations, and strategies also include statements of similar intent (or vice versa).

A final challenge with conducting research that involves interviews and questionnaires is the influence of cultural phenomena. Interviewees may want to try and please or satisfy the interviewers with responses they think are most appropriate. The interviewer must also consider that, in wanting to make a good impression, either the interviewer or interviewees may unconsciously alter or embellish responses (particularly to open-ended questions).

9.4 Contributions to the Literature

The need for and value of a new water ethic has been recognized for more than two decades by individuals such as Postel (1989; 2008), Gleick (2000), Selborne (2000), Harremoes (2002), Aureli and Brelet (2004), Priscoli et al. (2004), Rahaman and Varis (2005), Armstrong (2006), Matthews et al. (2007), and Brown and Schmidt (2010) and Gerlak et al (2011). Organizations such as the United Nations, the European Union, and the Canadian Water Resources Association have all identified sets of principles that encompass ideals such as transparent, equitable, and open decision-making. In this dissertation, I develop and extend the idea that ethical perspectives underpin the creation, development and implementation of legislation/policy/strategy. Furthermore, awareness by decision-makers regarding underlying ethical perspectives as they relate to water management may help implementation of the proposed water ethic at the municipal level of government in Canada, a position supported by Armstrong (2006). This research contributes to the literature by offering a set of principles, based on a synthesis of global and national principles of sustainable and ethical water use within a Western context, and then introducing a proposed water ethic. This proposed water ethic was then presented, the principles rated, and endorsed by provincial and municipal staff in both case study areas.

This research was inspired by the works of Leopold (1949), Carson (1962), Hardin (1968), Postel (1989, 1992), and Gleick (2000), for example. Each of these researchers examined various aspects of natural resources and the environment and offered their own perspectives on how an ethic could influence decision-making, in general. The implication of this research for natural resources and the environment, beyond water, is that it offers an alternate way of exploring the underlying ethics of those who may influence the future direction of resource management policy on a broad-scale by offering a specific set of principles that constitute an ethic.

One gap in the literature relates to the application of ethical frameworks to decision-making in the context of water management (Chapters Two and Three). Armstrong (2006, 11) supports attention to ethical underpinnings when he says that, “the objective [of an ethic] is not to convince the reader to follow any one particular way of doing ethics, but to recognize the (often only implicit) ethical components of their own position, and those of their opponents.” The results of this study show that it is possible to identify ethical frameworks, extract the defining characteristics associated with each framework, and use case studies to suggest what ethical frameworks assert varying degrees of influence. This methodological link between theory and practice may help organizations, such as area municipalities: (a) recognize what ethical considerations may currently influence legislation and policy and, (b) identify strengths and limitations of their ethical approach(es) to managing water resources.

The identification of recommendations for implementing an endorsed version of the proposed water ethic is another gap in the literature. The literature on water ethics, discussed primarily in Chapter Four but also identified in the introductory chapter and in Chapter Three, indicates that a water ethic is needed and that various templates to achieve order, coordination, consistency and agreement about water have been developed (for example, the Dublin Statement). The scholarship on water ethics advances the identification of principles, but does not provide recommendations for advancing implementation of any set of principles. The results of this study offer evidence that identification and endorsement of a comprehensive set of principles is possible within municipal contexts, and offer practical implementation recommendations. The extent to which these recommendations may be useful is yet to be determined, but there does appear to be considerable potential.

9.5 Future Research Opportunities

Several areas could benefit from additional research, including applying different ethical frameworks to the analysis of decision-making, broadening the scope of the participants, and implementing the proposed water ethic in a Canadian municipality. As mentioned throughout this dissertation, the field of water ethics is in its infancy, relative to other fields of research, and an array of studies would add to the knowledge pool.

This study is one of the first of its kind in terms of the application of ethical frameworks and decision-making at the municipal level of government in Canada. The application of these Western ethical frameworks was based on a modification of Armstrong's framework (2006). The application of other ethical frameworks could be investigated to determine differences and similarities between studies. Schmidt (2012), for example, applied a political economy ethical framework with regard to the development of Alberta's *Water for Life Strategy* and the findings from his study may either support or refute the findings of this study. Kowarsch and Schroer (2011, 1) are also investigating "what the most important ethical questions really are regarding water management and how to answer them"; these researchers are philosophers by education and thus may bring an entirely different perspective to the literature on ethics and water management.

In addition, the application of ethical frameworks to other areas of natural resources management decision-making, such as in the fields of energy, wildlife, and land conservation, may be a logical extension of this research. Similar concepts, processes and challenges exist in this type of decision-making and exploring the underlying ethical considerations that influence policy development in these areas could provide valuable comparisons and contrasts. A related area of future research is in exploring the underlying ethical foundations of other pieces of legislation, regulation, policy, and strategy. This research assumed that the Consequentialist ethical framework influences the direction of water policy in a Western context, but more investigation into this assertion is necessary. In Ontario, for example, the *Greenbelt Act*, 2005, and the accompanying *Greenbelt Plan*, was introduced to permanently protect Ontario's greenbelt. There is language in the Act and the Plan to suggest that a Consequentialist ethical framework is present, as well as some underlying evidence of an Intrinsic Value ethical framework, but further exploration of the intent and consequences of these two documents could serve to enhance ethical policy development in Ontario. Similarly, in Alberta, the *Oil and Gas Conservation Act*, 2000, is intended to conserve these natural resources, control pollution through their extraction, and promote economic and efficient development of these resources. The overall purpose and language contained in this statute also suggests an underlying Consequentialist ethical framework, due to the wish to balance social, economic and environmental concerns. However, further research into the Act's history, application, and consequences could shed light on the ethical compatibility of legislation related to Alberta's natural resources management.

This research is also original due to the identification of a proposed water ethic and associated implementation recommendations. However, this research did not test the implementation of this proposed water ethic and this is one area of inquiry that could further develop knowledge about water ethics. A case study approach, in Canadian cities such as Vancouver, Edmonton, Lethbridge, Saskatoon, and Halifax, would be an obvious route for such research, and Binstock (2010) took this approach when examining how to implement the soft path to water, also in Guelph. Each of these cities has experience with water management strategies and has experienced challenges associated with their water supply.

Investigating how to integrate ethical considerations about water into checklists and protocols related to land use development, professional codes of conduct and standards, institutional and organizational training programs in ethics, performance measures for official plans, and as standard components for municipal council reports and ministerial presentations are also examples of opportunities for future research. In addition, this research did not investigate what specific ethic presently underlies water management practices in Canada for the specific reason that it was necessary to keep this research manageable. This type of information, however, is essential to providing a more informed and comprehensive picture of how and why decisions about water resources are made, and knowing the current ethic (or ethics) could further enhance water resource decision-making and policy in Canada.

The exploratory nature of this research, and the research design, focused on qualitative methods and findings. The findings are based on the interviewees' perceptions and indications of intent. However, there is an opportunity to expand this research by focusing on quantitative methods, such as multivariate analysis, to interpret the results of the interviews and content analysis.

Finally, although the initial questionnaire did ask the respondents about their professional history and occupation, an analysis of this information cross-referenced with the identified ethical frameworks was not conducted. The absence of this analysis is attributed to needing to keep the results of the research focused on the ranking of the ethical statements and the rating of the principles of the proposed water ethic. This type of analysis, however, could yield some interesting results and is a possible avenue for future research. As recognized throughout this research, policy development is an extremely complex and political process, and involves many stakeholders and decision-makers. While this research focused on those who write, edit and develop policy, valuable insights may be gained from broadening the scope of the questionnaire to include elected municipal councillors. Councillors are elected to represent the concerns and perspectives of their constituents, and as such, are ultimately accountable for the implementation of policy.

9.6 Conclusion

Water management and ethics have a history of togetherness, stretching back many thousands of years. The new attention to water management ethics most likely arises from the increasing scale of water worries and the evident difficulties in addressing the underlying problems adequately, resulting in multiple calls over the last two decades for a water ethic. An awareness of underlying ethical perspectives is critical to the sustainability and lasting well-being of water resources in Canada, and throughout the world. Many have contributed to the advancement of water and ethics by developing guiding principles or principles for the wise use of water. However, there has yet to be a water ethic endorsed and implemented at the municipal level of government in Canada.

I acknowledge that ethics is a complex area of study; and coupling the field of water resources management with ethics results in an ever-more complex research relationship. The identification of four ethical frameworks and exploring their influence on policy creation and implementation marks a starting point for future research in the area of ethical policy implementation. The additional task of presenting a proposed water ethic, achieving endorsement, and providing pragmatic recommendations for its implementation is another area where further scholarly investigation can be advanced.

Many challenges remain before full implementation of the proposed water ethic can be achieved. Wide adoption of any set of ethical principles takes time, but once thoroughly embedded in legislation and policy, the proposed water ethic has the potential to exert significant influence over behaviour regarding the allocation and use of water. If, as this research indicates, policy makers are willing to become more aware of their underlying ethical underpinnings and acknowledge the role ethics may play in the decision-making process, then wiser use of water resources may result.

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Appendices

Appendix A: Case Study Questionnaire

Section A: Background

1. What is your involvement and interest in water issues? Please indicate the category that most applies.
 - a) water manager
 - b) water engineer
 - c) policy researcher
 - d) policy maker
 - e) academic
 - f) other (please specify)
2. How many years experience do you have regarding the interest identified in above?

Section B: Ethical Frameworks

3. According to the following ethical statements please choose five (5) that most define how you make decisions in your professional life. Please rank in order of most important (1) to least important (5).
 - a) Greatest good for greatest number of people
 - b) We are all responsible for our actions, past, present and future
 - c) All elements of an ecosystem, animate and inanimate, have value
 - d) The environment is the creation of a divine being
 - e) Believe in balancing economic, environmental and social elements
 - f) The environment is not just an object for human exploitation
 - g) Humans and nature are intimately linked
 - h) Resources are protected purely because of human need
 - i) Thoughts about the environment can be traced to indigenous thought
 - j) Economic needs are more significant than environmental needs
4. Some research suggests that water should be managed as a finite resource (i.e., as limited):
 - a) Do you think the relevant legislation, policies or documents recognize the finite nature of water resources?
 - b) How do you think the Provincial government (under which you work) could effectively implement policies relating to the finite nature of water?
5. Some research suggests that water should be treated as a common resource.
 - a) Do you think relevant legislation, policy, or documents address this issue?
 - b) What, if anything, should each level of government do to implement water being treated as a common resource?
6. Some research suggests water should be ensured for all people (regardless of economic status, ethnicity, religion, etc.) to meet their basic need.
 - a) Do you think relevant legislation, policy, or documents address this issue?
 - b) What, if anything, should each level of government do to implement ensuring water for all people?
7. Some argue that future generations of humans should be considered while managing water resources.

- a) Do you think relevant legislation, policy, or documents address this issue?
 - b) How do you think implementation of the relevant legislation, policies or documents address this issue?
8. Some suggest that the environment, or ecosystems, should be considered in allocation and quality management of water.
- a) Do you think relevant legislation, policy, or documents address this issue?
 - b) What, if anything, should each level of government do to implement the idea that the environment and ecosystems should be considered in allocation and quality management of water?
9. Some support the idea of a systems-oriented approach to water management.
- a) Do you think relevant legislation, policy, or documents address this issue?
 - b) What, if anything, should each level of government do to implement a systems-oriented approach to water management?

Section C: Proposed Principles of a Water Ethic

10. Based on a summary of international declarations, various progressive statutes (e.g., South Africa, Australia) and relevant water-based documents, six (6) principles of a proposed water ethic have been identified.

Please rate these principles according to your strength of agreement or disagreement regarding whether each principle should be included in a shared water ethic (5= strongly agree; 4 = agree; 3 = neutral; 2 = disagree; 1 = strongly disagree). The principles are:

- 1) Meet basic human needs and enhance equity today and for the future
- 2) Safeguard ecosystems by allocating sufficient water to maintain ecosystem integrity, including the preservation of ecosystem services
- 3) Encourage efficiency and conservation
- 4) Establish open and participative decision-making processes
- 5) Respect system complexity and emphasize precaution
- 6) Seek multiple sustainability benefits from water-centred initiatives, including enhancements of livelihood opportunities, health, education, and security.

- a) Are there any principles that you think are interdependent? If so, please identify the principles, and if possible, elaborate on why you think this is the case.
 - b) Should any of the principles be deleted from the list? If yes, which ones?
 - c) Should other ethical principles be included in a water ethic?
11. In terms of implementing this, or any other, water ethic at the local/municipal level of government, are there any institutional arrangements that need to be changed for successful implementation? For example, shifting the primary responsibility of policy formation regarding water allocation to non-engineering professionals?

Appendix B: *imagine*Calgary Plan's Goals and Targets for Water Resources (2006, 76-79)



NATURAL ENVIRONMENT

Water

System Natural environment

Goal Water is recognized as necessary for life. Calgarians value this precious resource and guarantee equitable access for all living things. We are stewards of water, protecting its quality and maintaining the integrity of the hydrologic cycle. Our water supply system is sufficiently secure, flexible and adaptable to changing conditions and circumstances.

1	<p>TARGET By 2036, per capita water consumption is reduced by 40 per cent.</p>
	<p>STRATEGY 1 Co-ordinate and support strategic initiatives in water conservation among all government and non-profit sectors to accomplish synergy and economies of scale.</p> <ul style="list-style-type: none"> • Support The City of Calgary's Water Efficiency Plan. • Encourage the co-ordination of efforts of the Bow River Basin Council. • Support the overall objectives of the Water for Life strategy, which states "Albertans will be leaders in conservation by using water efficiently and effectively." • Encourage collaborative efforts to increase The City's target of a 30 per cent water use reduction by 2030 to 40 per cent by 2030. • Research/eliminate health issues that restrict water conservation practices like grey water use. <p>STRATEGY 2 Use economic and financial tools to reduce water consumption and increase ecological service contribution.</p> <ul style="list-style-type: none"> • Lower rates/taxes or offer other incentives to decrease consumption. • Subsidize new technologies (economic incentives). • Apply full cost accounting. <p>STRATEGY 3 Establish community design initiatives that will result in decreased consumption and improved ecology.</p> <ul style="list-style-type: none"> • Encourage community design that maximizes the use of recycled water. • Designate what percentage of land should remain permeable (without paved surfaces). • Increase erosion controls and decrease impermeability. • Promote low-impact development (e.g. introduce swales). • Establish ecological infrastructure for cities and towns that requires less use of materials, energy and engineering. <p>STRATEGY 4 Adapt engineering infrastructure design to accommodate ecological infrastructure that will lead to water conservation.</p> <ul style="list-style-type: none"> • Use green infrastructure design and technology to restore and enhance wetlands. • Provide opportunities for low-impact development standards. • Reduce road width standards to reduce imperviousness. • Apply green infrastructure management where land use and wastewater management regulate and augment water flows in wetlands. • Develop regulations that control the impacts of construction on land water resources. • Conduct hydrological impact assessments prior to development.

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	<p>STRATEGY 5 Ensure current systems, policies and regulations are consistent with sustainable water use policies.</p> <ul style="list-style-type: none"> • Explore regulatory opportunities that favour water use efficiency. • Apply universal metering programs. • Restrict outdoor water use. <p>STRATEGY 6 Raise awareness of water conservation and encourage citizens to adopt water-efficient technologies and processes.</p> <ul style="list-style-type: none"> • Encourage community involvement in conservation planning. • Support water education among non-governmental organizations and other groups.
<p>2</p>	<p>TARGET By 2036, positive rates of flow in the Bow River Basin are maintained to keep aquatic ecosystems at these levels.</p>
	<p>STRATEGY 1 Encourage the co-ordination of water management strategies to accomplish synergy (saving resources and achieving objectives faster in order to protect the resources).</p> <ul style="list-style-type: none"> • Encourage the co-ordination of strategies between provincial and basin levels. • Support Alberta Environment's implementation of the Water Management Plan for the South Saskatchewan River Organization, which recommends there will be no additional allocations. • Establish the minimum in-stream flow needed to support all aquatic life forms by 2010 for the entire Bow River Basin. • Support Alberta Environment's water conservation objectives. • Permit opportunities for flow restoration. • Support appropriate basin-wide indicator development by the Bow River Basin Council. <p>STRATEGY 2 Minimize the impacts of up- and downstream development activities on water flow.</p> <ul style="list-style-type: none"> • Encourage TransAlta Utilities to operate hydroelectric dams in a way that minimizes their impacts on aquatic ecosystems. • Encourage people to use water in a way that returns most of the water diverted back to rivers on a continuous basis and in good quality, while recognizing their rights to economic development and prosperity. • Support flow restoration and water and land management for the Bow River downstream of Calgary to meet objectives for aquatic ecosystems.

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	<p>STRATEGY 3 Develop a strategy for watershed protection.</p> <ul style="list-style-type: none"> • Establish an ecological inventory and water balance sheet. • Establish objectives for aquatic ecosystems as described in the Alberta Government's Water for Life strategy. • Through watershed management planning, encourage land uses that protect riparian habitats. • Establish a water trust to buy up water allocations to keep water in streams.
<h1>3</h1>	<p>TARGET By 2036, effective impervious areas are reduced equal to or below 30 per cent to restore natural hydrograph and become less susceptible to flooding.</p>
	<p>STRATEGY 1 Develop policies (planning, engineering, transportation) and land use requirements that will promote permeability and reduce the share of imperviousness.</p> <ul style="list-style-type: none"> • Designate what percentage of land should remain permeable (without paved surfaces). • Increase erosion controls and decrease impermeability. • Promote low-impact development (e.g. introduce swales). • Establish community design standards that foster sustainable forms of transportation. • Align policy with conservation. • Foster conservation ethics. • "Unbundle" parking from residential units; buying condos and parking spaces separately results in less automobile ownership. • Create parking maximums for developments in order to promote automobile alternatives. • Reduce the sizes of driveways. • Reduce road width. • Require businesses in Calgary to use water-efficient technologies at their sites and in new or renovation projects. <p>STRATEGY 2 Disconnect impervious surfaces from the drainage system so that runoff does not flow directly to streams.</p> <ul style="list-style-type: none"> • Develop ecological approaches to infrastructure management that provide for on-site water infiltration where possible. • Promote permeable paving (e.g. paving tiles). • Promote rooftop rainwater catchment systems and gardens, and water-retaining eco-roofs. • Reduce the effects of soil compaction, lack of topsoil, loss of soil aerating organisms and vegetation removal on permeability. • Allow for the natural restoration of streams and wetlands. • Increase native tree planting and landscaping. • Encourage swales along building lots and parking areas, also considering human health impacts. • Encourage on-site stormwater storage and use.

Water

System Natural environment

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4	<p>TARGET By 2036, watershed health — as measured by loss of wetlands, water quality, non-compliance with pollution standards, in-stream flow and groundwater levels — improves.</p>
	<p>STRATEGY 1 Establish a forum to increase co-ordination among the stakeholders who directly impact river basin issues.</p> <ul style="list-style-type: none"> • Support the province’s Water for Life strategy, specifically the watershed approach for planning and management. • Establish regional watershed goals and targets. • Align policies with conservation. • Establish a co-ordinated approach to healthy water. <p>STRATEGY 2 Decrease all forms of water and riparian zone pollution.</p> <ul style="list-style-type: none"> • Support City of Calgary initiatives as described in the Water Efficiency Plan (2005). • Control nutrient loading to the river. • Support the best available technologies and practices for irrigation in- and outside the city. • Reduce harmful pesticide use to levels acceptable environmentally and for human (health). • Support alternative land practices that decrease pollution. <p>STRATEGY 3 Restore water quantity and quality to improve hydrological cycles.</p> <ul style="list-style-type: none"> • Apply full cost accounting to water quantity and quality. • Seek to restore a full complement of native plants and animals. • Connect habitat with surrounding watersheds. • Ensure there is a net increase in viable wetlands. • Establish groundwater testing criteria that will involve the identification and protection of key recharge areas, establishing natural water tables and natural recharge rates. • Ban the commercial and industrial mining of groundwater. • Ensure the residential extraction rate does not exceed the recharge rate. • Increase groundwater levels. • Use a combined approach of reducing effective impervious area, reforesting open space uplands, protecting riparian corridors and strategically placing facilities; this will improve stream health more than one or two strategies alone would.
5	<p>TARGET By 2036, Calgary’s ecological footprint decreases to below the 2001 Canadian average of 7.25 hectares per capita.</p>
	<p>STRATEGY 1 Reduce water consumption.</p> <ul style="list-style-type: none"> • Reduce water consumption by using water-efficient showerheads, turning off taps when not in use and collecting rainwater to water plants and lawns.

Appendix C: The City of Calgary's Municipal Development Plan's Water Policies (2012, pp.2-43 and 2-45)

2.6.3 Water

Objective Protect, conserve and enhance water quality and quantity by creating a land use and transportation framework that protects the watershed.

Water is a basic human need, critical for survival. Our rivers and creeks are the most visible part of a complex hydrological system. However, rivers are far more than the waters within their banks - they are the hearts of freshwater systems called watersheds that include all lands that drain to the rivers, as well as groundwater, springs, wetlands, ponds, streams and lakes within those lands. Watersheds reflect both the natural characteristics of their geography and the impacts of human activities within them.

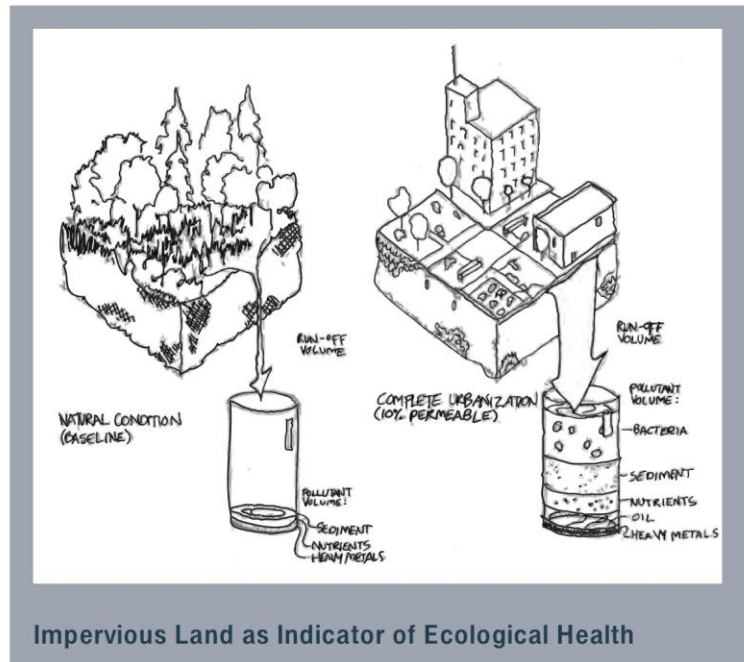
The City recognizes its location within the regional watersheds and the decisions made in Calgary may have impacts on regional water quality.

Watersheds in the Calgary Region are being rapidly developed for residential and industrial purposes. Development alters the balance and quality of water by:

- Change hydrology and flow patterns.
- Increase runoff from precipitation and reduce groundwater recharge.

- Increase water pollution (sediment, nutrients, bacteria, toxins, heavy metals, etc.).
- Increase water acidity.
- Raise water temperatures.

Calgary is situated within six watersheds, including the Bow River, the Elbow River, Nose Creek, Fish Creek, Pine Creek and the Shepard Wetland/Western Headworks Canal (see Figure 2-5). With an increase in severe weather patterns, including floods and droughts, decreasing freshwater resources and increasing land use changes, Calgary is becoming increasingly vulnerable to climatic changes.



Policies

- a. Recognize the importance of ground and surface water in supporting life and the prosperity of Calgarians and downstream municipalities.
- b. Protect and integrate critical ecological areas such as wetlands, floodplains and riparian corridors into development areas.
- c. Create watershed overlay maps to achieve water quality and quantity objectives and integrate the principles and policies of relevant watershed management plans into Local Area Plans.
- d. Incorporate the principles of green infrastructure into community, road and street design (see Part 3 CTP).
- e. Decrease impervious surfaces by minimizing development on undisturbed and agricultural lands.
- f. Encourage the reduction of overall land disturbance and impervious surfaces associated with development (including existing riparian areas and wetlands) by:
 - i. Preserving large, contiguous areas of absorbent open space within the city to maintain water quality;
 - ii. Promoting site-level techniques such as low impact development to prevent, treat and store runoff and associated pollutants;
 - iii. Using natural features (drainage and vegetation patterns) to increase onsite infiltration and minimize runoff;
- iv. Reducing the mean impervious cover by reducing the land required for vehicles, including parking lots, driveways, streets and directing runoff from impervious areas using appropriate stormwater source control best management practices;
- v. Designing to include pervious surfaces that allow the hydrologic cycle to continue close to its pre-development state, so that resulting flow duration curves do not impact fluvial morphology of streams or water balance of wetlands, aquifers are recharged and runoff pollutant loadings are prevented;
- vi. Developing stormwater plans to include stormwater source control practices, low-impact development strategies and technologies, post-development maintenance plans and setbacks to allow for infiltration and appropriate runoff timing; and,
- vii. Ensuring that approval standards are linked to water quality and quantity objectives of water management plans.
- g. Promote water conservation initiatives, including on-site stormwater and wastewater reuse and treatment.
- h. Encourage the design of public and private landscaping to reduce the need for water, and promote practices and vegetation choices that promote water conservation.
- i. Increase the tree canopy to achieve water quality benefits by reducing evaporation and promoting infiltration.