

CANADIAN/AMERICAN GROUNDWATER ISSUES

THE FORGOTTEN RESOURCE

by

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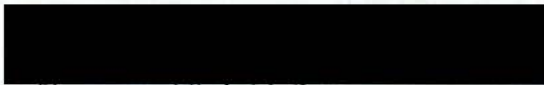

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Groundwater has been the forgotten resource in Canadian/American transboundary issues. Although transboundary groundwater is "out-of-sight, out-of-mind," real issues of groundwater allocation and contamination truly exist. Only recently has transboundary groundwater become a major concern. The Great Lakes region is experiencing some of the most complex interrelated groundwater problems anywhere. To compound the Great Lakes problems, the groundwater is shared by two independent sovereign nations. The traditional legal and institutional frameworks mandated by the United States and Canada deal strictly with surface water conflicts.

Groundwater must now be incorporated in a binational

framework. This thesis explores the cultural, legal, institutional, and international frameworks of both countries to determine the best solutions for incorporating transboundary groundwater protection into a binational scheme. By incorporating a three dimensional approach to transboundary water issues both countries would be in a position to manage comprehensively all types of water issues including groundwater.

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CHAPTER I

INTRODUCTION

Conceptualizing the Roots of the Tree

Groundwater has been the forgotten resource in the extended history of national and binational affairs between the United States and Canada. By its very nature groundwater exists in the within the ground unseen, often misunderstood, and usually totally ignored. Historical international concern about jointly shared waters of the U.S. and Canada have focused solely on surface water resource issues.¹

Nothing in the plethora of material documenting the interaction of the U.S. and Canada concerning surface water transboundary issues has indicated a concern for groundwater as a problematic issue until just recently.² The traditional institutional and legal framework established by Canada and the U.S. mandates only activities which deal strictly with surface water conflicts. Groundwater is totally excluded.³

However, recent efforts to ascertain the extent of groundwater problems within the Great Lakes Region and the Flathead River Basin (located on the border of Montana,

Alberta, and British Columbia, see map page 71) have revealed that groundwater transboundary problems exist or could potentially exist both in terms of quality and quantity.⁴ A Great Lakes Conference on groundwater issues between the two countries occurred in 1989.⁵ Also, a group of multidisciplinary international specialists just recently completed the Bellagio Draft Treaty, an international transboundary groundwater document which seeks to address multilateral contamination, depletion, drought, and transboundary transfers.⁶

Phone interviews with a U.S. International Joint Commission (IJC) appointee and his Canadian counter-part have revealed parallel views concerning groundwater.⁷ When asked whether groundwater was a transboundary issue, both confirmed that it was definitely a transboundary issue looming on the horizon with only negligible analysis performed by either country and without any legal mandate to confront any problems which have and are arising.⁸

Further phone interviews with major water experts on both sides of the border have revealed that lack of groundwater issues between the two countries correlates directly to the lack of aquifer analysis and information along the border, and not because groundwater issues do not exist.⁹ Most of the experts noted that it is only a matter of time, political will, groundwater emergencies, and money,

before mechanisms evolve to manage transboundary groundwater issues.

The time has arrived to incorporate groundwater protection into a binational framework. In an apt analogy during a conference on transboundary surface water issues between Canada and the United States, a speaker described river systems as "trees." The speaker was illustrating this analogy in the horizontal sense, noting:

Let us suppose that we are nurserymen, and I ask you questions about this set of trees (rivers). Some of you want to cut the trunk off, and some of you want to change a couple of limbs. But if this were a growing organism you obviously could not change one piece of it without affecting the rest of the tree. In fact, some changes would kill the whole system.¹⁰

Conceptually, in reference to legal and institutional mechanisms established by the United States and Canada to address transboundary water issues between the two countries, such mechanisms have only confronted surface water issues (the trunk and branches of the tree, so to speak). In contrast, there are few if any legal or institutional mechanisms which address the vertical aspect of the analogy, the roots of the tree or the groundwater system.

Logically, by incorporating a three dimensional approach to transboundary water issues, (i.e., addressing the whole hydrologic cycle) both countries would be in a position to systematically manage all types of water issues including groundwater, based on sound fundamental hydrological principles. A balanced holistic hydrological approach that recognizes the fundamental interaction between surface water and groundwater and the land uses associated with such resources may be the best course of action.

The purpose of this thesis is to explore the cultural, physical, legal, institutional and international implications of incorporating groundwater protection into a binational scheme. Two fundamental issues will be addressed: (1) can and should existing regulatory mechanisms and institutions be adapted to address the problem or should new ones be created; and (2) in what forum should protection problems be addressed.

The Nature of Transboundary Issues

Canada and the United States share roughly 5,000 miles of the world's longest undefended and most peaceful border.¹¹ They share a common history, ecology, landscape, ancestral origin, culture, sets of goals and values, and most notably, as is the concern of this paper, water. Water and air do not adhere to an arbitrary political boundary, but to physical boundaries. The tendency of the two

countries is to maximize water potential within their political boundary with disregard to the physical boundaries.

Because water adheres only to physical limits, activities of one country affect the culture, ecology, and landscape of the other. This sets the stage for complex multilateral confrontations. In the end, each country may have to sacrifice a small part of its sovereignty to achieve some sort of workable compromise, which is not to say that these compromises are always equitable or bilaterally beneficial.

This is the essence of transboundary water issues between Canada and the United States. As groundwater moves from obscurity to a "realized or recognized" transboundary issue, the same political principles will apply. What makes groundwater distinct is that the actors and interested parties can not visualize the resource and do not always understand the complexities involved in its degradation. But it is the actors of each country who must find solutions.

Potential Actors in Groundwater Transboundary Issues

International

In 1909, the United States and Great Britain (Canada's mentor at the time) signed The Boundary Waters Treaty (see

Appendix 1), an agreement with the purpose of preventing and settling disputes arising from the use of boundary waters.¹²

The Boundary Waters Treaty (BWT) established the International Joint Commission (IJC), a bilateral body made up of six commissioners, three from Canada appointed by the Canadian Governor in Council and three from the U.S. appointed by the President.¹³ There is a profusion of written material on the IJC,¹⁴ and over-all there seems to be a consensus that it has done a good job with fairly limited tools.¹⁵

The IJC performs four major functions: administration, investigation, quasi-adjudication, and arbitration. The IJC's legal mandate and authority in relation to the BWT are strictly oriented towards surface water conflicts with a couple of notable exceptions which will be discussed later. Since its creation, as one author notes, the IJC has concentrated exclusively on the following areas:

1. approval of hydroelectric, flood control, and reclamation and irrigation storage structures which entail flood damage upstream across the frontier;
2. approval of hydroelectric structures and navigation improvements on boundary waters;
3. application for approval of assorted minor river works;
4. water appropriation from boundary and transboundary water, both intra and inter basin; and
5. investigations of various types.¹⁶

Conceptually, these areas can be further broken down into "single use development, such as power dam or flood control structures on a body of water as opposed to "multiple use" planning and development of a water basin.¹⁷

The IJC has handled 102 transboundary cases between 1912-75, and has had between 75 and 80% of its recommendations accepted by the two governments. These recommendations have stood up over time.¹⁸ With its long and successful institutional history, the IJC is the ideal bilateral body to oversee and mediate controversial groundwater issues, and in fact has commissioned studies on groundwater/surface water interaction in the Flathead River basin of Montana and Saskatchewan.¹⁹

Federal

The federal Canadian actors are more active in bilateral issues than their U.S. counterparts.²⁰ The Department of External Affairs, which is analogous to the U.S. State Department, has a highly staffed Bureau of U.S. Affairs which handles general relations (i.e., politics, economics, and military issues) and transboundary relations (i.e., traffic trade, physical aspects of the border, all environmental affairs). Within transboundary relations there are five full time environmental transboundary specialists based out of Ottawa. There is a Canadian

Consulate in every major U.S. city, acting as the "eyes and ears" of External Affairs.²¹

Canada's EPA equivalent is Environment Canada. Its main function is to set environmental policy. Under Environment Canada is the Environmental Protection Service, the Inland Water Directorate, and the Atmospheric Environmental Service. These departments, in the past, have assisted the IJC in fact-finding investigations.

The American federal actors are comparatively very few in number and less experienced in diplomatic relations between the two countries than their Canadian counterparts.²² The Canadians maintain a solid block of senior diplomats while the U.S. diplomats are usually younger and inexperienced. There is the State Department, which for all its bureaucratic mass, has only one diplomat assigned to Canadian transboundary issues.²³ The EPA has an Office of International Affairs which also only has one full time person involved in Canadian affairs. There is, however, constant private interface with public officials in a variety of federal agencies both on the Canadian and American sides.²⁴

The federal role in a transboundary groundwater protection scheme could also be potentially strong. Given the past practices under the Reagan/Mulroney administrations and the slow start by the Bush administration, a strong role

is unlikely for the foreseeable future. The federal role should involve technical support and guidance in evaluating specific problems. Both Canada and the U.S. have the necessary resources and investigative infrastructures in place (i.e., for U.S.: EPA & USGS, for Canada: Department of Environment) to evaluate many crucial hydrologic and contamination questions pertinent to the solutions of transboundary groundwater problems. Couple these technical resources with the administrative expertise of the IJC and the solutions to transboundary groundwater issues are not far behind.

Provincial and State Actors

Canadian provincial actors play a very large role in transboundary water issues because under The British North American Act²⁵ the provinces own and control all resources within their boundaries including their groundwater resources. Each province has set up its own external affairs department to deal directly with foreign relations. There is a constant power "tug-of-war" between the Parliament and the provinces. The result is a constant negotiation process as to who plays what part on what issue.

The U.S. state actors have in the past played relatively small roles (usually on an issue by issue basis) in transboundary water issues, leaving the federal government to handle the negotiations. As noted by

Montana's former Governor Ted Schwinden, "There is a renewed sense of federalism...we can solve our own problem."²⁶ This statement reflects the growing federalism among states which abut the 49th parallel. Increasingly, this federalist movement is in reaction to the lack of concern on the part of the federal government.

The potential is very high for states and provinces to play crucial roles in transboundary groundwater issues. Any adverse impact on the groundwater resource will be felt by the primary users of the resource. The state and provincial governments not only have a political incentive to protect their own users but have an economic incentive to maximize the resource within their own jurisdictions. The state and provincial governments are also in the best position to mutually protect the resource through land use and source protection controls.

Local Governments Along the Border

For those who actually use groundwater and feel the effects of having a town water supply become contaminated or have wells run dry, the regulation of transboundary groundwater issues becomes a very acute and real issue. In the late 1890's it was not uncommon for local Montana and Alberta ranchers to take transboundary water issues into their own hands including range wars over water allocation.²⁷ Concern for family, property, health, and

livelihood become central to the equation when dealing with groundwater problems at the local level.

These actual users at the local level have the most to lose and gain in transboundary groundwater protection and allocation. In order to protect the groundwater resource and prevent contamination certain land use controls at the local level are inevitable. For those residing along the border that means that they will benefit from a protected resource at the expense of having their property rights regulated. For a farmer from Alberta or Montana, this may mean a curtailment in pesticide or fertilizer application so that the farmer on the opposite side of the arbitrary political line will be able to allow his cattle to drink the water.

The inequities of any regulation of the border will manifest themselves at the local level. The political reality is that in order to protect the resource for the "many" some of the "few" will lose out economically. Those who sense a threat will put political pressure on local, state, or provincial governments to protect their interests. In the end these local users have or should have an important say in the outcome of any transboundary regulatory mechanism.

Other Actors

There are a wide variety of non-governmental actors which include Canadian/American policy institutes, environmental interest groups, citizen interest groups, Indian tribes, corporate interests, and a host of others which involve themselves usually on an issue by issue basis across the common frontier. Their importance to any given transboundary groundwater issue depends on the types of interests involved and the extent to which they can politically influence the process.

Geophysical Nature of the Border

The hydro-physical nature of the border lands is quite diverse. The length of the border transverses six major drainage basins (Figure 1), three physiographic regions (Figure 2), and countless unmapped groundwater systems. To date, only two areas along the 49th parallel (Flathead River Basin and the Great Lakes Region) have been extensively analyzed in terms of groundwater quality, quantity, and flow direction.²⁸

The climate at the border ranges from humid, semi-arid, to arid.²⁹ Of importance, in terms of groundwater quantity issues which are likely to arise, are the potential water deficit regions of the Great Plains states and provinces (Figures 3 and 4).

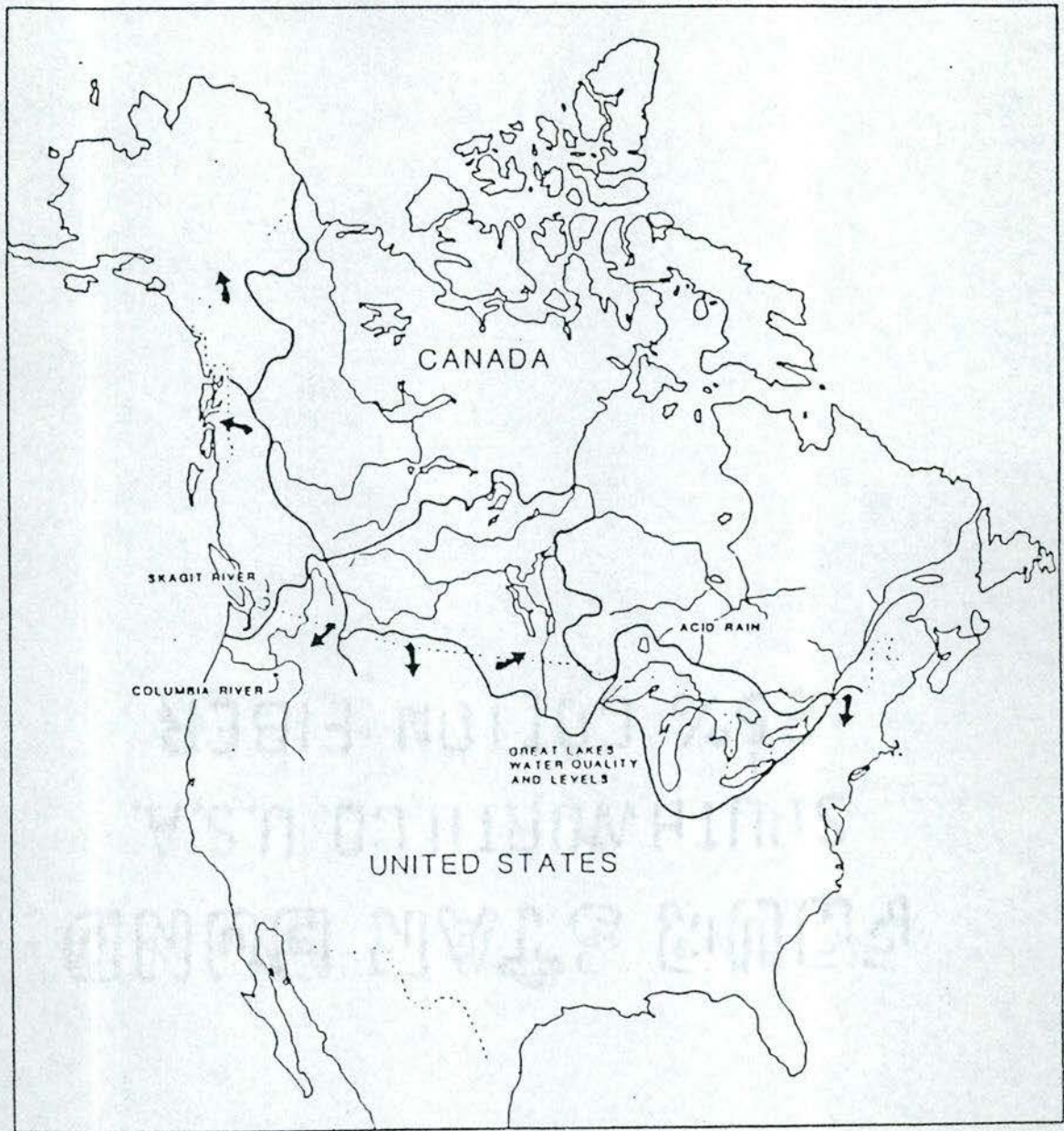


FIGURE 1. Six major drainage basins.

Source: Saddler, 26 Nat. Resources J. 202 (1986).

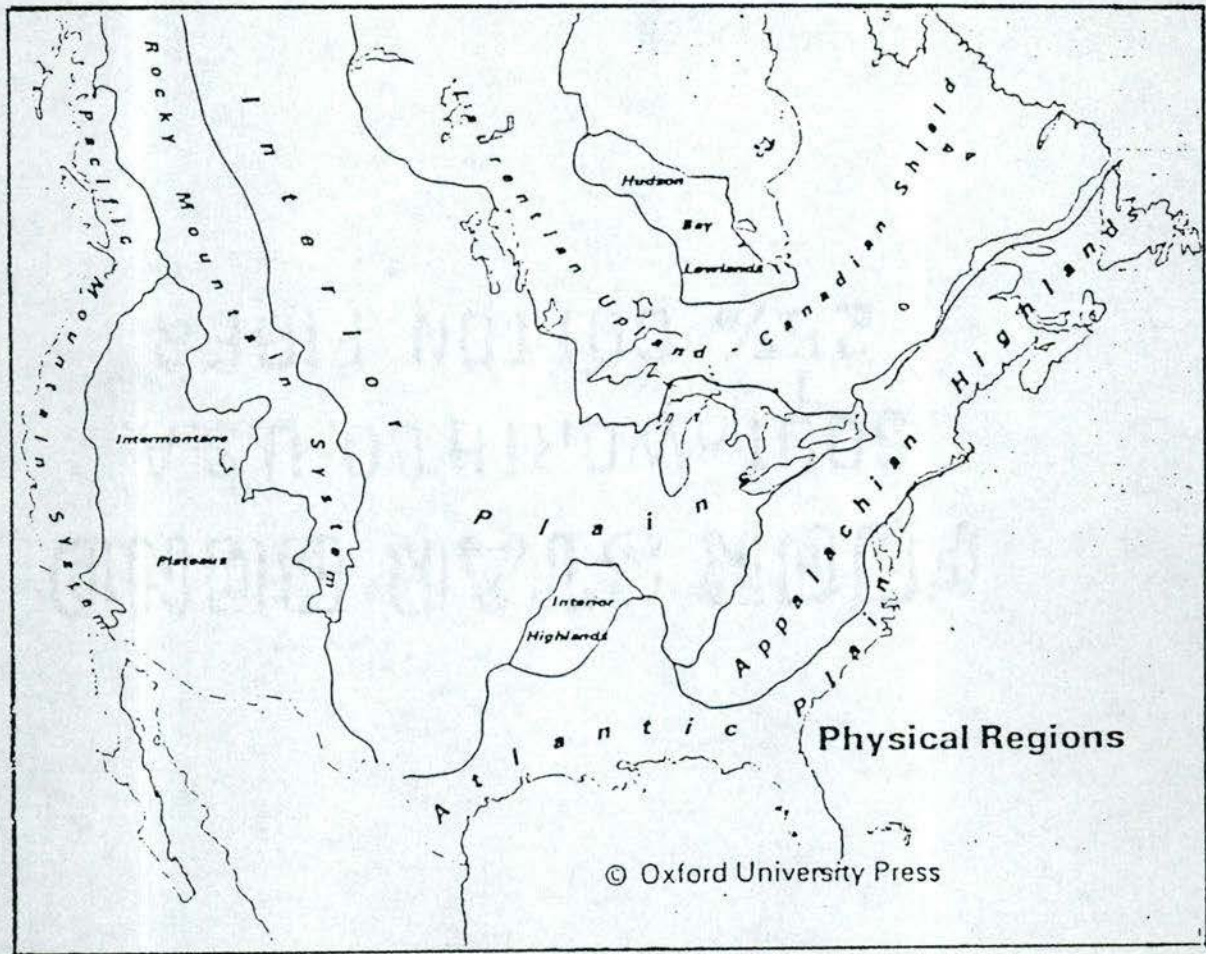


FIGURE 2. North American physiographic regions.

Source: The U.S. and Canadian Oxford Economic Atlas (1966).

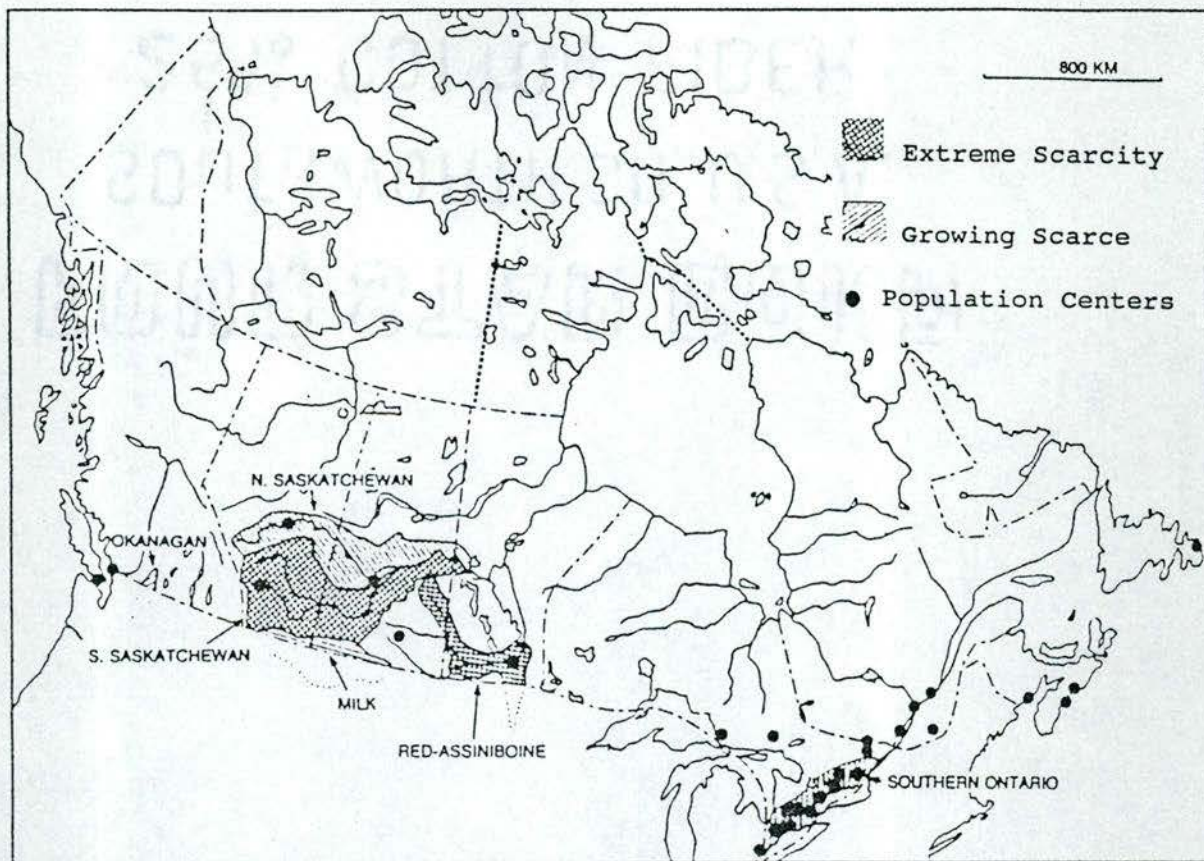


FIGURE 3. Potential Water Deficient Regions in Canada.

Source: Foster & Sewell, Water, the Emerging Crisis in Canada, (1986).

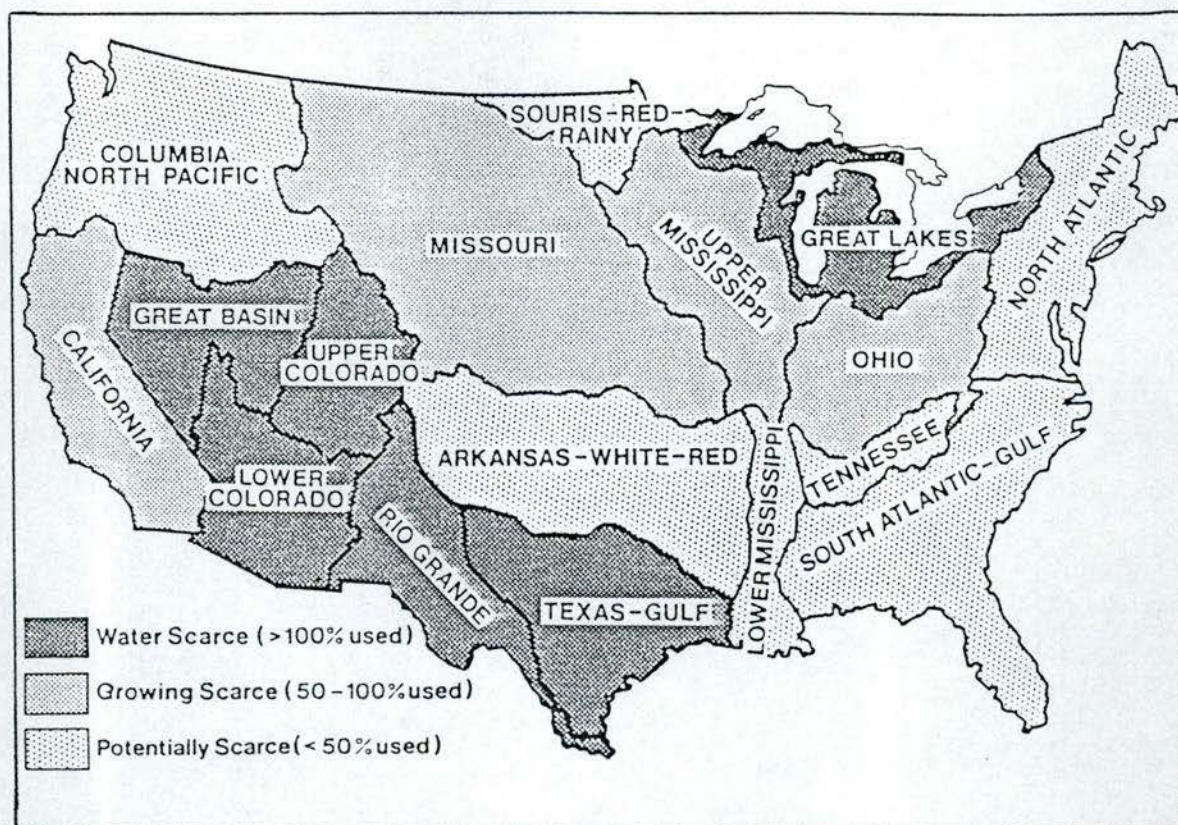


FIGURE 4. Potential water deficient regions in the U.S.

Source: Foster & Sewell, Water the Emerging Crisis in Canada, (1986).

Water scarcity in this region will become a major transboundary allocation issue in the years to come.³⁰

There are acute north-south demographic differences along the 49th parallel. In general, three-fourths of all Canadians reside within one hundred miles of the U.S. border.³¹ Conversely, the U.S. population density along the border of Canada, especially in the western region, is comparatively sparse. What is the "snow-belt" for Americans is the "sun-belt" for the Canadians.³²

The differences in demographic distribution between the two countries are also illustrated by extensive development patterns in the southern regions of Canada near the border versus the preservation tendencies of the U.S. (i.e., Boundary Waters Canoe Area in Minnesota and Glacier National Park in Montana, among others).

Of further note are the vast untapped reserves of coal and petroleum within the provinces of British Columbia, Alberta, and Saskatchewan, and the states of Montana and North Dakota. Currently, these resources have only been minimally exploited, causing only a few water resource conflicts.³³ The future potential of energy/water resource conflicts will substantially increase as costs of energy increase.

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Notes

1. For an historical account see: J.E. Carroll, Environmental Diplomacy (1983); and L.M. Bloomfield, Boundary Water Problems of Canada and the United States (1958).

2. See Tarlock & Deutsch, Great Lakes Groundwater-- The Neglected Resource, 65 Chi.[-]Kent L. Rev. 345 (1989); Hayton & Utton, Transboundary Groundwaters: The Bellagio Draft Treaty, 29 Nat. Resources J. 663 (1989); and United States Geological Survey, Groundwater-Surface Water Relations in the Flathead River Valley near Proposed Cabin Creek Coal Mine, British Columbia Canada, Report 87-28, 1987 [hereinafter Flathead].

3. Boundary Waters Treaty, Jan. 11, 1909, United States-United Kingdom, 36 Stat. 2448, T.I.A.S. No. 548 (here-after cited as BWT).

4. Tarlock, supra note 2, at 345; Flathead, supra note 2.

5. Id.

6. Hayton, supra note 2, at 663.

7. Phone interview with Dr. Fisher, the American IJC appointee (Nov. 9, 1987); and Phone interview with Dr. Hamilton, the Canadian IJC appointee (Nov. 9, 1987).

8. Id.

9. Phone interviews with Bob Davis USGS, Helena MT, (Jan. 15, 1988); Barry Sadler, Director of Programs for Canada of the Institute of the North American West (Jan. 15, 1988); Robert Newbury, Research Scientist at Fresh Water Institute in Canada (Jan. 16th 1988); John Giland, Canadian National Hydrological Institute, (Jan. 17th 1988); and John Cherry, National Groundwater Expert for Canada, (Jan. 17th, 1988).

10. R. Newbury, Research Scientist at the Freshwater Institute for the Canadian Department of Fisheries and Oceans, presented a speech on international river basin planning in which he utilized the analogy described in the text. He spoke at the Western Border Waters Forum held in Helena, Montana, Oct 30-31, 1986.

11. Carroll, supra note 1, at 1.

12. BWT, supra note 3.

13.Id., at Article VII.

14.The following references discuss the IJC at length: Carroll, *supra* note 1, at 39-58; Bloomfield, *supra* note 1; The International Joint Commission Seventy Years On, (R. Spencer ed. 1981); W.R. Willoughby, The Joint Organizations of Canada and the United States, 17- 64, (1979); Jordon, The International Joint Commission and Canada-United States Relations, 522-543, in: Canadian Perspectives on International Law and Organization, (R. MacDonald ed. 1974); and Sugarman, International Joint Commission and Principles of International Law, 51, in: Common Boundary/Common Problems, (ABA ed. 1981).

15.Id.

16.Carroll, *supra* note 1, at 48.

17.Jordan, *supra* note 12, at 528.

18.Carroll, *supra* note 1, at 52.

19.Flathead, *supra* note 2.

20.Id. at 10.

21.Id. at 11.

22.Id.

23.Id.

24.An example of this type of dialogue was demonstrated at the December 1986 Western Boundary Waters Conference held in Helena Montana. The Conference was attended by federal state, and provincial governmental officials, college professors, and private individuals.

25.British North American Act (BNA), 30 &31 Victoria, C.3, (1867).

26.An opening keynote speech given by Montana Governor Ted Schwinden at the 1986 Western Boundary Waters Conference held in Helena, Montana, October 30, (1986).

27.Bloomfield, *supra* note, at 1.

28.Flathead, *supra* note 2; Tarlock, *supra* note 2.

29. There are several good references regarding climatic patterns. For Canada: see D.F. Putnam, Canada: A Regional Analysis, 1979. For the U.S.: see J.J. Geraghty, Water Atlas of the U.S., (1973); USGS National Surface Water Summary Paper, No. 2300, (1985).

30. P.H. Pearse, F. Bertrand, & J.W. MacLaren, Currents of Change, 222, 37-49, (1985).

31. The population distribution reference is noted in K.M. Curtiss, Canadian American Relations, 1983. Other references to population distribution along the common frontier include: Carroll, *supra* note, at 162-63; Sadler, The Management of Canadian-U.S. Boundary Waters--Boundary Water: Retrospect and Prospect, 26 Nat. Resources J. 2 (1986). For actual population figures and visual distribution note The National Atlas of the United States of America, 242-243, (1970); The National Atlas of Canada, 7-10, (1974).

32. Sugarman, *supra* note 14, at 51.

33. Flathead, *supra* note 2.

CHAPTER II

THE GROUNDWATER RESOURCE

Over 40% of the United States population relies on groundwater for its drinking supply.¹ In Canada, groundwater accounts for approximately 25% of the drinking water supply.² The importance of groundwater to both countries can not be understated. Because of the diverse nature of the border, groundwater is critical as a source for everyday drinking water, agriculture and industry.

Groundwater is particularly important as a source of drinking water because it is widely available and very accessible. Easy individual well access reduces the need for costly community transmission lines and networks. Further, groundwater is not subjected as frequently to chemical, physical and thermal changes which trouble surface water supplies. The quality of groundwater as opposed to surface water is generally higher.

Groundwater also acts as a stabilizing source of surface water supplies.³ Groundwater levels generally do not fluctuate as dramatically as those of surface water. In times of drought and/or surface water decline, groundwater may stabilize in-stream flows and lake levels preserving highly prized natural and ecological systems all across the border.

What is Groundwater?

Precipitation in the form of rain, snow, hail, and fog which alternately drapes the boundary landscape works its way into the ground, infiltrating through aerated spaces in the soil.⁴ The ability of precipitation to move or transmit itself through any given soil is based on the permeability of soil. Soils high in clay tend to be impermeable in nature and allow little water to percolate through. Soils high in sand or gravel tend to be highly permeable in nature allowing precipitation to percolate through the ground with ease.

The water percolates through the soil until it reaches a level where the spaces in the soil and bedrock are filled with water (Figure 5).⁵ This line between the unsaturated aerated spaces in the soil and the water saturated spaces is called the water table. These water bearing deposits of fractured bedrock and soil are the source of groundwater.

Visualize if you will an ordinary dry kitchen sponge. When tap water, like rain, is poured onto the sponge, the sponge, like the ground, soaks up the water. The pores of the sponge, much like the little spaces in the ground, act as small storage areas for water. It is from these storage areas that our groundwater is extracted. The capacity of any given groundwater supply is a function of the size and inter-connectiveness or porosity of the storage spaces within the ground. The larger the sponge and the greater

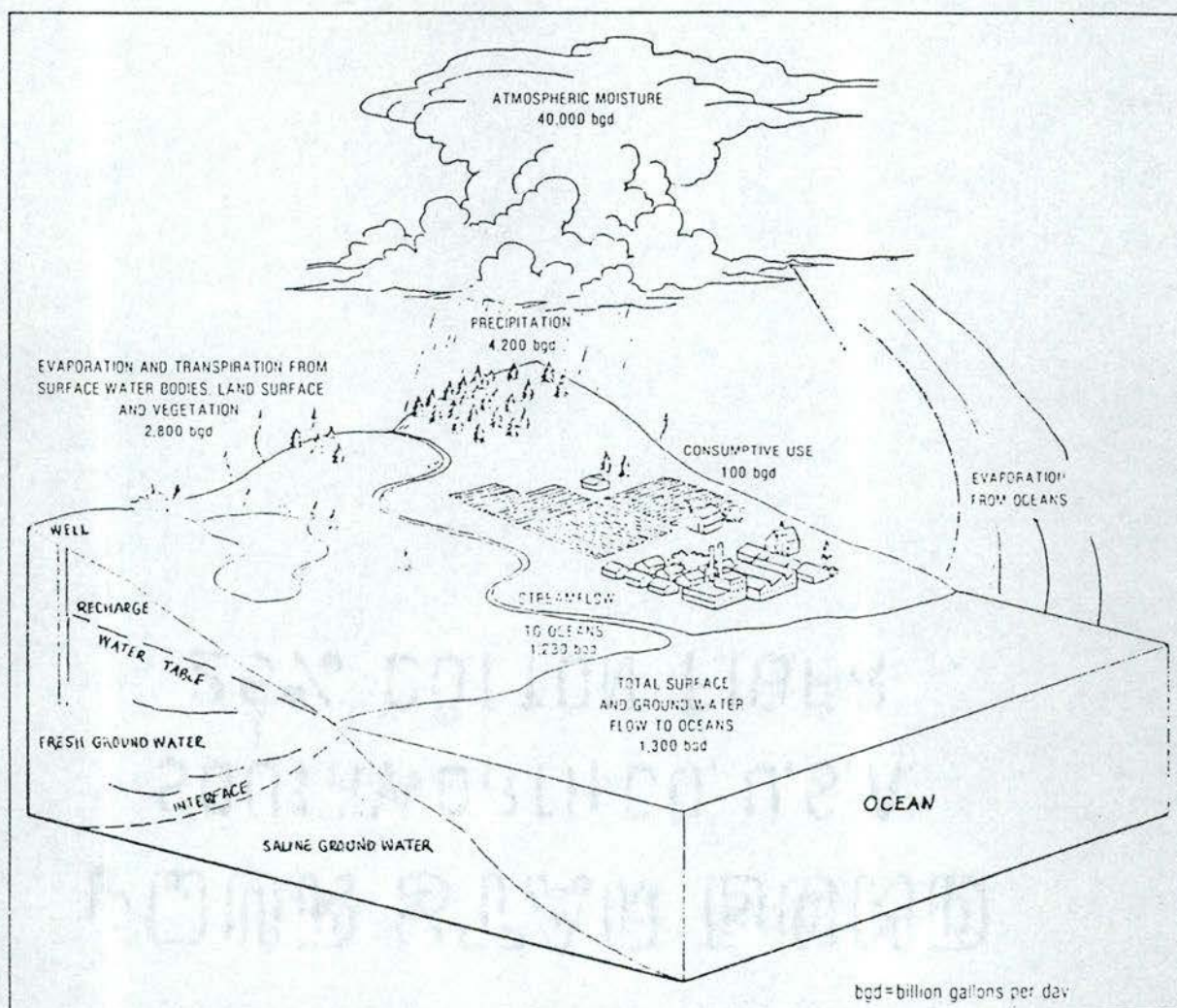


FIGURE 5. The hydrologic cycle.

Source: Waller, Groundwater and the Rural Home Owner, U.S. Geological Survey, (1988).

the inter-connectiveness, the more water one can squeeze out of it.

These underground sponges are called aquifers if they produce water in significant quantities.⁶ Aquifers can either be confined or unconfined. A confined aquifer, sometimes called an artesian aquifer, is an aquifer under pressure created by overlying and underlying impermeable strata. The pressure in the aquifer is greater than atmospheric pressure.⁷ Once contained aquifers have been accessed little or no pumping maybe required. Unconfined aquifers are the most common. The water in these aquifers exists under atmospheric pressure. Unlike confined aquifers, the water must be pumped out.

Groundwater Recharge and Movement

When we are thirsty we head to the nearest faucet or drinking fountain. The "faucets" or "drinking fountains" which replenish groundwater are those areas on the land's surface which allow precipitation to seep into the ground. These areas are called recharge zones (Figure 6). Recharge zones are located in areas of permeable soils plus known sand and gravel deposits.

It is not uncommon in the fall and winter along the 49th parallel for the ground to freeze. This freezing action prevents recharge of the groundwater until the soil

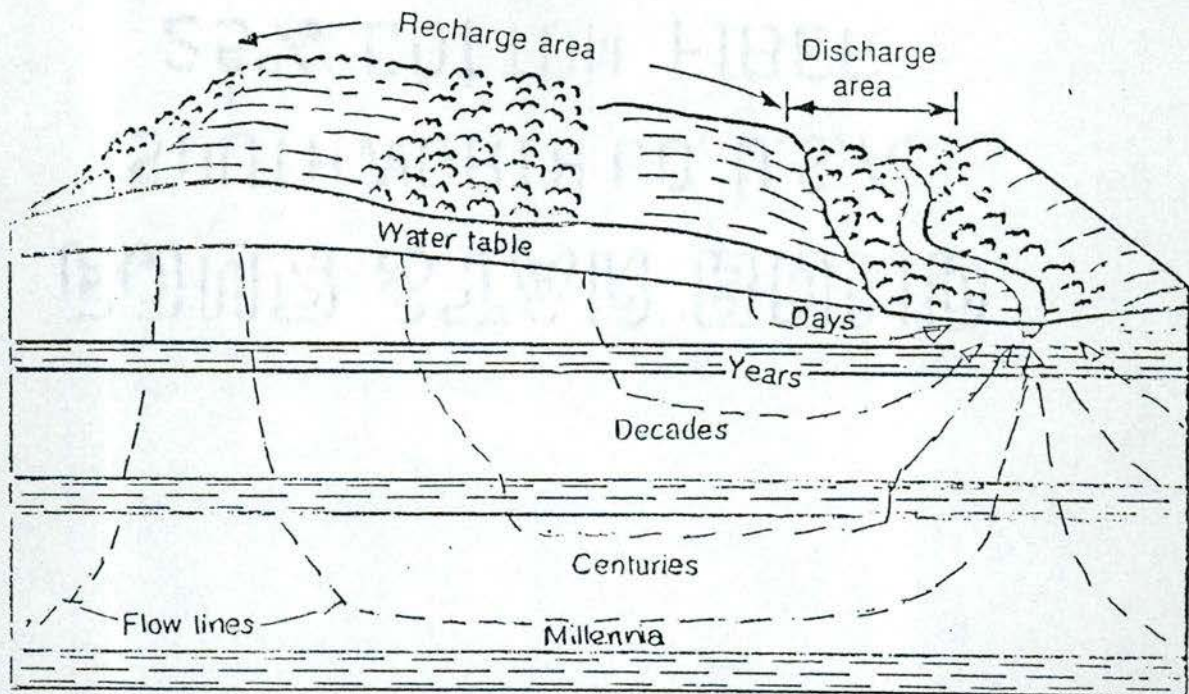


FIGURE 6. Recharge and discharge areas.

Source: Waller, Groundwater and the Rural Home Owner, U.S. Geological Survey, (1988).

thaws. This causes the water table to fall. With spring the annual thaw takes place generating a rapid increase in storage and raising the water table.

Once the precipitation filters down to the water table, the groundwater is pulled along by the force of gravity. It follows the contours of the land surface moving slowly towards areas of discharge. Every winter all along the border evidence of groundwater movement can be seen in road cuts along interstates and back roads when the water freezes on exposed bedrock cliffs. Groundwater may emerge in the form of a spring or swamp or bog, or it might seep into a stream, lake or pond.

The amount that a given groundwater system can yield without depletion is termed the "safe yield." When withdrawals exceed aquifer recharge those withdrawals are actually mining water which in some cases has taken centuries to store up.

Groundwater, unlike surface water, moves very slowly--measured in feet per day or year. Sands and gravels allow groundwater to move quickly because of their porous and permeable nature. Clay and silty soils tend to restrict groundwater flow. The flow of groundwater through bedrock is a function of the size and inter-connectiveness of the cracks and rifts within the bedrock.⁸ This slow steady movement does not allow for any mixing or dilution. When contaminants enter the groundwater they generally stay heavily concentrated as they flow towards the discharge areas.

Wells and Their Effects on Groundwater

Drilling wells is an expensive process. The deeper the well the more money is expended. As water levels drop due to excessive pumping, having to deepen an existing well can mean the difference between staying in business or going out of business. There are a number of effects may result from excessive water withdrawal.

The well acts like a straw in a water glass: as water is withdrawn the remaining water rushes to replace it and if

there is no one there to fill up the glass, the over-all level in the glass drops. The water percolating through the soil to replace the pumped water creates a "cone of influence." (Figure 10).⁹ This inverted cone-shaped region depicts the point of withdrawal at the tip and the surface of the water table as its base. The cone of depression may begin to broaden out through excessive pumping or non-replenishment. This may force landowners with shallow well (shorter straws) to drill their wells deeper to avoid losing their water supply.

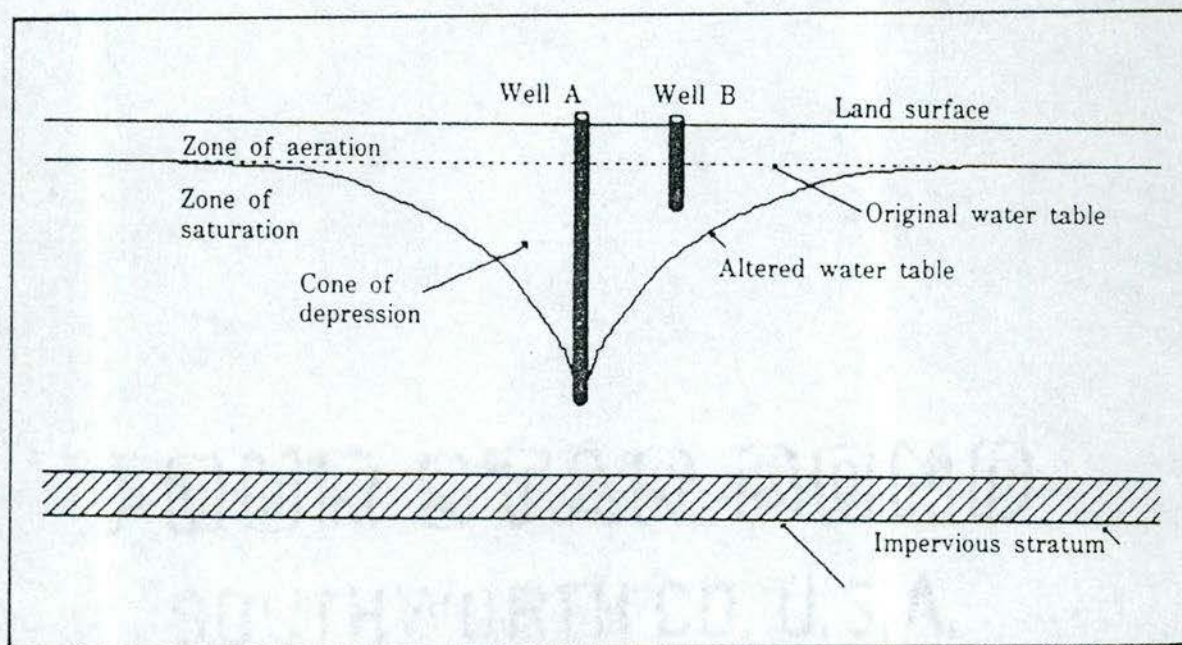


FIGURE 7. Well interface.

Source: Sax & Abrams, Legal Control of Water Resources (1986).

The effects of overall depletion of an aquifer can be disastrous. Depletion of an aquifer can cause the land overlying the aquifer to subside. The hydrostatic pressure of existing water provides the necessary support for some surface strata. When the water is removed, the support is no longer there causing, the strata to collapse.

In coastal areas, depletion of aquifers can cause salt water intrusion. As the fresh water of the aquifer is withdrawn, salt water rushes in to replace the void, contaminating the remaining groundwater.

Sources of Groundwater Contamination

The activities which take place on the land's surface have the potential for contaminating the groundwater underneath. Contamination of groundwater occurs when precipitation leeches waste or pollutants stored on the land surface or buried within the ground. This polluted precipitation percolates through the soil into the groundwater. Liquid wastes, fertilizers, and pesticides when applied to the land surface or deposited in the ground may also contaminate the groundwater through the leeching process. Contamination can also occur when hazardous substances such as oil, household cleaners, pesticides, fertilizers, and paints are dumped or spilled on the ground or flushed into the septic tank.

Sources of contamination which are of special concern include septic discharge, landfills, road salt, industrial pits and lagoons, fertilizers and manure, pesticides, public waste water, and spills or leaks (Figure 11). If the community groundwater supply becomes contaminated it may become unfit for use and consumption.

Groundwater Protection: Save Now or Pay Later

The costs of groundwater contamination and mining are heavy. If levels of pollutants pose a public threat, wells must be closed and alternative sources of water must be found. Remedial treatment of polluted groundwater can be a very lengthy and expensive process costing millions of dollars. If the groundwater resource is exhausted physically, the hydrologic cycle sometimes becomes irreversibly altered. Not only does this create allocation problems, but land subsidence may result. The purchase of water while locating alternative sources can also be very expensive.

The solution and one of the premises of this thesis is groundwater protection. It will cost less to protect the groundwater resource in the long run than it will to clean up the mess of groundwater contamination or allocation later. The best protection is prevention. Institutional arrangements must prevent contaminants from reaching the groundwater resources or allowing major draw downs to take

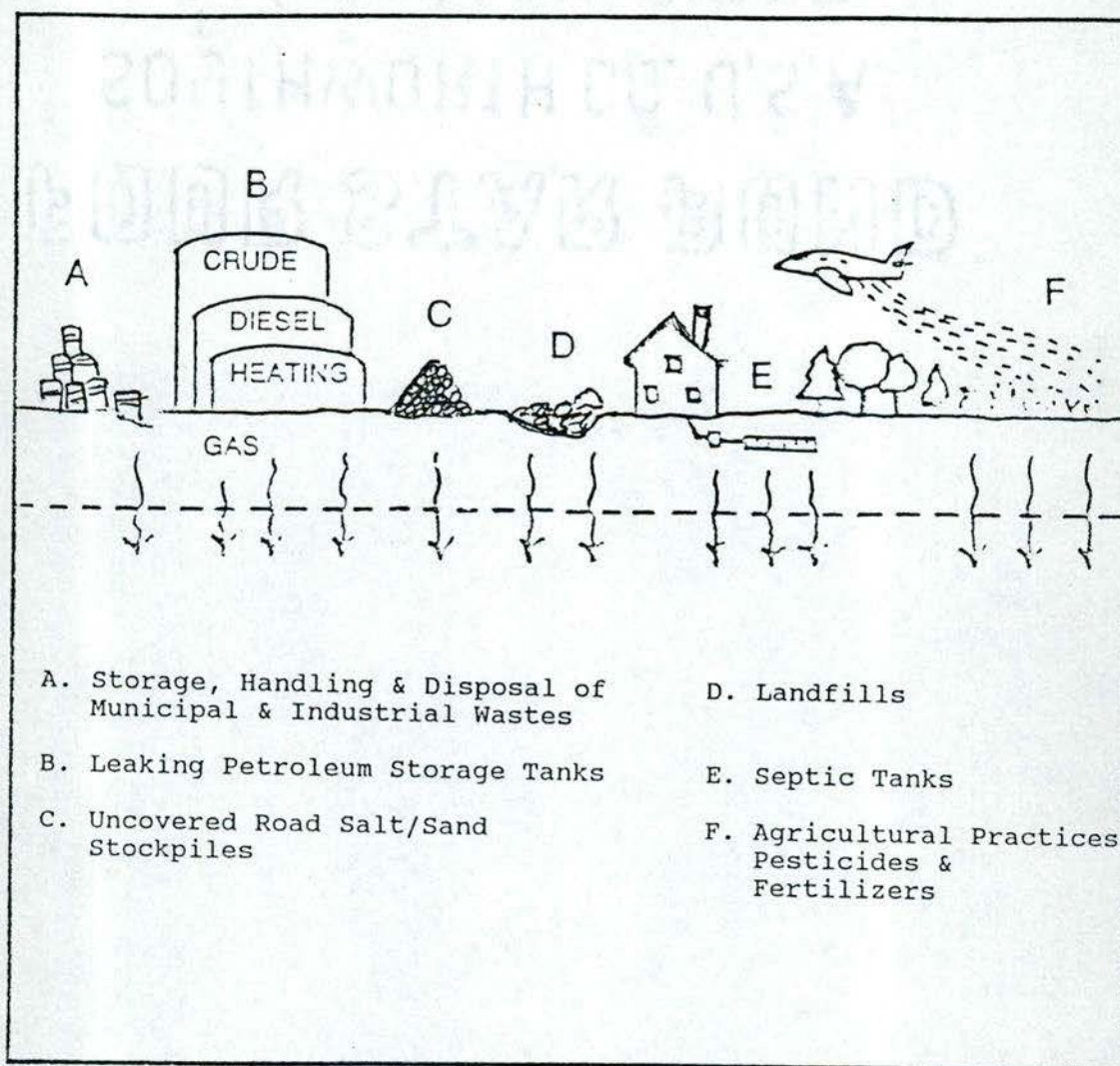


FIGURE 8. Sources of groundwater pollution.

Source: New England Inter-state Water Pollution Control Commission, Groundwater Out-of-Sight not Out-of-Danger (1989).

place. Only by controlling the sources and activities which cause groundwater contamination and mining can each be prevented.

Shirley, E. W. (1967). *Water Pollution Control & Prevention*. McGraw-Hill, New York, 1967.

Shirley, E. W. (1967). *Water Pollution Control & Prevention*. McGraw-Hill, New York, 1967.

Shirley, E. W. (1967). *Water Pollution Control & Prevention*. McGraw-Hill, New York, 1967.

Shirley, E. W. (1967).

Shirley, E. W. (1967).

Shirley, E. W. (1967).

Shirley, E. W. (1967).

Shirley, E. W. (1967).

Shirley, E. W. (1967).

Notes

1.J.J Geraghty, D.W. Miller, F. Van BerLeedeen, & F.L. Troise, Water Atlas of the United States, (1973).

2.H.D. Foster & W.R. Sewill, Water, The Emerging Crisis in Canada, (1981).

3.R. Linsley & J Franzini, Water-Resources Engineering (1979).

4.Id. at 77.

5.Id. at 79.

6.Id. at 78.

7.Id. at 79.

8.Id. at 82.

9.Id. at 85.

CHAPTER III

LEGAL FRAMEWORK OF GROUNDWATER ALLOCATION AND CONTAMINATION IN THE U.S./CANADA

Canada and the United States share the same English common law legacy. Judge-made rules in both countries concerning groundwater allocation and injury resulting from groundwater contamination follow many common principles of law. As a result each country has a common law heritage which overlaps and upon which they can possibly draw to resolve transboundary groundwater disputes. It is the purpose of this chapter to provide an overview of the common law on both allocation and injury of contamination in each jurisdiction.

Overview of United States' Common Law on Groundwater Allocation and Contamination

United States' common law concerning groundwater allocation and quality can be divided into two sub-categories. The first category concerns State common law. State common law deals with groundwater allocation and quality issues which arise among individuals. It sets out the rules which will govern individual rights as they pertain to quantity, quality, utility, and liability when using the groundwater resource.

The second category and perhaps the more important in terms of transboundary groundwater issues is of common law that concerns quantity and quality issues of water among states. Federal common law decides interstate groundwater allocation and disputes arising out of interstate groundwater pollution. These interstate disputes have major transboundary implications because they tend to define the rights of two sovereign entities who share a common resource.

State Common Law

Allocation

Historically water law has been separated into surface and groundwater based on the misconception and lack of knowledge of the inter-connectiveness of the two resources.¹ Independent rules of allocation and ownership were split based on these misconceptions. Today, even though hydrology has become a well-honed science, making it possible to track groundwater flow and discharge, the legal rules are still wallowing in their historical roots.²

Because groundwater is widely available and very accessible a series of legal rules and procedures have been developed to establish rights to use such a common-pool resource. The origin of such rights evolved out of property ownership and public resource allocation in terms of reasonable use.³ As a result, a state can recognize an

overlying landowner's ownership of the groundwater resource but at the same time limit the owners use to a reasonable one.⁴ A number of legal doctrines have been created to deal with groundwater allocation and injury resulting from contamination.

Historically, under English law, the overlying landowner had absolute ownership of the groundwater below.⁵ The owner had an unlimited right to withdraw subterranean water below his/her parcel of property. This doctrine was adopted with no regard or even thought that groundwater may flow beneath one parcel to the next and that unlimited withdrawal might harm neighboring groundwater withdrawals and stream flows.⁶

The absolute ownership rule was adopted in the United States in the 1850's.⁷ It is still considered law (in varying forms) in Vermont, the District of Columbia, Texas, Ohio, Rhode Island, Massachusetts, Mississippi, Georgia, and Connecticut. Of these states, only Vermont borders with Canada. The effects of the absolute ownership rule in terms of unlimited withdrawal regardless of neighboring injury are harsh and as a result a number of states have tempered the rule with statutory reasonable use regulations.

Obviously, this type of archaic legal mechanism would have little value in transboundary groundwater dispute resolutions. Owners on each side of the political boundaries would claim that they had complete ownership

rights to withdraw an unlimited amount. There is little room for parties to compromise when each side is dealing in "absolutes."

States which have adopted the prior appropriation doctrine protect those people who use the groundwater first. The doctrine is based on priority in time--first in time equals first in right. The purpose of the rule is to protect the investments in wells, irrigation, land, etc. in areas such as the arid west where groundwater and surface water are finite resources.

In the arid west the problem of groundwater mining is acute because the use of the groundwater resource outstrips the negligible recharge. Prior appropriation without some constraint does not solve the problem of groundwater mining but allows prior users in theory to use as much water as their prior rights allow--and in time completely drain a given aquifer.

This legal doctrine also has little use in the scheme of transboundary groundwater issues. Each country has its own historically separate priority schemes. It would be politically tough to integrate the two systems. To tell a rancher in Alberta that his priority right which has been in the family for generations is now suddenly secondary to the priority of a Montana rancher is tough to swallow politically. Prior appropriation ignores equities of individuals and the society at large and would not be

conductive to a transboundary groundwater scheme.

Some states do not recognize private groundwater ownership. Those state consider groundwater as a public resource to be allocated in the public's best interest. The Supreme Court of Colorado noted that it is the legislature not the overlying owner that has the right to appropriate the water that decides how to manage the groundwater resource.⁸ Usually, the states allocate rights the public groundwater resource based on some type of permitting structure.

States which respect private ownership protect the resource and fellow users through police power regulatory schemes. Health ordinances, zoning laws, and source restrictions are all used in private ownership states to limit the harm to other users and the public at large. Private property rights are not absolute and can be infringed upon where the public health, safety, and welfare is involved.

The concept of groundwater as a public resource has merit in a transboundary groundwater scheme. If a joint commission were to establish criteria under which groundwater as an international public resource could be allocated equitably and contamination liability be distributed fairly then respectable solutions are possible. Problems in defining whose public resource it is and how to distribute the benefits and costs associated with the

resource must be addressed.

A user of groundwater may have established rights but those rights are subject to the restrictions placed on the use itself as determined by the rules of liability among competing groundwater users. The rules are: (1) the No Liability Rule; (2) the Junior Liable Rule of Prior Appropriation; (3) the Reasonable Use Rule; (4) Correlative Rights Rule; and (5) the Restatement of Torts Rule. These rules will be analyzed below.

For those states which recognize absolute ownership of the groundwater resource without restriction, groundwater can be pumped to the detriment of surrounding groundwater users without liability. No liability would theoretically be applied in cases where groundwater was contaminated by an absolute owner. The no liability rule has little merit in groundwater protection in general and in the case of transboundary groundwater protection it is not even worth considering.

The junior liability rule finds its origin in prior appropriation. If rancher (Z) was first in time to appropriate groundwater all other users would be junior in right to rancher (Z). If junior rancher (X) pumped groundwater creating an unreasonable harm to rancher (Z) then junior rancher (X) would be liable to rancher (Z) for the harm caused. Rancher (Z) is first in time and therefore first in right. Rancher (Z)'s right is protectable against

all junior users.

This rule only recognizes liability based on priority in time and not the equities of any given situation. There is no protection for the junior holder against a senior holder whose use may neither be reasonable or beneficial. Further, the resource under this type of liability system is unprotected and could be exhausted. This liability rule would also have little application in a transboundary groundwater scheme.

The doctrine of reasonable use evolved in reaction to the harsh results of the no liability or absolute ownership rule. Under this doctrine, the overlying owner is still entitled to appropriate groundwater below his/her land but he/she can not withdraw the water in excess of a reasonable and beneficial use without liability for injury to others.⁹

Any beneficial use on the overlying property is considered reasonable except for actual waste.¹⁰ Those uses outside the overlying tract of land are per se unreasonable.¹¹ Landowner (A) is protected from (B) who extracts groundwater for use on a parcel of land two miles away. Land owner (A) is not protected from adjacent land owner (C) who uses the huge amounts of groundwater to cool her electric coal generation plant.

If land owner (A) could not pump enough water to support her livestock because land owner (C) was extracting a tremendous amount of water for her electric generation

plant, so long as electricity generation was considered reasonable and beneficial, the injured land owner (A) is without legal recourse under this rule. The limitations of the reasonable use doctrine in terms of social welfare and utility are self evident.

Like absolute ownership, reasonable use imposes little restriction on the type and amount of the overlying use. Further, reasonable use does not account for the totality of all uses and demands on the aquifer itself. This in turn leads to the inevitable "tragedy of the commons" with each user seeking to maximize their own groundwater use potential at the expense of each other and the resource.¹² Lastly, the reasonable use doctrine does not balance the utility of the competing uses and the hardships they impose on competing users.¹³ The reasonable use doctrine has little application in transboundary groundwater disputes.

The doctrine of correlated rights evolved in California to take into account the total demand upon the aquifer.¹⁴

The requirements of correlated rights include:

- (1) the right to use groundwater stored in an aquifer is shared by all the owners of land overlying the aquifer,
- (2) uses must be made on the overlying tract and must be reasonable in relation to the uses of other overlying owners and the characteristics of the aquifer, and
- (3) the groundwater user's property right is usufructuary.¹⁵

Each land owner is entitled to a reasonable share of the groundwater resource. When there are water shortages, the

shares are based on a pro rata distribution based on landownership or historic use of the resource.¹⁶

Consumption during shortage can be limited to an amount much less than reasonable share. If land owner (A) has more property than land owner (B) or has historically used more groundwater than land owner (B), landowner (A) is usually entitled to a larger share during times of shortage. This creates an incentive to use more instead of less. Those who conserve water under this doctrine lose out in times of shortage.

Those who export water to be used on land outside of the aquifer area do not have correlative rights. Exporters can only acquire rights in surplus water that is left over after all correlative right holders use their reasonable share. Any surplus water that is left is distributed by prior appropriation.

Correlative rights for transboundary purposes at least takes into account the total demand on the resource. However, its allocation mechanism does not promote conservation nor does it balance the equities and hardships of competing users. Possibly some type of hybrid correlative rights/balancing competing interests maybe a suitable transboundary mechanism.

The Restatement Rule unlike the others which have been discussed balances the equities and hardships among competing users.¹⁷ A landowner who withdraws groundwater

from her property will not be liable for the withdrawal unless it creates an unreasonable harm to neighboring landowners, exceeds her reasonable share, or has a direct and substantial effect on surface water supplies and their users.¹⁸ What constitutes an "unreasonable harm," "reasonable share," or "direct and substantial effect" involves a balance of the nature and extent of harm done to the other users of the groundwater and surface water resource.

The Restatement rule has the greatest potential to equitably allocate the groundwater resource across the transboundary area and access the liabilities. Some form of the restatement should be incorporated into a transboundary water agreement.

Contamination

Under the historical rules of absolute ownership, an adjacent land owner had no legally enforceable right to stop her neighbor from withdrawing groundwater even if her well was running dry. If, however, her neighbor was not withdrawing groundwater but contaminating it, the landowner could haul her neighbor into court under a theory of nuisance. Under what is called a "private" nuisance theory, the harmed landowner could assert that her neighbor's pollution of the groundwater unreasonably interferes with the use and enjoyment of her property. She can no longer

drink the water or water the livestock which constitutes an infringement on her use and enjoyment of her property.

If the polluting neighbor's activities affect what turns out to be a public drinking water supply, a "public nuisance" action may be brought on behalf of the public which has been harmed because of the action. It becomes a question of who can sue on behalf of the public. This is usually decided by state statute.

The common law is not generally a very effective tool for the public to ensure that groundwater will be safe. The actions only affect a small number of individuals and their precedent value is very fact specific. Common law rules only deal with problems retroactively, not prospectively like much of the environmental legislation. Further, there are problems of proof and causation (i.e., proving that the source of contamination of the groundwater was caused by (X)) and the system is costly.

Federal Common Law

Allocation

Disputes of interstate allocation have primarily concerned themselves with surface water allocation although the same principles would likely apply to groundwater. These disputes are resolved by federal judicial allocation, inter-state compacts which have been upheld by the federal courts, and congressional legislative allocation which has

also been reviewed and upheld by the federal courts.

The evolution of U.S. judicial water allocation has lead to the internationally accepted doctrine of "equitable apportionment."¹⁹ Equitable apportionment is an allocation mechanism that espouses that each basin state is entitled to reasonable and beneficial uses of the water resource.²⁰ The court in Connecticut v. Massachusetts,²¹ noted that equity [equitable apportionment] does not mean equitable division of the waters of an interstate stream among the states through which it flows. It means:

that the principles of right and equity shall be applied having regard to the equal level or plane on which all the states in the point of power and right under our constitutional system, and that upon consideration of the pertinent laws of contending states and all other relevant facts this court will determine what is an equitable apportionment of the use of such waters.²²

The doctrine was first formulated in 1907 in Kansas v. Colorado.²³ The issue in this case was whether Colorado appropriators who were utilizing the Arkansas River for extensive irrigation could deprive the downstream state of Kansas of the beneficial use of the water. Kansas argued that appropriation of water by Colorado was violating natural flow conditions and causing hardship on downstream Kansas riparians. Colorado claimed that it had complete sovereignty over all waters of the river because it originated in its territory. The Court held that both state

contentions were extreme and that a reasonable and equitable means would be utilized to solve apportionment problems.

In the case of New Jersey v. New York,²⁴ which resulted out of a dispute over New York diversions from the Delaware River, Justice Oliver Wendell Holmes delivered the following eloquent majority opinion for the Court concerning equitable apportionment:

A river is more than an amenity, it is a treasure. It offers a necessity of life that must be rationed among those who have power to cut off all the water within its jurisdiction. But clearly the exercise of such a power to the destruction of the interest of lower states could not be tolerated. And on the other hand equally little could New Jersey be permitted to require New York to give up its power altogether in order that the river might come down to it undiminished. Both states have real and substantial interests in the River that must be reconciled as best they may be. The different traditions and practices in different parts of the country may lead to varying results, but the effort always is to secure an equitable apportionment without quibbling over formulas.²⁵

Equitable apportionment has been further refined in cases such as Wyoming v. Colorado²⁶ and Nebraska v. Wyoming²⁷ among others.

The second way to solve allocation disputes between states has been for states to enter into compacts among themselves so long as Congress approves.²⁸ Although technically compacts are not a part of federal common law,

they have been reviewed and approved by Courts. As one Court noted, the compact "adapts to our Union of sovereign states the age old treaty making power of independent sovereign nations."²⁹ Compacts are binding on citizens of compacting states even though those citizens were not parties to the agreement.³⁰ Further, state laws which conflict with the terms of an interstate compact once it has been ratified by Congress are unenforceable.³¹

Lastly, legislative allocation of interstate waters was recognized in Arizona v. California,³² which held that Congress intended to allocate waters among states by dividing the lower waters of the Colorado basin by passing the Boulder Canyon Project Act.³³ The Court recognized that Congress has the authority to apportion interstate waters.

Contamination

The most notable example of interstate water pollution resolved by federal common law involved the State of Illinois and the City of Milwaukee over city sewage effluent releases into Lake Michigan. In what turned out to be one of the most protracted litigations ever, Illinois tried to impose strict effluent standards on the operation of Milwaukee's sewage treatment facility as well as three other Wisconsin municipalities. Illinois was concerned that the discharge of untreated raw sewage would effect its use and enjoyment of Lake Michigan.

Illinois brought suit in the United States Supreme Court asserting that the sewage treatment plants should be abated as a public nuisance.³⁴ The Court held that Illinois could bring a suit under federal common law of interstate pollution. In writing the opinion for the Court, Justice Douglas noted that:

It may happen that new federal laws and new federal regulations may in time preempt the field of federal common law nuisance. But until that comes to pass, federal courts will be empowered to appraise the equities of the suits alleging creation of a public nuisance by water pollution. While federal law governs, consideration of state standards may be relevant.....Thus a State with high water quality standards may well ask that its strict standards be honored and that it not be compelled to lower itself to the more degrading standards of a neighbor.³⁵

The Milwaukee/Illinois litigation continued until 1981 when the United States Supreme Court finally laid the issue to rest.³⁶ The Court held that because Congress had enacted the Clean Water Act, the federal common law of nuisance cannot impose stricter effluent limitations than are imposed by the Act. The federal common law claim is preempted where Congress has acted.

An Overview on Canadian Groundwater Allocation and Contamination

Allocation

Canadian common law on groundwater allocation has

tremendous overlap with the common law of the United States. The origins of absolute ownership are the same as are the doctrines of prior appropriation and reasonable use. Correlative rights are an American invention without precedent in Canada. Canadian rules of allocation are virtually identical to those of the United States.

Contamination

Like the United States, there are several causes of action under Canadian Common Law which a private landowner or the public at large can bring in order to stop contamination of groundwater. The first action is a private nuisance theory which espouses that by polluting groundwater, land owner (G) is unreasonably interfering with the use and enjoyment of land of owner (H) who is adversely affected by the pollution.³⁷ Canadian courts have said that the annoyance must be substantial and unreasonable and that the harmed party should be deprived of a beneficial use.³⁸ The second action, again like the United States' law, is that of public nuisance. Public nuisance actions in Canada are almost non-existent because only the State Attorney General may commence a public nuisance action.³⁹ Because of the array of statutory environmental legislation in Canada, the public nuisance suit has become obsolete.⁴⁰

The storage and escape doctrine is another cause of action that can be used to address harm to groundwater in

Canada. The doctrine holds that if a land owner stores on his/her land anything which could be potentially harmful and it escapes causing damage to a neighbor, he/she is liable for the harm.⁴¹ The land owner is assuming the risk of his/her actions.

The last cause of action under Canadian common law is the action of negligence. In negligence, the land owner has a duty to be safe in his/her actions and that violation of that duty results in liability. Negligence can be used in the alternative with nuisance.

The same limitations that apply to U.S. common law hold true for Canadian common law as well. It is a very limited tool for protecting groundwater. In response to these limitations, the public in both countries has enacted a panoply of federal, provincial & state, as well as local legislation to combat groundwater contamination. The structure of these regulatory schemes are set out in Chapter IV.

Notes

- 1.J.L. Sax, & R.H. Abrams, Legal Control of Water Resources, at 786 (1986).
- 2.Id. at 786
- 3.D.H. Getches, Water Law in a Nut Shell, at 233 (1983).
- 4.Id.
- 5.Acton v. Blundell, 12 Mees. & W. 324, 152 Eng. Rep. 1223 (1843).
- 6.Sax, supra note 1 at 787.
- 7.Getches, supra note 3, at 233.
- 8.Colorado v. Southwestern Colorado Water Conservation District, 671 P.2d 1294 (1983).
- 9.Metropolitan Utilities District v. Merrit Beach Co., 179 Neb. 783, 140 N.W.2d 626, (1966); Forbell v. City of New York, 164 N.Y. 522, 58 N.E. 644 (1900).
- 10.Getches, supra note 3, at 239.
- 11.Id.
- 12.Hardin, Tragedy of the Commons, (1974).
- 13.Getches, supra note 3, at 239.
- 14.Katz v. Walkinshaw, 141 Cal. 116, 74 P. 766 (1903).
- 15.Sax, supra note, at 795.
- 16.Id., at 795.
- 17.Restatement (Second) of Torts Section 858 (1979).

Section 858. Liability for Use of Groundwater

(1) A proprietor of land or his grantee who withdraws groundwater from the land and uses it for a beneficial purpose is not subject to liability for interference with the use of the water by another, unless

(a) the withdrawal of groundwater unreasonably

causes harm to a proprietor of neighboring land through lowering the water table or reducing artesian pressure,

(b) the withdrawal of groundwater exceeds the proprietor's reasonable share of the annual supply or total store of groundwater, or

(c) the withdrawal of groundwater has a direct and substantial effect upon a watercourse or lake and unreasonably causes harm to a person entitled to the use of its water.

18.Id.

19.Equitable Apportionment is recognized in the Helsinki Rules on the Uses of the Waters of International Rivers. Adopted by the International Law Association at the 2nd Conference held in Helsinki, Finland on August 20, 1966 [Hereinafter cited as Helsinki Rules].

20.Bourne, International Water Resources, XVII, Canadian Bar Review, 67 (1969).

21.282 U.S. 660 (1931).

22.Id., at 668. In this case, Connecticut sought to enjoin Massachusetts from diverting water from the Connecticut River to provide water for Boston and neighboring cities. The Court held that Connecticut was not entitled to injunction because it was already receiving an equitable share based on the facts of the case. There is some good language in the opinion that is pertinent to groundwater transboundary issues. The Court noted "For the decisions of suits between states, federal, state, and international law is considered and applied by this Court." The court noted that these types of water issues are settled on the basis of equity.

23.295 U.S. 142 (1935).

24.283 U.S. 336 (1931).

25.Id., at 338.

26.295 U.S. 419 (1922). In this case, Wyoming sought to prevent major Colorado corporate water diversions that would take water out of the Laramie River (which originated in Colorado and flowed into Wyoming) and transmit the water into another drainage basin within Colorado. The Court held after balancing the equities (especially the economic equities) that Colorado was entitled to its share of the water even if the water was transferred out of the basin. The Court also held

that Wyoming was entitled to a reasonable share of the river water and if there were any further diversions by Colorado, Wyoming would be entitled to a Court injunction to stop the withdrawal.

27.325 U.S. 589 (1945). Here the Court was faced with a tri-state allocation dispute between Nebraska, Colorado, and Wyoming over the waters of the North Platte River. Nebraska asserted that Colorado and Wyoming were depriving it of an equitable share of the North Platte River. In a lengthy analysis utilizing principles of equitable apportionment, the court decided that Nebraska was not deprived of its equitable share.

28. Authority for this is found in the United States Constitution, article I, section 10 clause 3 which states:

No state shall, without the consent of Congress... enter into any agreement or compact with another state, or foreign power...

29. Hinderlider v. La Plata River & Cherry Creek Ditch Co., 304 U.S. 92 (1938)

30. Id.

31. Dyer v. Sims, 341 U.S. 22 (1951).

32. 373 U.S. 546 (1963).

33. 45 Stat. 1057 (1928), 43 U.S.C. sections 617-617t.

34. Illinois v. Milwaukee (Milwaukee I), 406 U.S. 91 (1972).

35. Id. at 107.

36. City of Milwaukee v. Illinois (Milwaukee II), 451 U.S. 304 (1981).

37. A. Linden, Canadian Tort Law 514 (4th ed. 1988)

38. Jackson v. Drury Construction Co., 4 O.R.2d 735 (1974).

39. Roman & Ferris, Regulation of Groundwater Contamination in Canada, 65 Chi.[-]Kent L. Rev. 519, 521 (1989).

40. Id. at 522.

41. Rylands v. Fletcher, 3 LR.E. & 1 App. 330 (H.L. 1968); followed by Duncan v. The Queen, 1966 Ex. C.R. 1080.

CHAPTER IV
REGULATORY FRAMEWORK CONCERNING GROUNDWATER
IN THE UNITED STATES AND CANADA

The interface between federal, state, provincial, and local government will play a tremendously important role in the planning and execution of any international transboundary groundwater protection schemes. The regulatory framework in which these governing bodies operate will dictate the approach taken in formulating transboundary policy. Groundwater contamination prevention can only be achieved through land use and source controls. This means that state, provincial, and local government will be the key players in implementing any transboundary groundwater scheme. This chapter will explore the governing powers, intergovernmental relationships, and the regulatory framework in which they operate.

Canadian Governmental Structure and Powers

Canadian governmental structure has its origins in The British North American Act (BNA) of 1867.¹ and The Constitution Act of 1982.² In the BNA, there are exclusive and joint legislative powers. Under joint jurisdiction, the federal governmental and the provinces can each make laws, for example, that concern agriculture within a province, but

Exclusive powers contemplated by the Act, on the other hand, are so broad that they do not specify the jurisdictional powers of the provinces or the federal government in various matters such as water. The decisions of jurisdiction between the federal and provincial governments has been left to the courts to decide.⁴

The constitutional powers over "property and civil rights" and the management and sale of public lands" give the provinces general power over water within their borders.⁵ Specific powers over water resources were transferred to the provinces by the Natural Resources Transfer Agreement of 1930, and amended in 1938.⁶ Federal statutes and legislation that control groundwater are few in number because federal jurisdiction is limited to its powers to regulate fisheries, federal lands, navigation, foreign relations, Indians, "peace, order, and good government," and "works for the general advantage of Canada."⁷

The federal government has passed several Acts which have potential effects on groundwater. In 1985, the parliament passed the Canada Water Act.⁸ Where there is a significant national interest in a given water problem the Minister of Environment may enter into agreements with provincial governments to combat the problem.⁹ If the federal government and provinces can not reach any agreement on how to solve, for example, a groundwater problem of "significant" national concern, the federal government may

take unilateral action. To date, no agreements have been made between the federal government and any province.¹⁰

The federal government under the Canada Water Act also passed the Canadian Drinking Water Quality Guidelines.¹¹ These guidelines are only non-legally enforceable objectives for drinking water quality. Under the National Transportation Act and the Railway Act, regulations concerning flammable liquids bulk storage¹² and ammonium nitrate storage facilities¹³ address groundwater concerns. The regulations are designed to minimize or alleviate the impact of such storage facilities on the groundwater resource. Other than these Acts, there is no national policy in Canada concerning groundwater management.

Authority over inter-jurisdictional waters has been termed "a constitutional uncertainty" in Canada since there has been little federal legislation besides that relating to the rights of navigation and fisheries.¹⁴ Parliament does have the authority to regulate inter-provincial water, but as one commentator notes, "it is impossible to define the legal position of an upstream province with precision" because inter-provincial rights which concern inter-judicial waters are unclear.¹⁵ There have been inter-provincial water allocation agreements, but there are questions as to whether such agreements are legally binding.¹⁶

Historically, provinces have had almost complete

sovereignty over waters within their boundaries. As such, they are the major players in groundwater pollution control and regulation. Provincial governments have instituted their own clean water acts and environmental protection acts to protect groundwater resources against point sources of pollution.¹⁷ Most provincial governments lack controls on non-point source pollution.¹⁸ Further there is little provincial legislation which provides for sole source aquifer designation and protection or mandatory requirements by provincial authority to require local governments to plan and zone for susceptible aquifers protection.¹⁹

Traditionally, provincial governments have been major culprits in diverting and polluting waters without regard for the other provincial sovereignty. This changed in the case of Inter-provincial Co-Operatives Ltd. v. The Queen the Right of Manitoba,²⁰ in which Saskatchewan and Ontario ruined certain downstream fisheries of Manitoba by polluting the river with mercury. In a split decision, the majority concluded that Saskatchewan and Ontario could pollute because they had a license to do so. However, in dissent, which was not opposed by the majority opinion, three judges noted that Manitoba could not interfere with the civil rights of the other provinces, neither could the other provinces interfere with the right of Manitoba to clean water. The effect of this case is that up stream states can not authorize activities which would be injurious to

downstream states. Thus, absolute provincial sovereignty is no longer a given in Canada.

United States Governmental Structure & Powers

Federal Government

The U.S. federal government exercises far more authority and has been much more active legislatively over water resources than its Canadian counter-part. Generally, state law controls use and allocation of water within its jurisdiction and federal law sets minimum water quality guidelines and governs interstate allocation. The federal government has also set up national remediation schemes to clean up, among other things, contaminated groundwater.

The basis of federal jurisdiction is grounded in the enumerated and implied powers under the constitution. The enumerated powers include the power to regulate commerce and navigation, regulate public lands, and to control taxation and financing of public projects. They allow the Congress to exert tremendous authority in terms of groundwater regulations. The implied powers of Congressional authority in the Necessary and Proper Clause of the constitution.²¹ This clause allows Congress "to make all laws which shall be necessary and proper for carrying into execution the foregoing powers...." to regulate groundwater.²²

Given the enormous power the federal government can exert, it is not surprising that there is a variety of

federal legislation which regulates groundwater quality directly and indirectly. A short discussion of those statutes which affect groundwater is set out below.

The Clean Water Act of 1972 focused primarily on surface water issues with only indirect effects on groundwater.²³ Congress enacted the Safe Drinking Water Act (SDWA) of 1978 which sets minimum national standards for safe drinking water.²⁴ States are primarily responsible for enforcement under SDWA. SDWA is a prospective preventative statute. It seeks to prevent drinking water contamination from occurring. SDWA regulates public water systems which are defined as systems which have at least fifteen service connections or regularly service a minimum of twenty five people at least sixty days a year.²⁵ SDWA does require some monitoring of non-community systems.

Under the SDWA, the Federal Environmental Protection Agency (EPA) preempts all state authority for regulation of injection wells which may be contaminating groundwater.²⁶ The EPA is also charged under the SDWA with designation of sole source aquifer protection status. If the EPA designates an aquifer as a "sole source" for community drinking water, a series of protective mechanisms and funding arise under SDWA.²⁷ Such a designation precludes any federal funds being committed to any federal project that the EPA finds would contaminate the aquifer.

The Toxic Substance Control Act²⁸ and the Pesticide,

Fungicide, and Rodenticide Act²⁹ both have indirect prospective control mechanisms which provide protection from groundwater. The Resource Recovery and Conservation Act (RCRA) of 1976 is strictly remedial in nature.³⁰ It regulates hazardous waste only. It has no application unless groundwater underlying a hazardous waste site is contaminated. RCRA institutes remedial action to clean up the contamination. Lastly, the Comprehensive Environmental Response, Compensation, and Liability Act prioritizes waste sites and imposes liability on those responsible for the mess.³¹ Again this statute is remedial in nature, not preventative. It deals strictly with hazardous waste and its effects.

State Government

In the absence of federal preemptive control over groundwater resources, waters within state boundaries are managed and allocated for the general welfare by state law based on the inherent police power of the state. State groundwater protection schemes can be grouped into three categories: (1) non-degradation; (2) limited degradation; and (3) differential protection.³²

States with non-degradation schemes allow states to protect existing groundwater resources at levels of maximum purity to insure quality. Protection through land use controls and source controls limits any degradation of the

resource. If degradation occurs, remedial mechanisms insure that quality will be maintained.

Limited degradation schemes allow for pollution of aquifers up to an acceptable level. Limited degradation takes into account those marginal costs of maintaining a pure aquifer as opposed to allowing some degradation to occur. It is based on what is economically feasible.

Differential protection schemes classify aquifers according to use and quality. Pure aquifers which are used as community drinking water are given maximum non-degradation protection. Aquifers which are used strictly for industrial or agricultural purposes are allowed to be degraded up to a certain point.

Local Government

The real challenges of groundwater protection in the United States come at the local level. Local governments have the authority to protect groundwater quality through the use of their police power. The police power is a local government's inherent regulatory authority which can prevent a public harm such as groundwater contamination from threatening the public's health, safety, and welfare. Police power tools include zoning, subdivision regulations, performance standards, building codes, or health ordinances.

Regulatory and administrative tools for protecting groundwater at the local level either attempt to control the

source of groundwater contamination or seek to protect a specific geographic area known for its critically sensitive recharge capabilities. There are a number of these regulatory tools available which local governments employ individually or in combination. Set out below are the specific tools local governments in the United States use to protect their groundwater.

Zoning restricts and directs the use of land. It can be an invaluable tool in restricting or regulating the direction and density of development within wellhead protection areas. Zoning can also be indispensable in controlling future sources of groundwater contamination. Zoning ordinances are prospective only--they cannot regulate existing development. If local governments want to control existing land uses they must rely on health and source ordinances not zoning.

Subdivision ordinances are controls which local governments place on land which is being divided for sale or development. Like zoning, subdivision ordinances control future growth. Subdivision review ordinances allow a town to stipulate what the physical requirements of a given development site should be and dictate the type of on-site systems which are conducive to groundwater protection.

If a local government is concerned that development within a critical groundwater recharge area is out of control, it might enact a subdivision ordinance which

specifies the size and timing of the development to limit its impact on the groundwater resource. The ordinance might specify the type of grading and drainage allowable to minimize storm run-off. It could require that land for parks be set aside to preserve sensitive areas or provide a buffer zone.

A local government can control the form and density of development using subdivision regulations. It might require the clustering of residential units on a portion of a parcel to preserve open space needed for recharge of an aquifer. These are just a few of the many examples which subdivision regulations can be used for.

Building codes and performance standards are useful but limited tools in protecting groundwater. They are techniques which can control the harmful aspects of a use rather than control the use itself. If the use does not meet the standards set out in a building code or ordinance, the use is in violation and subject to specific penalties. Unlike zoning and subdivision regulations, some building code/performance requirements can apply retroactively. They can be used to control the placement, type, and design of a given structure and on site facilities. For example, building codes can control set-back requirements for a building, set restrictions on individual lot density in terms of floor area ratios, require the best available technology and maintenance for on-site sewer systems, and

mandate certain grades and drainage patterns on a given lot based on run-off levels.

Health ordinances generally control the sources of groundwater contamination where the public health is at risk. These types of ordinances control design, operation and maintenance of on-site sewage disposal; the location, construction, and permitting of drinking water wells; and the storage and handling of hazardous wastes. Unlike zoning and subdivision regulations, health ordinances can apply retroactively.

In order for health ordinances to be effective, proper implementation must occur. Local governments must be willing to strictly monitor sources and potential sources of groundwater contamination. They must be willing to enforce the health ordinance, bringing violators into compliance.

A number of the aquifers in the transboundary region are located within areas prone to seasonal river and stream flooding. Adoption of flood plain regulations is an effective and easy way to protect these sensitive aquifers. Local governments across the nation have participated in flood insurance studies sponsored by the Federal Insurance Administration. These studies determined the extent of the 100-year flood plain within a given drainage area. In order for communities to be eligible for FIA flood insurance, local regulations must be adopted to prohibit development or alteration of the floodway and to set minimum elevation and

flood proofing construction standards for all development within the 100-year flood plain.

Local governments may enact higher flood plain standards than the existing federal regulation allows. These higher standards can help control the sources of groundwater pollution. For example, a local government could set higher design standards for existing on-site septic systems to control release of sewage during times of flooding.

As discussed above, under the Federal Safe Drinking Water Act, the towns of local governments may petition the Environmental Protection Agency to designate aquifers which are the principal source of public drinking water as "Sole Source Aquifers."³³ If the petition is granted, the designation prompts additional environmental review of the impacts of Federally funded or sponsored projects on the sole source aquifer.

Public ownership of land overlying aquifers is the most effective and permanent way to control the quality and use of the groundwater resource. If a local government has concluded that its highly productive aquifer is very susceptible to contamination and that no development should be allowed, then acquisition of property is the only sure way of permanently implementing that policy.

Local governments can acquire fee simple ownership (absolute ownership) or seek partial interests in property

such as easements or restrictive covenants. Local officials can either negotiate with a willing seller or exercise eminent domain proceedings and condemn the property. As a fee simple owner the town has the ultimate control over the land uses on that property.

Acquisition of easements or restrictive covenants on property located within a wellhead protection area can also protect the groundwater resource. While the local government may not have total control over the property there are three advantages that partial interests have over fee simple ownership: (1) the property is still taxable; (2) it costs less allowing the local government to acquire more interest in more land; and (3) the local government does not have to maintain the property. Furthermore, there is an incentive for property owners to grant or donate partial easements because there is a possibility that the donor is eligible for a tax break in terms of a Federal tax income deduction and lower real estate property taxes.

Of special interest to local governments concerned with groundwater protection is the acquisition of a conservation easement. When a land owner sells a conservation easement that covers his or her property, she or he (under the terms of the agreement) is prohibited from using or developing the property in a way that would adversely affect the groundwater resource. In essence, the landowner has sold the right to develop the property. In this way local

governments can maintain open-space over critical recharge areas and limit sources of contamination.

In sum, the regulatory framework of both countries can be used as a foundation for transboundary groundwater issues. Although there are some differences, the approach to solving problems is quite similar because of the two countries' common legal foundation. The U.S. regulatory schemes are, however, far ahead of their Canadian counterparts.³⁴

Notes

1. B.N.A. act, (1867), 30 & 31 Victoria, C.3.
2. Constitution Act of 1982 is a United Kingdom Act which transferred exclusive jurisdiction over Canada to the Canadian Parliament.
3. Girling, Land as the Subject of Environmental Law, in: Stress on the Land, W. Simpson-Lewis (ed.) 303-322.
4. Id., at 304.
5. See BNA, supra note 24, at 30 & 31 Victoria, C.3, ss. 92 & 92A, 95, as amended.
6. 2 Geo. vI, C.36 (Can.)
7. See BNA, supra not 24, at 34 & 35 Victoria, c. 63, s.2.
8. R.S.C. ch. C-11 (1985).
9. Id., at Section 10.
10. Roman, Canadian 65 Chi. [-] Kent L. Rev. 345, 524 (1989).
11. Canadian Drinking Water Quality Guidelines 1987, passed under the Canada Water Act, R.S.C. ch.5 (Supp. 1970).
12. Can. Cons. Regs. ch. 1145 (1978).
13. Id. at ch. 1148.
14. P.H. Pearce, Currents of Change, (1985).
15. Percy, New Approaches to Inter-Jurisdictional Problems, in: Water Policy for Western Canada: The Issues of the Eighties, B. Sadler (ed.), 113-123, (1982).
16. Id.
17. For example, Ontario has its own Environmental Protection Act, Ont. Rev. Stat. ch. 141 (1980) amended Ont. Stat. ch. 30 (1989); and a Ontario Water Resources Act, Ont. Rev. Stat. ch. 361, section 16(1) (1980); amended by Ont. Stat. ch. 54 (1988).
18. Roman, supra note 10, at 551.
19. Id.

- 20.53 D.L.R. (ed) 321 SS.C.C. (1975).
- 21.United States Constitution, Art. I, sec. 8, (1787).
- 22.Id.
- 23.33 U.S.C. sections 1251 to 1387.
- 24.42 U.S.C. sections 300f to 300j-26.
- 25.Id.
- 26.Id.
- 27.Id.
- 28.15 U.S.C. sections 2601 to 2671.
- 29.7 U.S.C. sections 136 to 136y.
- 30.42 U.S.C. sections 6901 to 6992k.
- 31.42 U.S.C. sections 9601 to 9675.
- 32.M. Jaffe, & F. DiNovov, Local Groundwater Protection, (1987).
- 33.SDWA, supra note, at
- 34.Roman, supra note 10, at 551.

CHAPTER V

IS GROUNDWATER A TRANSBOUNDARY ISSUE:

TWO CASE STUDIES

There is no question that groundwater has become a transboundary issue not only between the Canadian/American border but internationally as well.¹ As industrial and agricultural demands increase and population rises, the pressure on groundwater resources worldwide has become enormous. In North America, transboundary groundwater concerns have been limited historically to the U.S./Mexican border.² This is a function of the arid nature of the border in that region and the high surface water demands along the Texas, New Mexico, and Mexican borders.

The Canadian/American border in contrast, has in the past enough water to fulfill the demand. Except for in the high plain states and provinces, water both on the surface and in the ground is plentiful. The quality of the groundwater supply along the border has not been an issue until the last decade. The "out-of-sight, out-of-mind" mentality has persisted along the border as it has everywhere else.³ The case studies of actual transboundary groundwater issues are few but only because public and institutional awareness have been slow to recognize the implications.

The concern for transboundary groundwater problems along the Canadian/American border has begun to gain momentum. In 1989, a group of academics, governmental officials, and scientists held a conference on Great Lakes groundwater problems and solutions.⁴ The title of the law review article by Tarlock and Deutsch says it all: "Great Lakes Groundwater--The Neglected Resource."

This chapter will review two groundwater case studies along the Canadian/U.S. border: the Cabin Creek and Great Lakes transboundary groundwater issues. Although there are likely many more case studies, these are the two which have received enough attention and enough documentation to analyze.

Cabin Creek

Since the discovery of large deposits of high grade coal in the area adjacent to British Columbia's Cabin Creek, which flows directly into the Flathead River which in turn flows down into Montana (at which point it becomes a nationally designated Wild and Scenic River) and through Glacier National Park, national environmental groups as well as the state of Montana have been very uneasy (Figure 9). It is a case of energy developers (Sage Creek Coal Company) within B.C. seeking to reasonably develop energy resources while Montana and the United States seek to preserve one of

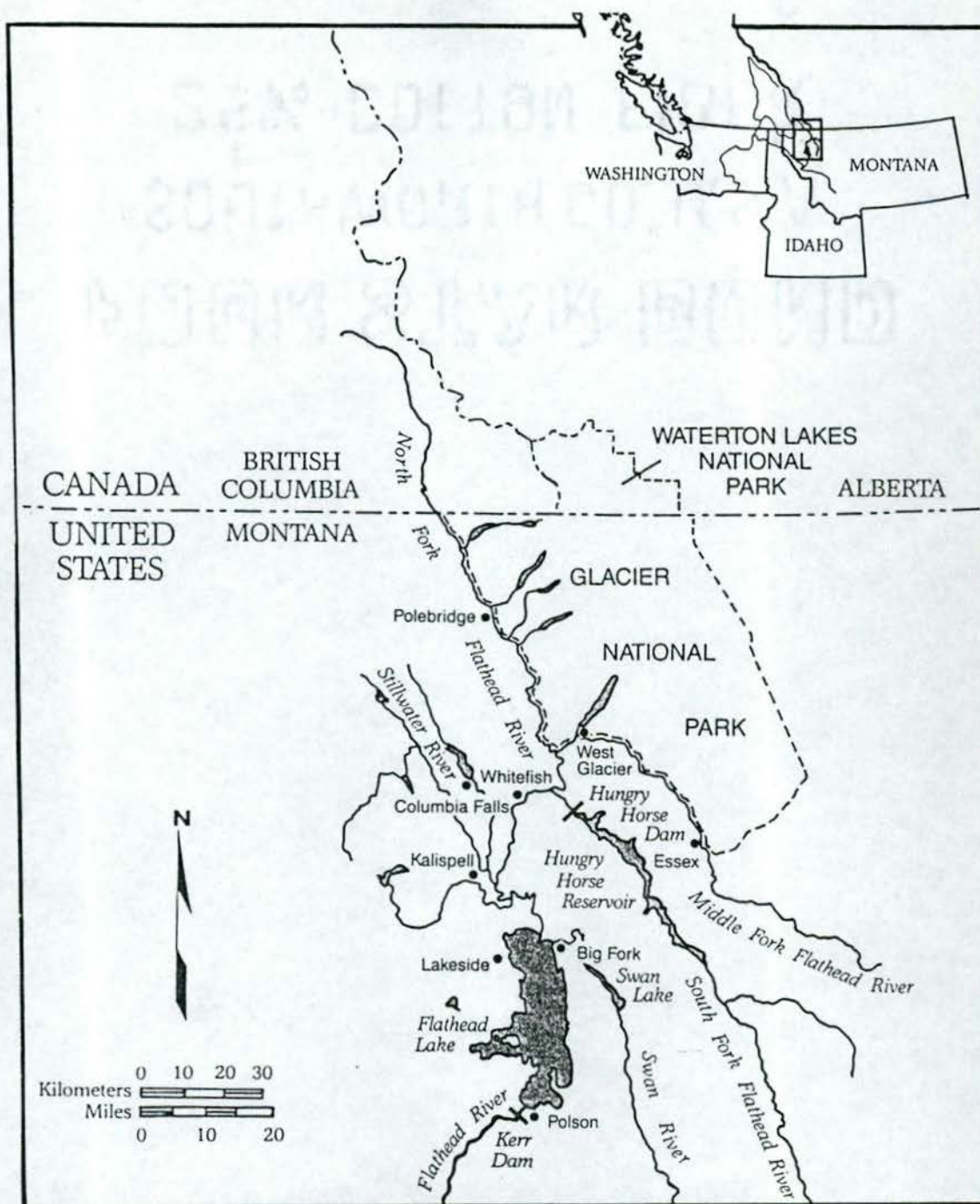


FIGURE 9. Flathead River area.

Source: 49th Parallel Institute for Canadian-American Relations, Border Waters, Proceeding of a 1986 Conference, (1987).

the few remaining vestiges of pristine wilderness areas left in the lower 48 states.

This is an ongoing issue. British Columbia and the Sage Creek Coal Company have not yet decided to develop an open-pit mine or construct the planned coal-fire electric plant, but are committed to doing so in the future when the price of oil increases. Montana has made extensive overtures to B.C. regarding this issue, but B.C. has not responded to its concerns. Montana, in frustration, unilaterally enacted a law which allows Montana citizens to sue B.C. and the energy developers for potential effects of the Cabin Creek mine and power plant.⁵ The law was merely a token effort, because the state has no legal authority to make it binding on a province of Canada.

The potential effects of the Cabin Creek mine and power plant on the Glacier Park Area based on technical studies and field work (if the open-pit mine and infrastructure were built under current provincial laws and guidelines) conducted by the IJC's bilaterally appointed Flathead Advisory Board would include: substantial increases in the sulfur concentrations over the park (from a 40 Mega-watt coal-fire power plant), because of the prevailing north/south winds; acid leeching from mining activities into the Flathead River could be of sufficient concentrations to seriously impact all downstream biota;⁶ and possible adverse effects on transboundary groundwater quality.

The United States and Canada submitted a reference in 1985 to the International Joint Commission (IJC)⁷ to conduct an investigation and prepare a report on the potential transboundary effects of the coal mine. The reference specified certain water issues the IJC was to investigate⁸ but nothing specifically was mentioned on the effects of transboundary groundwater resources.

Issues of potential transboundary groundwater problems were raised during the IJC's deliberations. The specific concern was that the open-pit mine would leech high concentrations of acidic compounds and heavy metals into the Flathead River which in turn would pollute the groundwater aquifers recharged by the surface waters of the Flathead River. These polluted aquifers could flow across the international border recharging surface water within Glacier Park causing adverse effects to recreational and fishery uses as well as water quality consumptive uses by ranching and farming operations in the area.⁹

In an unprecedented move, the IJC (in 1985) requested that the United States and Canadian Commission advisors (the USGS, the Montana Bureau of Mines and Geology, and Environment Canada) consider the problem to determine if the topic should be included in the Commission's overall review.¹⁰ Again it should be stressed as it has and will be throughout this thesis that the IJC has no legal mandate to investigate and make recommendations on groundwater issues

which are isolated from possible impacts on surface waters, unless both countries stipulate that the IJC may do so.¹¹

However, the legal loophole utilized by the IJC to bypass the legal mandate issue in conducting groundwater impact studies in the Flathead River Basin could be the possible adverse effects that polluted groundwater might have on surface waters. By linking polluted groundwater as a possible cause to surface water degradation across the border, the IJC would not overstep its legal mandate under the BWT, but would be legally pressed to investigate the source of the degradation.¹²

The Commission advisors posed three questions concerning groundwater resources in the Flathead Basin area: (1) is there a shallow, alluvial groundwater system that represents a channel to the international border that could be a conduit for transboundary water flow; (2) are there faults or bedrock aquifers that affect groundwater flow at the international border; and (3) to what extent, if any, will contaminated surface water at the mine affect shallow groundwater resources at or south of the international border.¹³

The Commission's advisors concluded that there is groundwater transboundary flow from the mine to and across the border, that faults or bedrock aquifers do not constitute major flows of groundwater, and most importantly, that "potentially degraded surface water at the mine would

affect water resources in the alluvial aquifer at the international border."¹⁴ The study by the Commission's advisors, which was completed in January of 1987, clearly indicates that the potential for adverse groundwater quality conditions exists. The issue, as noted previously, has yet to be decided. The issue will not come to a head until B.C. decides to act. The quality, amount, and availability of the coal only makes it a matter of time before development will occur.

Great Lakes Groundwater

Over one third of the Canadian population and one fourth of the U.S. population reside within the Great Lakes Basin.¹⁵ The industrial heart of both countries resides in, and substantially effects, the water quality of the Great Lakes. Approximately half of the people residing in the Great Lakes region are dependant on groundwater as a primary drinking water supply.¹⁶

Both groundwater allocation and contamination have been problems. Groundwater mining has been a particular problem in the Chicago-Milwaukee area, Green Bay Wisconsin, Lake Winnebago area, and is currently becoming an enigma in southern Ontario.¹⁷ Groundwater contamination has resulted from a variety of sources throughout the region.

Injection wells used for disposal of liquid industrial waste exist in many parts of the Great Lakes Basin. One

example noted by Hodge concerned several injection wells in the Sarnia Area Chemical Valley near the St. Clair River on the Canadian side between 1958 and 1975. Over 2 billion gallons of liquid industrial waste were injected into 16 wells.¹⁸ The Sarnia injection problem has raised issues of transboundary migration of groundwater pollutants from the Canadian side to the United States.¹⁹

Injection wells are only a small part of the problem in the Great Lakes. In 1985, it was estimated that 62.2 million tons of hazardous waste were generated in the Great Lakes region alone.²⁰ Although the data is sketchy, contaminated groundwater movement from hazardous waste sites and current industrial sources has been occurring in the Niagara River in the Niagara and Erie counties of New York as well as five sites on the Canadian side.²¹

In 1972, the U.S. and Canada entered into the "Great Lakes Water Quality Agreement" which set out water quality standards and set forth a non-degradation policy.²² Because of increasing concerns about toxics, acid rain, and continuing water quality degradation within the Great Lakes, the U.S. and Canada entered into another Great Lakes Agreement in 1978.²³ Both countries reaffirmed their commitment to enhance water quality acknowledging toxics, air to water pollution, and non-point pollution.

Neither of these agreements included adverse effects on groundwater quality or the effects of polluted groundwater

on surface waters. However, in 1987 the two countries amended the 1978 Water Quality Agreement.²⁴ The amendments include a provision which calls for the coordination of "existing programs to control contaminated groundwater affecting the boundary waters of the Great Lakes System."²⁵ The provision specifically deals with groundwater as it affects surface waters. It does not include surface waters as they affect groundwater or polluted international groundwater as an isolated entity.

The groundwater provision calls for the identification of existing and potential sources of polluted groundwater; the hydro-geological mapping of such sources; the development of agreeable standards and procedures of sampling and analysis of contaminants in groundwater to determine the extent and degree of contaminant, the extent of the impact of the contaminant on surface waters, and possible remedial actions; and the control of the sources of groundwater contamination when the source has been identified.²⁶ Obviously groundwater pollution affecting surface water is a problem in the Great Lakes or this provision would not have been included. Yet according to the commentators, little action has resulted since the Agreement's inception.²⁷

The complexity of the Great Lakes groundwater problem is so staggering that it boggles many of the brightest minds in both countries. The need for a comprehensive

transboundary groundwater protection mechanism with some teeth is apparent. The next chapter analyzes the current mechanism which can be utilized as a foundation to address these problems.

Notes

- 1.R.D. Hayton & A.E. Utton, Transboundary Groundwaters: The Bellagio Draft Treaty, 29 Nat. Resources J. 663 (1989).
- 2.Utton, The Development of International Groundwater Law, 22 Nat. Res. J. 95 (1982).
- 3.Hodge, Groundwater in the Great Lakes Basin: The Natural System, Use and Abuse, and Policy Implications, 65 Chi[-]Kent L. Rev. 439 (1989)
- 4.Tarlock & Deutsch, Great Lakes Groundwater--The Neglected Resource, 65 Ch.[-]Kent L. Rev. 345 (1989).
- 5.J.E. Carrol, Environmental Diplomacy (1983).
- 6.USGS, Groundwater-Surface Water Relations in the Flathead River Valley Near the Proposed Cabin Creek Coal Mine, B.C., Canada, Report 87-28, 1987 [hereafter Flathead Study].
- 7.IJC, International Joint Commission Activities Report, 1985.
- 8.Id.
- 9.Flathead Study, supra note 6.
- 10.IJC, supra note 7.
- 11.Boundary Waters Treaty, Art. V, Jan. 11, 1909, United States/United Kingdom, 36 Stat. 2448, 2451, T.S. No. 548 [hereafter cited as BWT].
- 12.Id.
- 13.Flathead Study, supra note 6.
- 14.Id.
- 15.Carrol, supra note 5.
- 16.Hodge, supra note 3, at 449.
- 17.Id., at 452.
- 18.Id., at 456.
- 19.Id.

20. Groundwater Contamination Task Force, Sc. Advisory Bd., International Joint Commission, As Study Proposal for Assessing Potential For Great Lakes Contamination Via Groundwater (1985).

21. Id., at 458.

22. 1972 Great Lakes Water Quality Agreement.

23. 1978 Great Lakes Water Quality Agreement.

24. Revised Great Lakes Water Quality Agreement of 1978, Nov. 18, 1987, United States-Canada Protocol, Annex 16, at 122 U.S.T., T.I.A.S. (1988) (Agreement with Annexes and Terms of Reference between the United States and Canada signed at Ottawa, Ontario, November 22, 1978, and Phosphorous Load Reduction Supplement signed October 7, 1983, as amended by Protocol signed November 18, 1987).

25. Id.

26. Id.

27. Hodge, *supra* note 3, at 439.

CHAPTER VI
AN INSTITUTIONAL AND LEGAL FRAMEWORK
FOR TRANSBOUNDARY GROUNDWATERS

Comparative Analysis of Groundwater in Light
of the BWT and Other International Law

It is imperative for any proposed transboundary protection scheme to review and analyze existing international transboundary mechanisms already in place or proposed. These institutional and legal mechanisms will provide models and solutions for future groundwater protection. To be able to incorporate an institution such as the IJC, with historical roots and precedent in the transboundary area as a facilitator of transboundary groundwater protection solutions would be not only be politically efficient but institutionally sound. This chapter evaluates the IJC and other international bodies and frameworks for future potential under a Canadian/American transboundary groundwater scheme.

The Powers of the IJC as Expressed in the BWT and Their
Application to Groundwater Quality and Quantity Issues.

The IJC, under Articles II and IV of the BWT, has compulsory jurisdiction over transboundary water issues (Note Appendix A).¹ Boundary waters are defined in the

Preliminary Article as:

the waters from main shore to main shore of lakes and rivers and connecting water ways, or the portions thereof, along which the international boundary between the United States and...Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers, and water ways, or water flowing from such lakes rivers, and waterways, or the waters of rivers flowing across the boundary.²

This definition rules out addressing transboundary water issues in terms of a complete three dimensional drainage basin approach by excluding groundwater, as well as tributary waters. If the IJC is to have a legal mandate to mediate groundwater issues groundwater must be included within the definition of boundary waters.

In Article III, the Commission has jurisdiction over "use, obstructions, and diversions" of boundary or transboundary waters that affect "the natural flow of boundary water on the other side of the line."³ In Article IV, if developments on boundary or transboundary waters affect the water level of the upstream state, then the development is subject to the approval of the IJC.

In ruling on cases which arise out of articles III and IV, where there are conflicting demands on shared waters, the IJC will give primacy to the following hierarchy under Article VIII:

1. Uses for domestic and sanitary purposes
2. Uses for navigation
3. Uses for power and for irrigation purposes⁴

Article VIII charges the IJC with insuring that the interest on both sides of the border are protected. The IJC is guided by the principle of equality, in that each country "shall have, each on its own side of the boundary, equal and similar rights in the use of waters hereby defined as boundary waters."⁵ The Commission is further directed to provide "that suitable and adequate provision" is made for the "protection and indemnity of all interests on the other side of the line which may be injured thereby."⁶ This empowers the IJC to adjudicate compensation claims which have resulted in indemnity or protection from injury. Further, the IJC could be directed to adjudicate claims compensation of injured groundwater users.

Under Articles IX and X, the IJC may acquire jurisdiction by voluntary consent of the two countries. Article IX provides that if there are differences which arise involving "the rights, obligations, or interest of either relation or inhabitation of the other along the common frontier," and if these differences are referred by either government, then the IJC may make findings of fact and provide recommendations.⁷ This acknowledges the Commission's powers of investigation. Article IX, however, specifically notes that the recommendations and conclusions of the IJC are not decisions on questions of fact or law,

and the governments are not bound.⁸ This article empowers the IJC (with consent) to investigate matters other than surface water issues such as air quality, economics, or most notably groundwater issues.

Article IX is the window through which, if both countries consent, the IJC could at least investigate the groundwater issue. Article IX is critical in the sense that if utilized it is a legal mandate for the IJC to analyze groundwater issues and make recommendations to both countries. If both countries want the IJC to arbitrate (Article X) on groundwater issues it is an option if both countries consent.

Other Articles which have considerable implications for groundwater issues include Article II and Article IV. Article II is the internationally ridiculed "Harmon Doctrine."⁹ The doctrine espouses the philosophy of complete territorial sovereignty over water. The Upstream country has the right to do what ever it wants regardless of the downstream consequences. This has very bad implications for surface water as well as groundwater, and wisely, neither the U.S. or Canada has invoked this doctrine.

Under Article IV, both governments have agreed that "boundary water and water flowing across the boundary shall not be polluted on either side to the injury of health or property of the other."¹⁰ Article IV is a great statement and would be very applicable to groundwater issues except

that it has no legally binding teeth. It simply mandates that each country will not pollute, and does not provide the IJC with any jurisdictional powers. However, the statement alone could invoke diplomatic pressure on the polluting nation in groundwater cases.

Precedents of the IJC

The IJC's experience constitutes a foundation for legal principles in international transboundary law as it relates to the U.S. and Canada.¹¹ In Table 1, there are IJC interpretations of Articles in the BWT as they are applied to different situations. These were compiled independently from a paper by Robert Sugerman under the sub-headings of substantive, procedural law, and remedies.¹² These precedents are not internationally binding law, but in transboundary issues as they relate to the U.S. and Canada, they are standing legal principles that have evolved from a legal body (IJC).¹³ Precedents in such areas as pollution, ecosystems, and equitable common law would have significant impacts on groundwater issues.

Other International Law which Might be Applicable to Transboundary Groundwater

Helsinki Rules

There is a recognized principle in international law that states have an obligation to "negotiate in good faith

to solve disputes relating to shared resources."¹⁴ This sentiment is illustrated within the BWT and should be applied to transboundary groundwater as well. This principle is further reflected in the International Law Association's report on the rules on international river basins (hereafter noted as the Helsinki Rules).¹⁵ The Helsinki Rules recognize the need for a holistic approach within its definition of a drainage basin in Article V: a "drainage basin is an indivisible hydrologic unit which requires comprehensive consideration in order to effect maximum utilization and development of any portion of its waters... the drainage basin approach has become a necessity."¹⁶ Clearly, it can be inferred from the language of Article V of the Helsinki Rules that groundwater could be included within the definition of drainage basin.

Also embodied in international law is the doctrine of equitable apportionment specifically applying to international rivers but with precedent for international groundwater resources. The doctrine is codified in Article V of the Helsinki Rules stating that "each basin state is entitled, within its territory, to a reasonable and equitable share in the beneficial uses of the waters of an international drainage basin."¹⁷ The Helsinki Rules further outline the factors which should be considered when determining what is reasonable and equitable.¹⁸ The equitable apportionment doctrine as applied to groundwater

TABLE 1. Precedents of the IJC

Substantive Law:

- | | |
|----------------------|--|
| Pollution- | <p>(1) In distinguishing pollution from injury (Article IV) the commission has decided that if pollution does not affect the net interest of the downstream country upon equitable review, it does not constitute injury.</p> <p>(2) Assimilation capacity is allowed without injury (some degradation is allowed), but in so doing such objectives must protect the most sensitive reasonable foreseeable use.</p> <p>(3) If evidence foretells injury, there is a duty not to pollute and therefore probable proof is sufficient to make an Article IV decision and therefore, Article IV and the Treaty contemplate equitable relief as well as compensatory relief.</p> <p>(4) The depletion of water quantity by the upstream country is not pollution as used in Article IV, but the reduction of quality should be considered in apportioning the waters of the stream under equitable apportionment.</p> |
| Ecosystems- | <p>(1) The commission recognizes the difficulty and the impossibility of quantifying ecosystem values and yet it recognizes them explicitly as a valid concern under Article IV.</p> <p>(2) In its Great Lakes Water Quality Agreement Reports, the Commission has developed the ecosystem concept, as reflecting the preservation value of the Great Lakes ecosystem.</p> |
| Treaty
Supremacy- | <p>(1) The principal held and enforced by the commission is that treaty obligations should prevail over contrary domestic law or administrative agencies or actions.</p> |

TABLE 1. (Continued)

 Substantive Law continued:

Equitable Common Law-	(1) Where the over-all effect of the project appears positive (or negative), but the net effect on one country was contrary to the total, the commission has ordered a redistribution of the costs or benefits which optimizes the result of both countries while sharing the costs equitably. The result is the evolution of quasi-judicial equitable commission law. The "appropriate protection" language of Article VIII provides the authority.
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Procedure & Judgments:

Amendments-	(1) Commission has held that it has continuing jurisdiction to amend its orders to assure compliance with Article VIII.
	(2) Commission can update orders to make appropriate protection for preservation of water quality and aquatic life.

Remedies:

Economic-	(1) Treaty and Agreements permit limits on economic activities in appropriate circumstances.
Individual Injury-	(1) The Commission is unclear in this area. It must define the responsibilities of the developer to provide compensation for injury to individuals in connection with the implementation of power and other projects under Article VIII and under its reference jurisdiction.

Source: Sugerman, International Joint Commission and Principles of International Law, In: Common Boundary/Common Problems, ABA (ed), 51, (1981).

would limited territorial sovereignty, permitting the use of groundwater to the extent that it does not impose harm on the other riparian state both in terms of quantity and the effects of overuse has on water quality.

Equal Access to Each Country's Legal System for Compensation from Injuries Arising out of Groundwater Quality and Quantity Problems

In Canada, the view is that if a person has to go to court, the system has failed in some way.¹⁹ Therefore, access to Canadian courts is highly restrictive as compared to the U.S. legal system.²⁰ In transboundary compensation claims (i.e., injuries that result out of the pollution of a groundwater aquifer in one country that affects groundwater in the other country whose individuals livelihood depends on the aquifer being clean), access to Canadian courts by foreigners is all but blocked by the "local action rule," which states that a court has no jurisdiction to entertain any actions involving damage to foreign lands, whether or not title to the lands is at issue.²¹

U.S. courts, on the other hand, are not opposed to entertaining foreign parties within their legal system. The Foreign Sovereign Immunities Act²² (FSIA) provides foreign states and their individuals access to federal courts. In Ohio v. Wyandotte Chemical Corp.,²³ the state of Ohio submitted a complaint which alleged that Dow Canada and another Canadian Corporation, Wyandotte, had each dumped

mercury into streams which enter Lake Erie. Ohio further argued that the mercury had polluted and contaminated the lake's water, fisheries, vegetation, and wildlife. Ohio petitioned the court to declare the dumping of mercury a public nuisance, enjoin the defendants from dumping any more mercury, require the defendants to pay costs for clean up, and direct defendants to pay damages. The court grappled with whether it had jurisdiction and noted:

Original jurisdiction is said to be conferred on this Court by Art. III of the Federal Constitution. Section 2, cl. 1, of that Article provides: "The judicial power shall extend... to controversies...between a state and citizens of another State...and between a state....and foreign...citizens or subjects." Section 2, cl. 2, provides: "In all cases..in which a state shall be party, the Supreme Court shall have original jurisdiction." Finally, 28 U.S.C. 1251 (b) provides: "The Supreme Court shall have original but not exclusive jurisdiction of...(3) All action or proceedings by a state against the citizens of another state or against aliens."²⁴

The court concluded that it had jurisdiction over the case, even though it involved Canadian defendants. However, the court declined to exercise its jurisdiction basically because the complexity of the Great Lakes water quality was already being dealt with by the IJC, and that the IJC had the legal mandate to resolve such matters.

Other cases include Michie v. Great Lakes Steel,²⁵ where the federal court granted standing to thirty seven Canadian residents who brought a suit against three Michigan

corporations for air pollution nuisance, and Wilderness Society v. Morton,²⁶ where the Court of Appeals granted standing to Canadian environmentalists concerning the Trans-Alaska pipeline. U.S. administrative agencies have also allowed Canadians to participate in hearings, as noted when Ontario intervened before the EPA concerning a hearings process over state sulfur emissions.²⁷

There is no institutional mechanism to date which provides for equal access to both country's judicial systems. The American and Canadian Bar Associations, however, have contemplated the equal access problem in depth as it pertains to transboundary pollution.²⁸ In 1979 they submitted two draft treaties to each government specifically outlining equal access and remedy (Appendix B), and third party settlements of disputes (Appendix C). Article 2 of the Equal Access and Remedy Treaty is the main operative provision:

(a) The country of origin shall ensure that any natural or legal person resident in the exposed country, who has suffered trans-frontier pollution, shall at least receive equivalent treatment to that afforded in the country of origin, in cases of domestic pollution or the risk thereof and in comparable circumstances, to persons of equivalent condition or status resident in the country of origin.

(b) From a procedural standpoint, this treatment shall include but not be limited to the right to take part in, or have resort to, all administrative and judicial procedures existing within the country of origin, in order to prevent domestic pollution, to have it abated, and/or to obtain compensation for the damage caused.

(c) In the case of requirements for security of cost, this treatment shall at least be equivalent to that accorded to a non-resident national of the country of origin.²⁹

This article would allow those injured in one country from groundwater pollution access to judicial remedy in the polluting country. Therefore, a Canadian resident whose groundwater was polluted by activities across the border in the United States might be able to sue under U.S. tort law (nuisance).

The second draft treaty submitted by the American and Canadian Bar Associations, "Third Party Dispute Resolution" (Appendix C), outlines procedural arbitration issues and opens a legal window in Article II for optional jurisdiction which could include groundwater issues under Art.2 (1) f: "environmental issues" or Art.2 (1) g: "the management of natural resources of common interest."³⁰

Although both of the nations' most prominent legal organizations agree that there should be some legal mechanism through which those injured in either country as a result of pollution should have equal access to each legal system, neither government has pursued such a mechanism for fear of encroachment upon their sovereignty.

These draft treaties have been included in this discussion of other applicable international law as it pertains to groundwater because of the draft treaties' potential positive impacts on the resolution of transboundary groundwater problems if they were ratified.

The equal access treaties, the Helsinki Rules, and the altered mandates of the IJC all have great potential as possible solutions to transboundary groundwater problems. The Bellagio Draft Treaty on Transboundary Groundwaters seems to incorporate the positive aspects of all these mechanisms including a few wrinkles of its own.

The Bellagio Draft Treaty on Transboundary Groundwaters

The Bellagio Draft Treaty (Appendix D) on transboundary Groundwater as noted previous chapters, was drafted in response to the critical lack of international law on the subject and the acute need for some type of framework for pressing global transboundary groundwater problems.³¹ The treaty is based on:

the proposition that water rights should be determined by mutual agreement rather than be the subject of uncontrolled, unilateral taking, and that rational conservation and protection actions require joint resource management machinery.³²

The treaty is very comprehensive in nature, suggesting ways to deal with water quality, recharge protection, aquifer depletion, dispute resolution and public health emergencies.³³

Three basic themes pervade the Bellagio Treaty Apparatus:

(1) rather than comprehensive administration along the entire border, control is to be asserted only in zones considered to be critical because withdrawals are exceeding recharge or contamination is threatening groundwater quality.

(2) actual enforcement would be left to the internal administrative agencies of each country with oversight and facilitating responsibility lodged in an international agency; and

(3) the "black letter" provisions delegate only a limited amount of substantive discretion to the joint agency, but above all they instruct the commission to take the initiative, subject to the governments' approval, in preparing for and confronting the full range of problems involving parties's transboundary groundwaters.³⁴

The ideal international body whose responsibilities are set out Article III of the Treaty would be the International Joint Commission. In fact, the IJC already has this type of authority for surface waters under the BWT.³⁵ It would take little transition time for the IJC to assume full responsibility under the Bellagio Draft Treaty given its historical context.

Article III would limit like the BWT, the IJC's ability to act unilaterally on behalf of one party.³⁶ The IJC would only be able to act if governments along the border jointly refer a groundwater issue to the IJC.³⁷ If a government on one side of the border is concerned with groundwater contamination migration, it can refer the issue to the IJC for investigation only not action. Only bilateral or multilateral consent on the part of all parties would

trigger IJC action.

The enforcement mechanism of the Act really rests in the hands of each party. Each party will enforce the agreements on quantity and quality measures within their own jurisdictions.³⁸ This means that the IJC would not be the responsible for enforcement but would be responsible to review the enforcement policies.³⁹ In addition, Article IV requires that each government be responsible for reporting to the commission specifying "water quality and conservation measures taken, quantities withdrawn, transferred and exchanged, and any problems encountered..."⁴⁰

The treaty calls for the establishment of a comprehensive data base pertaining to transboundary groundwaters.⁴¹ There is no doubt that this probably the most important provision of the treaty. Without the necessary data, the countries and the commission would be literally groping in the dark on groundwater issues. The comprehensiveness nature of the proposed data base is impressive:

The database shall include an inventory of all transboundary groundwater resources taking into account recharge rates, interaction with surface waters, and other pertinent data and shall identify all transboundary aquifers.⁴²

In order for the commission to make objective and accurate decisions, a comprehensive data base is essential.

Transboundary countries are called upon to protect and

improve the quality of groundwater within their jurisdictions.⁴³ The underpinning here is that its better to prevent the harm than have to take remedial action later. Article VI of the treaty calls for "prompt" notice of the part of any government which experiences any polluting discharge into transboundary groundwaters.⁴⁴ The commission is to determine the severity of the discharge.

The treaty directs the commission to determine the "desirability" of creating groundwater conservation areas along the border.⁴⁵ The commission can propose that such an area be given conservation status but each jurisdiction has the right to veto the declaration.⁴⁶ The commission determines whether an area should be declared a conservation area based on a number of factors as to whether:

- a. groundwater withdrawals exceed or are likely to exceed the recharge so as to endanger yield or water quality or are likely to diminish the quantity or quality of interrelated surface waters;
- b. recharge has been or may become impaired.
- c. the use of the included aquifer(s) as an important source of drinking water has been, or may become impaired;
- d. the aquifer(s) have been or may become contaminated; and
- e. recurring or persistent drought conditions necessitate management of all or some water supplies in the particular area.⁴⁷

If a transboundary groundwater conservation area has been declared then the treaty establishes a comprehensive management plan for each area.⁴⁸ Article VIII prescribes

measures which can be taken under the management plan to protect the groundwater resource. Sources controls, monitoring programs, even zoning schemes for use protection can be prescribed. It is almost as if the local governmental controls discussed in Chapter III have been thrust to the international level. The commission is charge with creating the plan. Each government has right to veto the plan unilaterally.⁴⁹ The commission will monitor and evaluate the enforcement of the plan.

Other Articles of the treaty deal with public health emergencies,⁵⁰ planned depletion,⁵¹ transboundary transfers,⁵² drought plans,⁵³ public interest inquiry,⁵⁴ accommodation of differences⁵⁵ and dispute resolution.⁵⁶ The treaty is very comprehensive in nature and covers very adequately most of the transboundary groundwater issue which have been raised. It goes a long ways towards providing a solutions to complex problems.

Proposed Institutional and Legal Solutions for Transboundary Groundwater Issues

There are five possible options in seeking solutions to transboundary groundwater issues: (1) keep the current status-quo; (2) amend the BWT to include groundwater within the definition of boundary waters and strengthen Article IV; (3) formally adopt the Helsinki rules in conjunction with the BWT along with ratification of the ABA and CBA draft treaties; (4) ratify the Bellagio Draft Treaty; or (5) some

combination of the above.

Status Quo

For the time being, this option is the most realistic. The IJC has incorporated groundwater into its management scheme by connecting its effects to surface water. If it is a purely groundwater issue (i.e., confined aquifers with international migration of hazardous pollutants) then until the IJC is challenged for overstepping its legal mandate or the issue itself becomes so cumbersome that new legal and institutional mechanisms are needed to effectively deal with the problems which arise, groundwater transboundary issues will stay in the shadows of surface water.

As noted above, Article IX allows the IJC to investigate with the consent of both countries issues other than boundary waters as defined in the BWT. On such issues, the IJC can only make recommendations. The problem with this approach, as well as the approach of the BWT in general, is that it is based on an ad hoc issue by issue procedure. In Article IX, both countries must consent and if one country does not consent, the issue does not get resolved or even studied. It allows no comprehensive review of the groundwater resource let alone the surface water resource.

This is not to say that there have not been any useful solutions based on IX references, but if the IJC were given

some type of compulsory jurisdiction mandate, the IJC would be able to monitor the common frontier and jump into an issue early and the probability for curtailing damage or increasing successful and beneficial resolutions would be substantially enhanced. A compulsory jurisdiction mandate would allow the IJC to plan ahead and play a preventative role.

In the case study of the cabin creek coal mine, the IJC would have stepped outside its legal mandate in having its advisory commission investigate the possible adverse affects on groundwater because neither country mutually referred the issue to the IJC to study. However, the IJC linked surface water quality problems with the groundwater resource thereby coming under the umbrella of their legal mandate.

Amend the Definition of Boundary Waters.

If the United States and Canada were to ratify a new amendment which amended the definition of boundary waters to include groundwater, it would provide the IJC with the stated legal mandate necessary to fully address groundwater issues. The definition might look like this:

...boundary waters are defined as the waters from main shore to main shore of the lakes and rivers and connecting waterways or the portion thereof and mutually defined aquifers and underground streams, along the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, inlets, and all tributary waters which in their natural channels would flow into such lakes, rivers,

waterways, aquifers, or underground streams
flowing across the boundary.

This definition seeks to instill a conjunctive awareness of surface and groundwater systems when dealing with transboundary issues. It could be surmised from this definition and mandates of the BWT, that the IJC would have jurisdiction over the use of groundwater which affects the flow of groundwater across the border and that strictly based on the BWT, the IJC must give deference where there are conflicting demands on groundwater for domestic and sanitary purposes. Further, the IJC could be directed to adjudicate claims for compensation of injured groundwater users. The definition would allow the IJC to make internal institutional changes (i.e., added staff, regulations, procedures, etc.) to address groundwater issues on a current continual basis.

To cover groundwater quality issues sufficiently, a strong enforcement mechanism should be included in Article IV.

Formally Incorporate the Helsinki Rules and
ABA/CBA Dispute Resolution Treaties.

By formally incorporating the Helsinki Rules in conjunction with the BWT, both countries would adopt the definition of a drainage basin which is an "indivisible hydrologic unit" or a definition which does not separate surface and groundwater systems. The Helsinki Rules also

call for comprehensive basin planning which by its very nature is a preventative mechanism in terms of future groundwater as well as surface water conflicts. Planning helps prevent conflicts. The equitable apportionment aspect of the Helsinki Rules also insures that where the unjust apportionment or the apportionment causes harmful effects, compensation will be made available.

If the United States and Canada were to ratify the ABA and CBA treaties, individuals from either country would have access to the judicial system of the other country and have the same legal rights as citizens in the other country to remedy injuries from transboundary pollution. Thus, those affected adversely by groundwater pollution created by the other country would take action to prevent, remediate, and/or get compensated for their injuries.

The treaty for third party dispute settlement could possibly, if both countries consented, include transboundary groundwater dispute settlement under Article II. This option as well as the last option are probably infeasible at this time because of current trends in both countries to fend off encroachment upon their state sovereignties and because of the immense legal complexity which would result in an equal access, equal footing bilateral legal system.

Adoption of the Bellagio Draft Treaty

The Bellagio Draft Treaty seems to adapt the best of

the BWT and Helsinki Rules and incorporates them into its scheme. It even goes further by establishing conservation zones and management practices within those zones to deal with the actual groundwater problems. If the draft treaty were adopted, there is already an institutional presence in the form of the IJC. The comprehensive nature of the treaty makes it the best alternative in achieving the goals of transboundary groundwater protection.

The Combination of the First Three Options

If a combination option were implemented (although very unlikely), there would be a blanket effect which would fairly well cover all aspects of groundwater transboundary issues. Incorporation of groundwater into the boundary water's definition would provide a legal mandate for the IJC. The Helsinki rules would not only provide a legal mandate for groundwater, but provide planning and equity as well. The ratification of the ABA and CBA treaties would provide access to compensation for injuries caused by groundwater pollution and provide dispute resolution mechanisms and procedures.

Adoption of the Bellagio Draft Treaty would in many ways overlap with the above scenario. Given the tough political procedure that such a comprehensive treaty must endure, it may be better to pass combination protects initially. The draft treaty lacks an equal access provision

in it. The ratification of the ABA/CBA treaties are essential in the recourse for personal injury. It is my hope that the Bellagio Draft Treaty would be ratified without any changes but political sovereignty is likely to rear its ugly head.

The combination option is the most comprehensive legal and institutional scenario to address transboundary groundwater issues, but likely the most unrealistic option in today's political climate. It is hoped that more awareness of the issue will bring more institutional protections as well.

Conclusion

It has been acknowledged that groundwater is a transboundary issue and that in the future, groundwater should be incorporated into the scheme of transboundary legal and institutional mechanisms. This thesis has analyzed and suggested possible avenues of incorporation for groundwater issues.

The logical and analytical premise of this thesis falls back on a fundamental hydrological principle: you have to incorporate the whole tree...the leaves, branches, trunk, and roots. Without this comprehensive incorporation, transboundary water issues of all types will only address smaller parts of the problem and not the entire organism.

Notes

1. Boundary Waters Treaty, Jan. 11, 1909, United States-United Kingdom, 36 Stat. 2448, 2451, T.S. No 548 [hereafter cited as BWT].

2. See BWT, supra note 1, at Preliminary Article.

3. Id., at Art. III.

4. Id., at Art. VIII.

5. Id.

6. Id.

7. Id., at Art. IX.

8. Id.

9. Id., at Art. II. As to why the Harmon Doctrine is ridiculed Internationally, note C.D. Bourne, International Water Resources, XLVII The Canadian Bar Review, 67 (1969). Note that the Harmon Doctrine was named after Judson Harmon, the Attorney General of the United States in 1909, who authored the upstream exclusive rights phrase.

10. Id., at Art IV.

11. Sugerman, International Joint Commission and Principles of International Law, In: Common Boundary/Common Problems, ABA (ed), 51, (1981).

12. Id.

13. Id.

14. M.A. Bowden, speech comparing Canadian & U.S. Water Law at the Western Border Waters Forum, held in Helena, Montana, Oct. 30-31, 1986.

15. International Law Association, Report of the 52nd Conference, Helsinki 484 (1967).

16. Id., at Art. V.

17. Id.

18. Id.

19. Girling, Land as the Subject of Environmental Law, in: Stress on the Land, W. Simpson & O. Lewis (eds) 303, (1982).

20. *Id.*, at 305.

21. *Id.*

22. The U.S. Foreign Sovereign Immunities Act of 1976.

23. 401 U.S. 493 (1971)

24. *Id.*

25. 495 F.2d 213 (1974).

26. 463 F.2d 1261 (1976).

27. Scott, Transboundary Transport of Air Pollutants: Eastern Canada's concern, in: Common Boundary/Common Problems, 44, (1981).

28. American and Canadian Bar Associations, Settlement of International Disputes Between Canada and the U.S.A., (1979).

29. *Id.*

30. *Id.*

31. R.D. Hayton & A.E. Utton, Transboundary Groundwaters: The Bellagio Draft Treaty, 29 Nat. Resources J. 663 (1989).

32. *Id.*, at 664.

33. *Id.*, at 665.

34. *Id.*, at 664-665.

35. BWT, supra note 1, at Art IV.

36. Bellagio, at Art. III

37. *Id.*, at sec. 8.

38. Bellagio, at Art. IV, sec. 1.

39. *Id.*, at sec. 2.

40. *Id.*, at sec. 3.

41. *Id.*, at Art. V

42. *Id.*, at sec. 1.

- 43.Id., at Art VI.
- 44.Id., at sec. 2.
- 45.Id., at Art. VII.
- 46.Id., at sec. 2.
- 47.Id., at sec. 5.
- 48.Id., at Art. VIII.
- 49.Id., at sec. 4.
- 50.Id., at Art. IX.
- 51.Id., at Art. X.
- 52.Id., at Art. XI.
- 53.Id., at Art. XII.
- 54.Id., at Art. XIII.
- 55.Id., at Art. XV.
- 56.Id., at Art. XVI.

APPENDIX A

TREATY BETWEEN THE UNITED STATES AND GREAT BRITAIN RELATING
TO BOUNDARY WATERS, AND QUESTIONS ARISING BETWEEN
THE UNITED STATES AND CANADA

The United States of America and His Majesty the King of the United Kingdom of Great Britain and Ireland and of the British Dominions beyond the Seas, Emperor of India, being equally desirous to prevent disputes regarding the use of boundary waters and to settle all questions which are now pending between the Dominion of Canada involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along their common frontier, and to make provision for the adjustment and settlement of all such questions as may hereafter arise, have resolved to conclude a treaty in furtherance of these ends, and for that purpose have appointed as their respective plenipotentiaries:

The President of the United States of America, Elihu Root, Secretary of State of the United States: and

His Britannic Majesty, the Right Honorable James Bryce, O.M., his Ambassador Extraordinary and Plenipotentiary at Washington;

Who, after having communicated to one another their full powers, found in good and due form, have agreed upon the following articles

PRELIMINARY ARTICLE

For the purposes of this treaty boundary waters are defined as the waters from main shore to main shore of the lakes and rivers and connecting waterways, or the portions thereof, along which the international boundary between the United States and the Dominion of Canada passes, including all bays, arms, and inlets thereof, but not including tributary waters which in their natural channels would flow into such lakes, rivers, and waterways, or the waters of rivers flowing across the boundary.

ARTICLE I

The High Contracting Parties agree that the navigation of all navigable boundary waters shall forever continue free and open for the purposes of commerce to the inhabitants and to the ships, vessels, and boats of both countries equally, subject, however, to any laws and regulations of either country, within its own territory, not inconsistent with such privilege of free navigation and applying equally and without discrimination to the inhabitants, ships, vessels, and boats of both countries.

It is further agreed that so long as this treaty shall remain in force, this same right of navigation shall extend to the waters of Lake Michigan and to all canals connecting boundary waters, and now existing or which may hereafter be constructed on either side of the line. Either of the High Contracting Parties may adopt rules and regulations governing the use of such canals within its own territory and may charge tolls for the use thereof, but all such rules and regulations and all tolls charged shall apply alike to the subjects of citizens of the High Contracting Parties, and they shall be placed on terms of equality in the use thereof.

ARTICLE II

Each of the High Contracting Parties reserves to itself or to the several State Governments on the one side and the Dominion or Provincial Governments on the other, as the case may be, subject to any treaty provisions now existing with respect thereto, the exclusive jurisdiction and control over the use and diversion, whether temporary or permanent, of all waters on its own side of the line which in their natural channels would flow across the boundary or into boundary waters; but it is agreed that any interference with or diversion from their natural channel of such waters on either side of the boundary, resulting in any injury on the other side of the boundary, shall give rise to the same rights and entitle the injured parties to the same legal remedies as if such injury took place in the Country where such diversion or interference occurs; but this provision shall not apply to cases already existing or to cases expressly covered by special agreement between the parties hereto.

It is understood, however, that neither of the High Contracting Parties intends by the foregoing provision to surrender any right, which it may have, to object to any interference with or diversions of waters on the other side of the boundary the effect of which would be productive of

material injury to the navigation interests on its own side of the boundary.

ARTICLE III

It is agreed that, in addition to the uses, obstruction, and diversions heretofore permitted or hereafter provided for by special agreement between the Parties hereto, no further or other uses or obstructions or diversions, whether temporary or permanent, of boundary waters on either side of the line, affecting the natural level or flow of boundary waters on the other side of the line, shall be made except by authority of the United States or the Dominion of Canada within their respective jurisdictions and with the approval, as hereinafter provided, of a joint commission, to be known as the International Joint Commission.

The foregoing provisions are not intended to limit or interfere with the existing rights of the Government of the United States on the one side and the Government of the Dominion of Canada on the other, to undertake and carry on governmental works in boundary waters for the deepening of channels, the construction of breakwaters, the improvement of harbors, and other governmental works for the benefit of commerce and navigation, provided that such works are wholly on its own side of the line and do not materially affect the level or flow of the boundary waters on the other, nor are such provisions intended to interfere with the ordinary use of such waters for domestic and sanitary purposes.

ARTICLE IV

The High Contracting Parties agree that, except in cases provided for by special agreement between them, they will not permit the construction or maintenance on their respective sides of the boundary of any remedial or protective works or any dams or other obstruction in waters flowing from boundary waters or in waters at a lower level than the boundary in rivers flowing across the boundary, the effect of which is to raise the natural level of waters on the other side of the boundary unless the construction or maintenance thereof is approved by the aforesaid International Joint Commission.

It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other.

ARTICLE V

The High Contracting Parties agree that it is expedient to limit the diversion of waters from the Niagara River so that the level of Lake Erie and the flow of the stream shall not be appreciably affected. It is the desire of both Parties to accomplish this objective with the least possible injury to investments which have already been made in the construction of power plants on the United States side of the river under grants of authority from the State of New York, and on the Canadian side of the river under license authorized by the Dominion of Canada and the Province of Ontario.

So long as this treaty shall remain in force, no diversion of the waters of the Niagara River above the Falls from the natural course and stream thereof shall be permitted except for the purposes and to the extent hereinafter provided.

The United States may authorize and permit the diversion within the State of New York of the waters of said river above the Falls of Niagara, for power purposes, not exceeding in the aggregate a daily diversion at the rate of twenty thousand cubic feet of water per second.

The prohibitions of this article shall not apply to the diversion of water for sanitary or domestic purposes, or for the service of canals for the purposes of navigation.

ARTICLE VI

The High Contracting Parties agree that the St. Mary and Milk Rivers and their tributaries (in the State of Montana and the Provinces of Alberta and Saskatchewan) are to be treated as one stream for the purposes of irrigation and power, and the waters thereof shall be apportioned equally between the two countries, but in making such equal apportionment more than half may be taken from one river and less than half from the other by either country so as to afford a more beneficial use to each. It is further agreed that in the division of such waters during the irrigation season, between the 1st of April and 31st of October, inclusive, annually, the United States is entitled to a prior appropriation of 500 cubic feet per second of the waters of the Milk River, or so much of such amount as constitutes three-fourths of its natural flow, and that Canada is entitled to a prior appropriation of 550 cubic feet per second of flow of the St. Mary River, or so much of such amount as constitutes three-fourths of its natural flow.

The channel of the Milk River in Canada may be used at the convenience of the United States for the conveyance, while passing through Canadian territory, of waters diverted from the St. Mary River. The provisions of Article II of this treaty shall apply to any injury resulting to property in Canada from the conveyance of such waters through the Milk River.

The measurement and apportionment of the water to be used by each country shall from time to time be made jointly by the properly constituted reclamation officers of the United States and the properly constituted irrigation officers of His Majesty under the direction of the International Joint Commission.

ARTICLE VII

The High Contracting Parties agree to establish and maintain an International Joint Commission of the United States and Canada composed of six commissioners, three on the part of the United States appointed by the President thereof, and three on the part of the United Kingdom appointed by His Majesty on the recommendation of the Governor in Council of the Dominion of Canada.

This International Joint Commission shall have jurisdiction over and shall pass upon all cases involving the use or obstruction or diversion of the waters with respect to which under Articles III and IV of this Treaty the approval of this Commission is required, and in passing upon such cases the Commission shall be governed by the following rules or principles which are adopted by the High Contracting Parties for this purpose:

The High Contracting Parties shall have, each on its own side of the boundary, equal and similar rights in the use of the waters hereinbefore defined as boundary waters.

The following order of precedence shall be observed among the various uses enumerated hereinafter for these waters, and no use shall be permitted which tends materially to conflict with or restrain any other use which is given preference over it in this order of precedence:

- (1) Uses for domestic and sanitary purposes;
- (2) Uses for navigation, including the service of canals for the purposes of navigation;
- (3) Uses for power and for irrigation purposes.

The foregoing provisions shall not apply to or disturb any existing uses of boundary waters on either side of the boundary.

The requirement for an equal division may in the discretion of the Commission be suspended in cases of temporary diversion, along boundary waters at points where such equal division can not be made advantageously on account of local conditions, and where such diversion does not diminish elsewhere the amount available for use on the other side.

The Commission in its discretion may make its approval in any case conditional upon the construction of remedial or protective works to compensate so far as possible for the particular use or diversion proposed, and in such cases may require that suitable and adequate provision approved by the Commission, be made for the protection and indemnity against injury of any interests on either side of the boundary.

In cases involving the elevation of the natural level of waters on either side of the line as a result of the construction or maintenance on the other side of remedial or protective works or dams or other obstructions in boundary waters or in waters flowing therefrom or in waters below the boundary in rivers flowing across the boundary, the Commission shall require, as a condition of its approval thereof, that suitable and adequate provision, approved by it, be made for the protection and indemnity of all interest on the other side of the line which may be injured thereby.

The majority of the Commissioners shall have power to render a decision. In case the Commission is evenly divided upon any question or matter presented to it for a decision, separate reports shall be made by the Commissioners on each side to their own Government. The High Contracting Parties shall thereupon endeavor to agree upon an adjustment of the question or matter of difference, and if an agreement is reached between them, it shall be reduced to writing in the form of a protocol, and shall be communicated to the Commissioners, who shall take such further proceedings as may be necessary to carry out such agreement.

ARTICLE IX

The High Contracting Parties further agree that any other questions or matters of difference arising between them involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along the common frontier between the United States and the Dominion of Canada shall request that such question

or matters of difference be so referred.

The International Joint Commission is authorized in each case so referred to examine into and report upon the facts and circumstances of the particular questions and matters referred, together with such conclusions and recommendations as may be appropriate, subject, however, to any restrictions or exceptions which may be imposed with respect thereto by the terms of the reference.

Such reports of the Commission shall not be regarded as decisions of the questions or matters so submitted either on the facts or the law, and shall in no way have the character of an arbitrary award.

The Commission shall make a joint report to both Governments in all cases in which all or a majority of the Commissioners agree, and in case of disagreement the minority may make a joint report to both Governments, or separate reports to their respective Governments.

In case the Commission is evenly divided upon any question or matter referred to it for report, separate reports shall be made by the Commissioner on each side to their own Government.

ARTICLE X

Any questions or matters of difference arising between the High Contracting Parties involving the rights, obligations, or interests of the United States or of the Dominion of Canada either in relation to each other or to their respective inhabitants, may be referred for decision to the International Joint Commission by the consent of the two Parties, it being understood that on the part of the United States any such action will be by and with the advice and consent of the Senate, and on the part of His Majesty's Government with the consent of the Governor General in Council. In each case so referred, the said Commission is authorized to examine into and report upon the facts and circumstances of the particular questions and matters referred, together with such conclusions and recommendations as may be appropriate, subject however, to any restrictions or conditions which may be imposed with respect thereto by the terms of the reference.

A majority of the said Commission shall have power to render a decision or finding upon any of the questions or matter referred.

If the said Commission is equally divided or otherwise

unable to render a decision for finding as to any questions or matters so referred, it shall be the duty of the Commissioners to make a joint report to both Governments, or separate reports to their respective Governments, showing the different conclusions arrived at with regard to the matters or questions so referred, which questions or matters shall thereupon be referred for decision by the High Contracting Parties to an umpire chosen in accordance with the procedure prescribed in the fourth, fifth, and sixth paragraphs of Article XLV of the Hague Convention for the pacific settlement of international disputes, dated October 19, 1907. Such umpire shall have power to render a final decision with respect to those matters and questions so referred on which the Commission failed to agree.

ARTICLE XI

A duplicate original of all decisions rendered and joint reports made by the Commission shall be transmitted to and filed with the Secretary of State of the United States and the Governor General of the Dominion of Canada, and to them shall be addressed all communications of the Commission.

ARTICLE XII

The International Joint Commission shall meet and organize a Washington promptly after the members thereof are appointed, and when organized the Commission may fix such times and places for its meetings as may be necessary, subject at all times to special call or direction by the two Governments. Each Commissioner upon the first joint meeting of the Commission after his appointment, shall, before proceeding with the work of the Commission, make and subscribe a solemn declaration in writing that he will faithfully and impartially perform the duties imposed upon him under this treaty, and such declaration shall be entered on the records of the proceedings of the Commission.

The United States and Canadian sections of the Commission may each appoint a secretary, and these shall act as joint secretaries of the commission at its joint sessions, and the Commission may employ engineers and clerical assistants and personal expenses of the Commission and of the secretaries shall be paid by their respective Governments, and all reasonable and necessary joint expenses of the Commission, incurred by it, shall be paid in equal moieties by the High Contracting Parties.

The Commission shall have power to administer oaths to witnesses, and to take evidence on oath whenever deemed necessary in any proceeding, or inquiry, or matter within its jurisdiction under this treaty, and all parties interested therein shall be given convenient opportunity to be heard, and the High Contracting Parties agree to adopt such legislation as may be appropriate and necessary to give the Commission the powers above mentioned on each side of the boundary, and to provide for the issue of subpoenas and for compelling the attendance of witnesses in proceedings before the Commission. The Commission may adopt such rules of procedure as shall be in accordance with justice and equity, and may make such examination in person and through agents or employees as may be deemed advisable.

ARTICLE XIII

In all cases where special agreements between the High Contracting Parties hereto are referred to in the foregoing articles, such agreements between the High Contracting Parties, by also any mutual arrangement between the United States and the Dominion of Canada expressed by concurrent or reciprocal legislation on the part of Congress and the Parliament of the Dominion.

ARTICLE XIV

The present treaty shall be ratified by the President of the United States of America, by and with the advice and consent of the Senate thereof, and by His Britannic Majesty. The ratification shall be exchanged at Washington as soon as possible and the treaty shall take effect on the date of the exchange of its ratification. It shall remain in force for five years, dating from the day of exchange of ratification, and thereafter until terminated by twelve months' written notice given by either High Contracting Parties to the other.

In faith thereof the respective plenipotentiaries have signed this treaty in duplicate and have hereunto affixed their seals.

Done at Washington the 11th day of January, in the year of our Lord one thousand nine hundred and nine.

(Signed) ELIHU ROOT [SEAL]
(Signed) JAMES BRYCE [SEAL]

AND WHEREAS the Senate of the United States by their resolution of March 3, 1909, (two-thirds of the Senators

present concurring therein) did advise and consent to the ratification of the said Treaty with the following understanding, to wit;

"Resolved further, as a part of this ratification, that the United States approves this treaty with the understanding that nothing in this treaty shall be construed as affecting, or changing, any existing territorial or riparian rights in the water, or rights of the owners of lands under water, on either side of the international boundary of the rapids of the St. Mary's river at Sault Sts. Marie, in the use of the waters flowing over such lands, subject to the requirements of navigation in boundary waters and of navigation canals, and without prejudice to the existing right of the United States and Canada, each to use the waters of the St. Mary's river, within its own territory, and further, that nothing in this treaty shall be construed to interfere with the drainage of wet swamp and overflowed lands into streams flowing into boundary waters, and that this interpretation ill be mentioned in the ratification of this treat as conveying the true meaning of the treaty, and will, in effect, form part of the treaty;"

AND WHEREAS the said understanding Has been accepted by the Government of Great Britain, and the ratification of the two Governments of the said treaty were exchanged in the City of Washington, on the 5th day of May, one thousand nine hundred and ten;

NOW, THEREFORE, be it known that I, William Howard Taft, President of the United States of America, have caused the said treaty and the said understanding, as forming a part thereof, to be made public, to the end that the same and every article and clause thereof may be observed and fulfilled with good faith by the United States and the citizens thereof.

In testimony whereof, I have hereunto set my hand and caused the seal of the United States to be affixed

DONE at the city of Washington this thirteenth day of May in the year of our Lord one thousand nine hundred and ten, and of the independence of the United States of America the one hundred and thirty-fourth.

Wm. H. Taft

By the President:

P.C. Knox
Secretary of State

PROTOCOL OF EXCHANGE

On proceeding to the exchange of the ratification of the treaty signed at Washington on January 11, 1909, between the United States and Great Britain, relating to boundary waters and questions arising along the boundary between the United States and the Dominion of Canada, the undersigned plenipotentiaries, duly authorized thereto by their respective Governments, hereby declare that nothing in this treaty shall be construed as affecting, or changing, any existing territorial, or riparian rights in the water, or rights of the owners of lands under water, on either side of the international boundary at the rapids of the St. Mary's River at Sault Ste. Marie, in the use of the waters flowing over such lands, subject to the requirements of navigation in boundary waters and of navigation canals, and without prejudice to the existing right of the St. Mary's River, within its own territory; and further, that nothing in this treaty shall be construed to interfere with the drainage of water, swamp, and overflowed lands into streams flowing into boundary waters, and also that this declaration shall be deemed to have equal force and effect as the treaty itself and to form an integral part thereto.

The exchange of ratification then took place in the usual form.

In witness whereof, they have signed the present Protocol of Exchange and have affixed their seals thereto.

DONE at Washington this 5th day of May, one thousand nine hundred and ten.

PHILANDER C. KNOX [SEAL]

JAMES BRYCE [SEAL]

APPENDIX B

A DRAFT TREATY ON A REGIME OF EQUAL ACCESS AND REMEDY IN
CASES OF TRANSFRONTIER POLLUTION. SUBMITTED TO THE
GOVERNMENTS OF CANADA AND THE UNITED STATES BY
THE AMERICAN AND CANADIAN BAR ASSOCIATIONS

ARTICLE 1: DEFINITIONS

For the purposes of this Treaty:

(a) "Pollution" means any introduction by man, directly or indirectly, of substance or energy into the environment resulting in deleterious effects of such a nature as to endanger human health, harm living, resources or eco-systems, impair amenities or interfere with other legitimate uses of the environment.

(b) "Domestic Pollution" means any intentional or unintentional pollution, the physical origin of which is situated wholly within the area under the jurisdiction of one Party and which has effects within that area only.

(c) "Transfrontier Pollution" means any intentional or unintentional pollution whose physical origin is subject to, and situated wholly or in part within the area under the jurisdiction of one Party and which has effects in the area under the jurisdiction of the other Party.

(d) "Country of origin" means the Country within which, and subject to the jurisdiction of which, transfrontier pollution originates or could originate in connection with activities carried on or contemplated in that Country.

(e) "Exposed Country" means the Country affected by transfrontier pollution or exposed to a significant risk of transfrontier pollution.

(f) "Persons" mean any natural or legal person either private or public.

ARTICLE 2: RIGHTS OF PERSONS AFFECTED

(a) The Country of origin shall ensure that any natural or

legal person resident in the exposed Country, who has suffered transfrontier pollution damage or is exposed to a risk of transfrontier pollution, shall at least receive equivalent treatment to that afforded in the Country of origin, in cases of domestic pollution or the risk thereof and in comparable circumstances, to persons of equivalent condition or status resident in the Country of origin.

(b) From a procedural standpoint, this treatment shall include but shall not be limited to the right to take part in, or have resort to, all administrative and judicial procedures existing within the Country of origin, in order to prevent domestic pollution, to have it abated, and/or to obtain compensation for the damage caused.

(c) In the case of requirements for security of cost, this treatment shall at least be equivalent to that accorded to a non-resident national of the Country of origin.

ARTICLE 3: RIGHTS OF PUBLIC AND PRIVATE ORGANIZATIONS

(a) (1) Where the domestic law of either Party or a political subdivision thereof permits persons who are resident or incorporated within its own territory, such as environmental defense associations, to commence or to participate in administrative and judicial procedures to safeguard general environmental interests, that Party or subdivision shall grant the same rights for comparable matters to similar persons resident or incorporated in the territory of the other Party, provided that these persons satisfy the conditions laid down for persons resident or incorporated in the Country of origin.

(2) When some of the conditions concerning matters of form laid down in the Country of origin cannot reasonably be imposed on persons resident or incorporated in the exposed Country, these latter should be entitled to commence proceedings in the Country of origin if they satisfy comparable conditions.

(b) When the law of a Party or a political subdivision thereof permits a public authority to participate in administrative or judicial procedures in order to safeguard general environmental interests, that Party shall provide competent public authorities of the exposed Country with equivalent access to such procedures.

ARTICLE 4: NOTICE TO PERSONS IN THE EXPOSED COUNTRY

(a) The Country of origin shall take any appropriate measures to provide persons exposed to significant risk of transfrontier pollution with notice sufficient in form and content to enable them to exercise in a timely manner the rights referred to in this Treaty. As far as possible, such notice should be at least equivalent to that provided in the Country of origin in cases of comparable domestic pollution. It shall be sent also to any authority designated for this purpose by the exposed Country.

(b) The exposed Country may designate one or more authorities which will have the duty to receive and the responsibility to disseminate such notice within limits of time compatible with the exercise of existing procedures in the Country of origin.

(c) Where such an authority has been designated, notification to it shall constitute fulfillment of the obligation of the Country of origin under paragraph (a). Failure of the exposed Country to designate an authority under paragraph (b) in no way affects the obligation of the country of origin under paragraph (a).

ARTICLE 5: LIMITATION OF RIGHTS GRANTED

In no event shall the provisions of this Treaty be construed as granting, per se, any greater rights to persons resident or incorporated in the exposed Country than those enjoyed by person of equivalent condition or status resident or incorporated in the Country of origin.

APPENDIX C

DRAFT TREATY ON A THIRD-PARTY SETTLEMENT OF DISPUTES

ARTICLE 1: COMPULSORY JURISDICTION

In any dispute between the States' Parties, any question of interpretation, application or operation of a treaty in force between them, which has not been settled within a reasonable time by direct negotiations or referred by agreement of the Parties to the International Court of Justice or to some other third-party procedure, shall be submitted to third-party settlement at the written request of either Party of foreign affairs, or by an exchange of notes between the two.

ARTICLE 2: OPTIONAL JURISDICTION

1. Any other dispute between the States Parties relating to a question or principle of international law may be submitted to third-party settlement by special agreement between the Parties. Without limiting the generality of this principle, the Parties regard disputes concerning the following matters as particularly appropriate subjects for such special agreements:

- a. pecuniary claims in respect of losses or damage sustained by one of the Parties or its nationals as a result of acts or omissions of, or attributable to, the other Party;
- b. immunities of States and of their agencies and subdivisions;
- c. consular privileges and immunities;
- e. treatment of the other Party's nationals;
- f. environmental issues;
- g. the management of natural resource of common interest; and
- h. transnational application of civil and criminal laws.

2. The special agreements referred to in the previous paragraph shall, for each case or group of cases, become effective through an exchange of diplomatic notes without any legislative action.

ARTICLE 3: ORGANIZATION OF THIRD-PARTY SETTLEMENT

Unless the Parties otherwise agree in a particular case, third-party settlement pursuant to Article 1 or Article 2 above shall be organized in each case as follows:

(a) Within 60 days either of the receipt by the other Party of the request for third-party settlement or of the date of signature of a special agreement, as the case may be, each of the Parties shall appoint one member of the arbitral tribunal. Within a further period of 60 days the Parties shall, by common agreement, select a third person who shall be the Chairman of the tribunal. If no agreement is reached on the selection of a Chairman within this period, either Party may request the President of the International Court of Justice to make the appointment. If the latter is prevented from acting or is a national of one of the Parties, the appointment shall be made by the senior judge of the Court who is not a national of either Party. The time limits specified in this paragraph may be extended or shortened by agreement of the Parties.

(b) If, for any reason, a tribunal is not constituted pursuant to the previous paragraph within 120 days of the receipt of the request for arbitration or of the date of signature of the arbitral agreement, either Party may, by written application, submit the dispute to the International Courts of Justice, to be decided by a Chamber thereof composed in accordance with the following paragraph. The acceptance by the Parties of the jurisdiction of the Court and its special Chamber is subject to the condition that the Chamber is subject to the condition that the Chamber has been established in accordance with that paragraph.

(c) The Parties agree that either of them will be authorized to request, at the time of submitting a dispute to the Court, that the Court form a Chamber for consideration of the case pursuant to Article 26(2) of the Court's statute and Articles 17 and 18 of its Rules, consisting of three judges, one national of Canada, one of the United States, and one of another State to be agreed upon by the Parties. If, at the time of application, one of the States Parties does not have a national on the Court, it shall, pursuant to Article 31(2) of the Court's statute, nominate a person to sit as judge. If there is no agreement between the Parties on the third member of the Chamber

within 30 days of the submission to the Court of an application pursuant to the previous paragraph, or if a Party with no national on the Court does not nominate a person to sit as judge within such time, that member or those members shall be elected by the court from among its members. In any such case the Parties may jointly request that any election be made from among judges coming from a particular geographical region or representing a particular legal system or tradition.

(d) Vacancies which may occur in an arbitral tribunal composed according to paragraph (a) above shall be filled in such manner as provided for original appointments. Vacancies occurring in the Chamber of the Court established pursuant to paragraphs (b) and (c) above shall be filled in accordance with the statute and rules of the Court.

ARTICLE 4: COMPETENCE

1. The arbitral tribunal or the chamber of the court constituted in accordance with Article 3 shall have jurisdiction in any question or dispute submitted to it in accordance with the provisions of this Treaty.

2. Any disagreement (a) as to whether such tribunal or Chamber has jurisdiction under this Treaty or any agreement concluded pursuant thereto, or (b) as to the extent of such jurisdiction, shall be settled by the decision of that tribunal or Chamber.

ARTICLE 5: PROVISIONAL MEASURES

1. An arbitral tribunal which considers prima facie that it has jurisdiction under this Treaty or an agreement concluded pursuant thereto shall have the power to prescribe, by order, any provisional measures which it considers appropriate to preserve the respective rights of the Parties pending final adjudication.

2. Such provisional measures may only be prescribed modified or revoked upon the request of a Party and after giving both an opportunity to be heard.

3. Each order issued pursuant to this Article shall specify the time during which it is to be in effect, which in no case shall be longer than six months. Either Party may apply to the tribunal for renewal of an order issued pursuant to this Article.

4. Any order prescribing, modifying or revoking provisional measures shall be notified forthwith to Parties

who shall promptly comply therewith.

ARTICLE 6: LOCATION OF PROCEEDINGS

1. Arbitration proceedings commenced at the request of one Party shall take place in the capital of the other Party, unless the Parties otherwise agree.
2. Arbitration proceedings commenced by agreement of the Parties shall take place at a location determined either (a) by the Parties' agreement, or (b) in default thereof by the tribunal itself.
3. Where a dispute is submitted to a Chamber of the Court pursuant to paragraphs (b) and (c) of Article 3, the Parties may request that the Chamber sit at the capital of one of the Parties.
4. The tribunal hearing a case may hold proceedings at location as other than its principal seat as and when the circumstances of the case make it desirable.

ARTICLE 7: CONDUCT OF PROCEEDINGS

1. An arbitral tribunal constituted in accordance with paragraph (a) of Article 3 shall function in accordance with the rules of procedure annexed to this Treaty, unless the Parties should otherwise agree.
2. At the request of a Party, the tribunal may call upon any agency, subdivision or national of either Party to appear to give evidence or testimony, provided that the tribunal may not receive evidence or testimony pursuant to this paragraph without the consent of the Party whose agency, subdivision or national is being called.
3. A Chamber of the Court formed pursuant to paragraphs (b) and (c) of Article 3 shall function in accordance with the applicable provisions of the statute and rules of the Court unless the Parties should, by common agreement, request otherwise.

ARTICLE 8: APPLICABLE LAW

1. In deciding any question or dispute submitted to it pursuant to this Treaty, a tribunal or Chamber shall apply the principles and rules of international law, especially as reflected in the treaties and practice of Canada and of the United States, as well as other relevant principles of

substantive law in force in either of the two countries, particularly those manifesting their common legal traditions.

2. If a case requires the application of the principles of substantive law in force in either of the two countries, but in the opinion of the tribunal there exists such a divergence between the relevant principles in force in Canada and in the United States that it is not possible to make a final decision on that basis, the tribunal shall apply such other common legal principles referred to in paragraph 1 as it considers appropriate, having regard to the desire of the Parties to reach a solution just to all interests concerned.

3. The Parties may agree on particular principles or rules to be applied by the tribunal.

APPENDIX D

THE BELLAGIO DRAFT TREATY

Agreement
Concerning the Use of Transboundary Groundwaters

The High Contracting Parties, _____ and
_____ ,

Motivated by the spirit of cordiality and cooperation which characterizes the relations between them;

Desirous of expanding the scope of their concerted actions with respect to the problems confronting their Peoples along their common frontier;

Recognizing the critical importance of their transboundary water resources and the need to enhance the rational use and conservation of the said resources on a long-term basis;

Noting especially the present unsatisfactory state of protection and control of their transboundary groundwaters as well as the prospects of crisis conditions in some areas because of increasing demands upon, and the decreasing quality of, those groundwaters;

Seeking to provide for the utilization, protection and control of those groundwaters on an equitable basis and, to that end, for the creation and maintenance of an adequate data base;

Recognizing that the optimum and deficient use of their transboundary water resources is essential to the interests of both Parties;

Resolving to protect the quality of the transboundary groundwaters for present and future generations;

Wishing to resolve amicably any differences that may arise in connection with the use, protection or control of the said transboundary groundwaters and, for that purpose, to utilize a joint agency; and

Concluding that the best means to achieve the rational management of their transboundary water resources and the protection of the underground environment is to adopt, in principle, an integrated approach including, where appropriate, the conjunctive use of surface water and groundwater in their border region,

ARTICLE 1
DEFINITIONS

As used in this Agreement:

1. "Aquifer" means a subsurface waterbearing geologic formation from which significant quantities of water may be extracted.
2. "Border region" means the area within approximately kilometers from each side of the mutual boundary as set forth on the annexed map.
3. "The Commission" means the agency designated in Article III, para. 1, of this Agreement.
4. "Conjunctive Use" means the integrated development and management of surface and groundwater as a total water supply system.
5. "Contaminant" means any substance, species or energy which detrimentally affects directly, indirectly, cumulatively or in combination with other substance, human health or safety or agricultural or industrial products or processes, or flora, fauna or an ecosystem.
6. "Contamination" means any detrimental chemical, physical, biological, or temperature change in the content or characteristics of a body of water.
7. "Depletion" means the withdrawal of water from an aquifer at a rate faster than it is recharged, otherwise known as "mining" the water.
8. "Drought" means a condition of abnormal water scarcity in a specific area resulting from natural conditions.
9. "Drought Alert" means the declared condition provided for in Article XII.
10. "Drought Emergency" means the declared emergency provided for in Article XII.
11. "Drought Management Plan" means the plan provided for pursuant to Article XII.
12. "Environmental sensitivity" means vulnerability or susceptibility to changes detrimentally affecting the quality of life or one or more biological or physical systems.

13. "Government(s)" means the governments of the Parties to this Agreement.
14. "Groundwater" means the water in aquifers.
15. "Impairment" means any physical change in an aquifer or its recharge area which significantly reduces or restricts the potential for use of the waters of the aquifer.
16. "Interrelated surface water" means those surface waters in the territory of either Party, the quantity or quality of which is affected by the outflows from, or the inflows to, transboundary groundwater.
17. "Pollution" means the introduction of any contaminant by man, directly or indirectly, into groundwaters or surface waters.
18. "Public Health Emergency" means the declared emergency provided for in Article IX.
19. "Recharge" means the addition of water to an aquifer by infiltration of precipitation through the soil or of water from surface streams, lakes, or reservoirs, by discharges of water to the land surface, or by injection of water into the aquifer through well.
20. "Transboundary aquifer" means an aquifer intersected by a common boundary.
21. "Transboundary Groundwater Conservation Area" means an area declared by the Commission pursuant to Article VII.
22. "Transboundary groundwaters" means waters in transboundary aquifers.

ARTICLE II GENERAL PURPOSES

1. The Parties recognize their common interest and responsibility in ensuring the reasonable and equitable development and management of groundwaters in the border region for the well being of the Peoples.
2. Accordingly, the Parties have entered into this Agreement in order to attain the optimum utilization and conservation of transboundary groundwaters and to protect the underground environment. It is also the purpose of the parties to develop and maintain reliable

data and information concerning transboundary aquifers and their water in order to use and protect these waters in a rational and informed manner.

ARTICLE III
THE COMMISSION RESPONSIBLE UNDER THIS AGREEMENT

1. The _____ Commission is designated as the Parties' agency to carry out the functions and responsibilities provided for by this Agreement.
2. The Commission shall be authorized a technical staff, which, in collaboration with the technical staffs of the Governments, shall assist the Commission in the accomplishment of its functions and responsibilities.
3. The Commission is authorized to declare Transboundary Groundwater Conservation Areas, Drought Alerts, Drought Emergencies and Public Health Emergencies, and to promulgate the corresponding plans and Depletion Plans, in accordance with the provisions of this Agreement.
4. The Commission shall have jurisdiction over such additional matters concerning the border region as are from time to time referred to it by the Governments jointly.
5. The Commission shall prepare and propose to the Governments a budget, conforming insofar as practicable to the budget cycles and procedures of the Governments, covering the projected expenses and capital costs of the Commission's joint operations, plant and staff. The total amount of each budget shall be divided between the Governments in the proportions agreed upon by the Commission and approved by the Governments.
6. The budget for the separate operating costs of each national section shall be the responsibility of the respective Government.
7. The Governments may jointly refer a specific matter relating to transboundary groundwater to the Commission for investigation or action. Individually Governments may request the Commission's advice relating to transboundary groundwaters on matters originating within the requesting Government's portion of the border region.
8. The Commission shall cause each such referral and request to be taken up and investigated, studied or

acted upon, as appropriate. The Commission shall render a report to the Governments on every referral and request taken up.

ARTICLE IV ENFORCEMENT AND OVERSIGHT RESPONSIBILITIES

1. The enforcement of water quality and quantity measures and related land use controls within the territory of each Party shall be the responsibility of the Party or of its political subdivisions, as appropriate.
2. The Commission shall biennially conduct a review of the water quality and quantity control measures taken within each Party's territory affecting the border region and shall issue a Report containing its assessment of the adequacy and effectiveness of programs for the protection and improvement of the transboundary aquifers and their waters and withdrawal and land use controls, including with respect to any Transboundary Groundwater Conservation Areas, Depletion Plans, Drought Emergency Plans and Health Emergencies. To that end, each Government shall furnish the Commission with the relevant data, information, and studies for use by the Commission in preparing its Report, in accordance with the reporting formats provided by the Commission.
3. In addition to facilitating, as needed, the Commission's oversight responsibilities under paragraph 2, each Government shall make a biennial Report to the Commission specifying the water quality and conservation measure taken; quantities withdrawn, transferred and exchanged, and any problems encountered in carrying out the provisions of the Agreement or in implementation of any of the conservation, depletion and drought management plans and health emergency measures adopted.

ARTICLE V ESTABLISHMENT AND MAINTENANCE OF THE DATABASE

1. The Commission is charged with the creation and maintenance of a comprehensive and unified database pertaining to transboundary groundwaters, in the languages of the Parties. The database shall include an inventory of all transboundary groundwater resources taking into account quantity, quality, aquifer geometry, recharge rates, interaction with surface waters, and other pertinent data and shall identify all transboundary aquifers.

2. The Commission shall carry out studies directly, or through research programs conducted by or with other bodies, public or private:
 - a. to identify inadequacies in available data and to propose remedial action;
 - b. to examine present and potential future uses of said groundwaters, taking into account demographic projections and socio-economic development plan;
 - c. to assess the impact of present and potential development on transboundary groundwaters and related resources;
 - d. to study possible alternative sources of surface water and groundwater for use in the border region, taking into account the quantity and quality of the waters and the potential for the conjunctive use of the available waters; and
 - e. to examine the potential for, and the consequences of, drought, floods, and contamination in the border region.
3. The Parties undertake to facilitate the acquisition of information and data by the Commission on a timely basis in accordance with the Commission's requirements.
4. The Commission shall compile, analyze, and disseminate the data, information and studies and provide the results to the Governments.

ARTICLE VI WATER QUALITY PROTECTION

1. The Parties undertake cooperatively to protect and to improve, insofar as practicable, the quality of transboundary aquifers and their waters in conjunction with their programs for surface water quality control, and to avoid appreciable harm in or to the territories of the Parties.
2. The Governments shall promptly inform the Commission of any actual or planned, significantly polluting discharge into transboundary groundwaters or recharge areas, or of other activity with the potential for significant leaching into transboundary groundwaters.
3. The Commission shall without delay consider the gravity of any situation indicating significant groundwater contamination, or the threat thereof, in any part of the border region in accordance with the provisions of Article VII.

ARTICLE VII
TRANSBOUNDARY GROUNDWATER CONSERVATION AREAS

1. The Commission shall determine the desirability of declaring any area with the border region containing transboundary groundwaters to be a Transboundary Groundwater Conservation Area.
2. In the event that the Commission determines that a Transboundary Groundwater Conservation Area is desirable, such determination shall be reported to the Governments with a draft of the proposed declaration and justification therefore, including the delineation of the area and its aquifer(s).
3. If no Government files an objection with the Commission within one hundred eighty (180) days, the Commission shall issue the formal declaration. Any objections(s) filed shall specify, with an explanation, the objectionable section(s) of the proposed declaration or justification or both.
4. Unless an objection requires termination of consideration, the commission shall within ninety (90) days of receipt of objections, report tot he Governments a revised proposed declaration, to be effective within ninety (90) days, unless a Government files a subsequent objection with the Commission. If no subsequent objection is filed with the said ninety (90) day period, the formal declaration shall be issues by the Commission. If a subsequent objection is filed within the ninety (90) day period, the Commission shall refer the matter, together with the entire record, to the Governments of resolution by consultation.
5. In making its determination, the Commission shall consider whether:
 - a. groundwater withdrawals exceed or are likely to exceed recharge so as to endanger yield or water quality or are likely to diminish the quantity or quality of interrelated surface waters;
 - b. recharge has been or may become impaired;
 - c. the use of the included aquifer(s) as an important source of drinking water has been, or may become impaired;
 - d. the aquifer(s) have been or may become contaminated; and

- e. recurring or persistent drought conditions necessitate management of all or some water supplies in the particular area.
- 6. In making its determination, the Commission shall take into account the impact of the implementation of the declaration under consideration on the sources and uses of water previously allocated by agreements between the Parties or under the Drought Management Plan.

ARTICLE VIII COMPREHENSIVE MANAGEMENT PLANS

- 1. For each declared Transboundary Groundwater Conservation Area, the Commission shall prepare a Comprehensive Management Plan for the rational development, use protection and control of the waters in the Transboundary Groundwater Conservation Area.
- 2. A Comprehensive Management Plan may:
 - a. prescribe measures to prevent, eliminate or mitigate degradation of transboundary groundwater quality, and for the purpose may:
 - (1) classify transboundary groundwaters according to use and coordinate the formulation of water quality standards;
 - (2) identify toxic and hazardous contaminants in the Area and require a continuing record of such substances from origin to disposal;
 - (3) establish criteria for the safe storage of wastes and maintain an inventory of dumpsites, abandoned as well as active, that have cause or may cause transboundary aquifer pollution;
 - (4) propose a scheme for monitoring water quality conditions including the placement and operation of test wells and for remedial actions where required, including pretreatment and effluent discharge limitations and charges; and
 - (5) provide for the establishment where required of protective zones in which land use must be regulated.
 - b. allocate the uses of groundwaters and interrelated surface waters taking into account any other allocation(s) previously made applicable within the Transboundary Groundwater Conservation Area.
 - c. prescribe measures including pumping limitation, criteria for well placement and number of new wells, retirement of existing well, imposition of extraction fees, planned depletion regimes or

- reservations of groundwaters for future use.
 - d. arrange, where conditions are favorable, programs of transboundary aquifer recharge.
 - e. articulate programs of conjunctive use where appropriate.
 - f. prescribe the integration and coordination of water quality and quantity control programs.
 - g. include other measures and actions as may be deemed appropriate by the Commission.
3. In making any allocations of water uses within a Comprehensive Management Plan, the Commission shall consider all relevant factors such as:
- a. hydrogeology and meteorology;
 - b. existing and planned uses;
 - c. environmental sensitivity;
 - d. quality control requirements;
 - e. socio-economic implications (including dependency);
 - f. water conservation practices (including efficiency of water use);
 - g. artificial recharge potential; and
 - h. comparative costs and implications of alternative sources of supply.

The weight to be given to each factor is to be determined by its importance in comparison with that of the other relevant factors.

4. The Commission shall submit proposed Comprehensive Management Plans to the Governments.
- a. If no Government files an objection with the Commission within one hundred eighty (180) days, the Commission shall adopt the Plan and monitor its implementation.
 - b. A Government's objections shall specify with an explanation the objectionable portions of the proposed Comprehensive Management Plan.
 - c. Within ninety (90) days of receipt of objections, the Commission shall submit to the Governments a revised proposed Comprehensive Management Plan to be effective within ninety (90) days unless a subsequent objection is filed. If no subsequent objection is filed with the ninety (90) day period, the proposed Comprehensive Management Plan shall be adopted and the Commission shall monitor its implementation. If subsequent objections are filed with the ninety (90) day period, the Commission shall refer the matter, together with the entire record, to the Governments for resolution by consultation.

5. The Commission is authorized to approve advances and exchanges of water consistent with the objective of the applicable Comprehensive Management Plan.
6. The Commission shall monitor and evaluate the measures taken under the Comprehensive Management Plan and shall propose, as appropriate, modifications thereto.

ARTICLE IX PUBLIC HEALTH EMERGENCIES

1. Upon a determination by the Commission or any Government that there is an imminent or actual public health hazard involving the contamination of transboundary groundwaters, the Commission shall notify the respective Governments, and may declare a Public Health Emergency for a stated period.
2. In the event that the Public Health Emergency is not mitigated or abated within the initial stated period, the Commission may extend the emergency for such additional period as may be deemed necessary under the circumstances.
3. On the basis of the declaration, the Commission shall have authority to investigate the area of imminent or actual contamination and to prescribe measures to prevent, eliminate or mitigate the public health hazard.
4. The Governments shall provide in indicated information, data, studies and reports concerning public health emergencies as set forth in Paragraphs 2 and 3 of Article IV.

ARTICLE X PLANNED DEPLETION

- a. The Commission, after evaluation of all relevant considerations, may prepare and, with the consent of the Governments, may approve a plan for the depletion of an aquifer over a calculated period. The plan may apportion the uses and specify the rates and means of extraction of the transboundary groundwaters, and may authorize advances, exchanges and transboundary transfers of water consistent with objective of the Depletion Plan.
2. The Governments shall provide the indicated

information, data, studies and reports concerning depletion as set forth in Paragraphs 2 and 3 of Article IV.

ARTICLE XI TRANSBOUNDARY TRANSFERS

Nothing in this Agreement shall be so construed as to preclude either short-term or long-term transfers of waters between the Parties under terms and conditions approved by the Commission.

ARTICLE XII PLANNING FOR DROUGHT

1. The Commission shall, within two (2) years of the coming into force of this Agreement, complete the preparation of a Drought Management Plan applicable to the border region for activation in the region, or in parts thereof, in the event of drought. The completed Plan shall be submitted to the Governments for standby approval.
2. The Drought Management Plan shall:
 - a. specify the hydrometeorological preconditions for the declarations of a Drought Alert and, thereunder, the conservation measures to be observed by all water users within the border region.
 - b. specify the hydrometeorological preconditions for the declaration of a Drought Emergency and, thereunder, the specific measures to be observed by all water users within the border region;
 - c. provide for the monitoring of the hydrometeorological conditions generally in the border region, and compliance with prescribed conservation or other specific measures under any Drought Alert or Drought Emergency; and
 - d. provide for periodic reports to the Governments during any Drought Alert or Drought Emergency, to include any proposed modifications to the Drought Emergency Plan and any modifications made to the prescribed measures under any Drought Alert or Drought Emergency.
3. The Drought Management Plan may:
 - a. designate and reserve certain transboundary aquifers or specific well sites for use in time of drought;

- b. provide, for the duration of any declared Drought Emergency:
 - (1) the conjunctive management of groundwater and surface water supplies within or made available to the border region or part(s) thereof governed by the declaration:
 - (2) increases and reductions in the normal allowable withdrawals and at variance with allocations made under a Comprehensive Management Plan for a Transboundary Groundwater Conservation Area or by prior agreements between the Parties, maintaining to the extent practicable the established withdrawal ratios between the Parties and an equitable balance of all emergency obligations.
 - (3) authorization to use designated and reserved groundwaters within the border region.
 - c. include other structural and nonstructural measures deemed likely to be needed under various drought conditions.
- 4. The conservation and other specific measures provided in the Plan for Drought Alert declarations or Drought Emergency declarations may be modified or suspended by the Commission to meet the specific requirements of the situation at the time of such declarations and during the time such declarations remain in force.
 - 5. The authority to determine the existence of the preconditions specified in the approved Drought Management Plan and to declare drought alerts and drought emergencies thereunder, in any portion of the border region, is vested in the Commission.
 - 6. The Commission is authorized to modify or terminate a declaration of Drought alert or of Drought Emergency when the hydrometeorological conditions so warrant.
 - 7. Declarations of Drought Alert and Drought Emergency, and modifications to or termination of the same, shall be immediately communicated to the Governments and published so as to come to the attention of all water users in the border region.
 - 8. The Governments shall provide the indicated information, data, studies and reports concerning drought as set forth in Paragraphs 2 and 3 of Article IV.

ARTICLE XIII
INQUIRY IN THE PUBLIC INTEREST

1. The Commission shall by general notice invite written statements and information from all persons professing interest in the groundwater-related conditions and activities in the portion of the border region for which a Transboundary Groundwater Conservation Area declaration, a Comprehensive Management Plan, a Depletion Plan, a transboundary transfer, or a Drought Alert or Emergency declaration is under consideration.
2. All submissions received pursuant to Paragraph I shall be taken into account by the Commission.
3. Whenever the Commission deems that public interest warrants, it shall schedule and conduct hearings open to the public in appropriate places and facilities in the border region, and shall make and publish a record of such hearings.
4. Any person professing an interest may also petition the Commission at any time requesting the Commission to schedule a hearing or to invite written statements and information concerning groundwater conditions in the border region, or urging the Commission to take a particular action under this Agreement.
5. When deemed useful by the Commission, technical meetings, workshops and briefings relating to transboundary groundwater matters may be held under the auspices of the Commission or in cooperation with authorities and organizations concerned with the welfare of the border region.

ARTICLE XIV
EXISTING RIGHTS AND OBLIGATIONS

The rights and obligations of the Parties as set forth in prior agreements between the Parties shall not be permanently altered by this Agreement or any measures taken hereunder.

ARTICLE XV
ACCOMMODATION OF DIFFERENCES

1. The Commission shall expend its best efforts to resolve differences within the Commission with respect to the facts and circumstances of a situation within the purview of this Agreement. Failure to resolve such

differences within six (6) months at the technical level of the Commission shall result in the submission of the difference(s), together with the entire record, to the Governments for resolution by consultation.

2. If after good faith consultations during a period of twelve (12) months the Governments are unable to reach an accommodation of a difference of differences between them concerning the facts and circumstances of a situation within the purview of this Agreement, or with respect to which the Commission has been unable to reach agreement,
 - a. any Government is entitled to invoke this Article to the effect that a commission of inquiry be appointed and charged with a full and impartial study for the purpose of verification of the facts of the situation;
 - b. the Governments shall appoint and instruct the commissioner(s), and defray the expenses of such commissions equally, unless otherwise agreed; and
 - c. in the event the Governments fail to agree upon the implementation of this Paragraph within six (6) months from the date of its formal invocation, the _____, at the request of any Government shall, after consultation with each Government, appoint the commissioner(s), instruct the same, and apportion the expenses of the commission, as may be required to render the commissions operational.
3. A commission of inquiry appointed under this Article shall render a report to the Governments within the terms of its instructions and on the basis of independent and detailed examination of the data and information made available to it by the Governments and the Commission, and may request such additional data and information as the commission of inquiry deems significant for its deliberations and findings.
4. On the basis of the report of a commission of inquiry, the Parties undertake promptly to enter into consultations for the purpose of reaching an agreed accommodation of the difference(s).
5. The Commission shall expend its best efforts to resolve differences within the Commission with respect to the interpretation of this Agreement, of any declaration, plan or prescribed measure, or of any other relevant document, referral, request or decision. Failure to resolve such differences within six (6) months by the Commission shall result in the submission of such difference(s), together with the record of

deliberations, to the Governments for resolution by consultation.

6. Should the Governments, after six (6) months of consultations fail to agree upon a questioned interpretation submitted to them by the Commission, pursuant to Paragraph 5, or that has otherwise arisen, including with respect to the validity or interpretation of any binding decision by the Commission, the provisions of Article XVI of this Agreement shall apply.

ARTICLE XVI RESOLUTION OF DISPUTES

1. If the consultations called for under Article XV do not achieve an agreed accommodation, the Governments shall promptly enter into formal, direct negotiations for the purpose of resolving the disagreement.
2. Should the Governments not achieve agreement after six (6) months of direct negotiations, the Parties shall refer the matter to mediation, conciliation, arbitration, the International Courts of Justice or any other means of peaceful settlement, absent a previously agreed, applicable means of dispute settlement binding upon the Parties.
3. In resolving differences and questions affecting the implementation of this Agreement and decisions taken thereunder, the Parties undertake to avoid delay and to facilitate the process of resolution as between themselves and, as appropriate, before any mediator, conciliator, tribunal or other settlement forum, taking into account the importance of timely resolution with respect to critical transboundary groundwater situations.

ARTICLE XVII AMENDMENT

This Agreement may be amended by agreement of the Parties.

ARTICLE XVIII ENTRY INTO FORCE

This Agreement shall enter into force on the date of the exchange of instruments of ratification (signature by the

duly authorized representative of the Parties).

ARTICLE XIX
AUTHENTIC TEXTS

This Agreement has been concluded in two originals, one in the _____ language and one in the _____ language, both being equally authentic.

ARTICLE XX
RESERVATIONS AND EXCEPTIONS

Any reservations or exceptions made by one Party upon signature or ratification shall be effective to modify this Agreement only after express acceptance by the other Parties.

IN WITNESS WHEREOF, the undersigned Plenipotentiaries, being duly authorized, have signed this Agreement.

DONE AT _____, this _____ day of _____,
one thousand nine hundred and _____.

BIBLIOGRAPHY

- American Bar Association, ed., *Common Boundary/Common Problems*, (1981).
- American and Canadian Bar Associations, *Settlement of International Disputes Between Canada and the U.S.A.*, (1979).
- Bloomfield, L. M., *Boundary Water Problems of Canada and the United States* (1958).
- Bourne, C. D., *International Water Resources*, 17 *Canadian Bar Review*, 67 (1969).
- Carroll, J. E., *Environmental Diplomacy* (1983).
- Curtiss, K. M., *Canadian American Relations*, (1983).
- Foster, H. D. and Sewill, W. R., *Water, the Emerging Crisis in Canada*, (1981).
- Geraghty, J. J., *Water Atlas of the U.S.*, (1973).
- Getches, D. H., *Water Law in a Nutshell*, (1983).
- Hardin, G., *Tragedy of the Commons*, (1974).
- Prosser, W. F., *Restatement (Second) of Torts*, (1979).
- Hayton, R.D., and Utton, A. E., *Transboundary Groundwaters: The Bellagio Draft Treaty*, 29 *Nat. Resources J.* 663 (1989).
- Hodge, J., *Groundwater in the Great Lakes Basin: The Natural System, Use and Abuse, and Policy Implications*, 65 *Chi[-]Kent L. Rev.* 439 (1989).
- International Law Association, *Report on the 52nd Conference, Helsinki* 484 (1967).
- International Joint Commission, *International Joint Commission Activities Report*, (1985).
- Jaffe, M., and DiNovo, F., *Local Groundwater Protection*, (1987).
- Linsley, R. K., and Franzini, J. B., *Water-Resources Engineering*, (1979).
- MacDonald, ed., *Canadian Perspectives on International Law and Organization*, (1974).

- Pearse, P., *Currents of Change*, (1985).
- Putnam, D. F., *Canada: A Regional Analysis*, (1979).
- Roman, T., and Ferris, J., Regulation of Groundwater Contamination in Canada, 65 Chi.[-]Kent L. Rev. 519 (1989).
- Saddler, B., ed., *Water Policy for Western Canada: The Issues of the Eighties*, (1982).
- Saddler, B., The Management of Canadian-U.S. Boundary Waters-- Boundary Water: Retrospect and Prospect, 26 Nat. Resources J. 2 (1986).
- Sax, J. L., and Abrams, R. H., *Legal Control of Water Resources*, (1986).
- Simpson, W., ed., *Stress on the Land*, (1978).
- Spencer, R., ed., *The International Joint Commission Seventy Years On*, (1981).
- Tarlock, D. and Deutsch, M., Great Lakes Groundwater-- The Neglected Resource, 65 Chi.[-]Kent L. Rev. 345 (1989).
- United States Geological Survey, Groundwater-Surface Water Relations in the Flathead River Valley near Proposed Cabin Creek Coal Mine, British Columbia, Canada, Report 87- 28 (1987).
- United States-United Kingdom, *Boundary Waters Treaty*, 36 Stat.2448, T.I.A.S. No. 548 (Jan. 11, 1909).
- United States Geological Survey, *National Surface Water Summary Paper*, No. 2300, (1985).
- Utton, A. E., The Development of International Groundwater Law, 22 Nat. Res. J. 95 (1982).