A COMPARATIVE ANALYSIS OF U.S. AND CANADIAN IMPLEMENTATION OF THE 1978 GREAT LAKES WATER QUALITY AGREEMENT

by

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ABSTRACT

This year, 2002, marks the thirtieth anniversary of the signing of the Great Lakes Water Quality Agreement between the United States and Canada. Over the past thirty years, there has been much written, and even more said, about the successes and failures of that Agreement. The Great Lakes Water Quality Agreement has been successful in bringing attention to many pollution issues surrounding the Great Lakes. However, many of the goals that the Agreement intended to achieve have still not been realized on either side of the border.

This thesis will explore several issues affecting successful implementation of the Great Lakes Water Quality Agreement. Although much has been written as to the areas where the two countries have fallen short in implementing the Agreement, little has been written which analyzes the full range of variables affecting implementation. Using the framework for implementation analysis laid out by Daniel Mazmanian and Paul Sabatier, this thesis will examine two of the biggest issues facing the Great Lakes, and determine the specific variables that have most hindered the Agreement's success. Furthermore, this thesis will determine which country - the United States or Canada - has done a better job implementing the Great Lakes Water Quality Agreement.

The thesis begins with a thorough description of Mazmanian and Sabatier's variables for analysis. After looking at necessary background information about the Agreement, we will examine two specific case studies. Chapter 3 will examine the issue of contaminated bottom sediment. Chapter 4 will look at how each country has addressed the issue of airborne toxic substances in the Lakes. We will conclude by reapplying the Mazmanian and Sabatier variables to our case studies, and coming to a conclusion as to which country has performed better, and why.

As we will see by the end of this thesis, neither country has fully met the objectives of the Agreement. However, the United States has come further, faster. This is due to differences in allocation of financial resources, regulatory strength and initiative of sovereigns and implementing officials.

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ABBREVIATIONS

AOC	Area of Concern
ARCS	Assessment and Remediation of Contaminated Sediments Program
ATS	Airborne Toxic Substances
BNTS	Binational Toxics Strategy
BWT	Boundary Waters Treaty
CAA	Clean Air Act
CEPA	Canadian Environmental Protection Act
COA	Canada-Ontario Agreement
CoSTTeP	Contaminated Sediment Treatment and Technology Program
CWA	U.S. Clean Water Act amendments
CWS	Canada-wide Standards
FWPCA	Federal Water Pollution Control Act Amendments of 1972
GLAP	Great Lakes Action Plan
GLCUF	Great Lakes Cleanup Fund
GLISP	Great Lakes International Surveillance Plan
GLNPO	Great Lakes National Program Office
GLTSCA	Great Lakes Toxic Substances Control Agreement
GLWQA	Great Lakes Water Quality Agreement
HAP	Hazardous Air Pollutants
HCB	HydroChlorinated Biphenyls
IADN	Integrated Atmospheric Deposition Network
IJC	International Joint Commission

IWC	International Waterways Commission
LaMP	Lakewide Management Plan
MACT	Maximum Available Control Technology
NAAQS	National Ambient Air Quality Standards
NPDES	National Pollution Discharge Elimination System
OCS	OstoChloroStyrene
PAH	Polynuclear Aromatic Hydrocarbons
PCB	PolyChlorinated Biphenyls
PLUARG	Pollution from Land Use Activities Reference Group
PSD	Prevention of Significant Deterioration program
RAB	Research Advisory Board
RAP	Remedial Action Plan
RTP	Remediation Technologies Program
SAB	Science Advisory Board
SIP	State Implementation Plans
USEPA	United States Environmental Protection Agency
WQB	Water Quality Board

To Dr. Ray McCandless

CHAPTER 1 - INTRODUCTION

In June of 2000, the International Joint Commission (IJC) released its Tenth Biennial Report on Great Lakes Water Quality. The reported opened by stating, "the power of the vision of the [Great Lakes Water Quality] Agreement has not been reflected in the two governments' implementation efforts."[1] The report then goes on to point out how the two signatories, Canada and the United States, have failed to meet the Agreement's objectives on contaminated sediment, contaminated sport fish, airborne toxic pollutants, urbanization and alien invasive species.

The IJC's report raises the questions of "why" and "how." Why have the two countries failed to meet the specified objectives of the Agreement; and how do the two countries differ in their implementation efforts? Although Canada and the United States are more similar than any two developed nations in the world, differences still exist in political, as well as regulatory, structure. This thesis will explore these differences, and determine which aspects of each country's implementation efforts have hindered the success of the Great Lakes Water Quality Agreement.

Thesis Overview

This thesis contains a thorough analysis of the implementation process in Canada and the United States. Daniel Mazmanian and Paul Sabatier have stated that a thorough implementation analysis will address three major issues:

1. To what extent are the policy outputs consistent with the official objectives enunciated in the original statute?
2. To what extent were the objectives modified?
3. What are the principal factors affecting the extent of goal attainment, the modifications in goals and strategies, and any other politically significant impacts.[2]

Although we will touch on each of these questions in this thesis, it is the third question on which we will spend the majority of our time. It is the third question that requires one to examine the entire range of variables that affect the implementation process.

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[1] International Joint Commission, *Tenth Biennial Report on Great Lakes Water Quality*, (Ottawa and Washington D.C.: IJC, 2000,) i.

[2] Daniel Mazmanian and Paul Sabatier, *Implementation and Public Policy* (Lanham, MD: University Press of America, 1989) 12.

Chapter 1 will serve as an introduction to the research question, and will review the appropriate literature on policy implementation, particularly Mazmanian and Sabatier's framework for implementation analysis, which will be used throughout this thesis. Chapter 2 provides an overview of the Great Lakes Water Quality Agreement, its formulation, its structure, and the key objectives of the Agreement. Chapters 3 and 4 will serve as specific case studies of the implementation process in Canada and the United States. Chapter 3 will examine how each country has worked to meet the specific objectives related to contaminated sediment. Chapter 4 will look at the implementation of airborne toxic substances (ATS) objectives. Chapter 5 is the conclusion.

The problems of contaminated bottom sediment and airborne toxic substances were chosen for the two case study chapters for primarily two reasons. First, the cases are currently two of the most pressing pollution issues in the Great Lakes, as evidenced by their prominence in recent IJC Biennial Reports. Therefore, these cases are more pertinent today than issues such as phosphorus, which was a major issue in the seventies and eighties. Looking at how the two countries have responded to the most pressing current issues in the Lakes will demonstrate their overall commitment to the Agreement's objectives. Second, although the two cases are similar in the sense that they are each technically complex to rectify, they are also quite different and thus allow us to highlight different variables. The level to which the problem of contaminated sediment is addressed can be measured, quite simply, by how much money is spent to clean up specific sediment sites. The problem of airborne toxic substances, on the other hand, is addressed through a variety of legislative and regulatory actions. For these two reasons, the case studies in this thesis allow us to draw conclusions in chapter five about how the Parties have responded to the Agreement's mandate, and why.

Methodological Overview

Although much has been written on policy implementation, the most widely used and pertinent framework for implementation analysis today is that which was laid out by Daniel Mazmanian and Paul Sabatier in their 1989 work, *Implementation and Public Policy*. Mazmanian and Sabatier's framework for implementation analysis specifies five dependent and sixteen independent variables that must be considered when analyzing a specific policy's implementation. In our analysis of the implementation of the Great

Lakes Water Quality Agreement, we will examine these variables in terms of both Canada and the United States' implementation efforts. After examining differences between each variable in each country, we will be able to conclude which aspects of the implementation process are responsible for implementation differences in the two countries.

The area of implementation analysis is relatively new in the social sciences. Organizational theorists were the first to delve into such analysis in the 1950s and 1960s. Scholars such as James March and Herbert Simon were writing as early as 1958 on the organizational complexity of public and private bureaucracies.[3] The work of systems theorists in the 1960s enabled policy analysts to begin looking outside the traditional scope of public administration and into the several administrative and legislative actors who affected a policy's implementation.[4]

Implementation studies rose in popularity in the early 1970's. Jeffrey Pressman and Aaron Wildavsky, in their groundbreaking 1973 work *Implementation*, point out that a policy's value must be measured not only in terms of its appeal but also in light of its "implementability." Pressman and Wildavsky contend that implementation and evaluation, although opposites sides of the same coin, are inseparable in analyzing a policy's effectiveness.[5] They state that implementation provides the experience that evaluation interrogates and evaluation provides the intelligence to make sense out of implementation.

Pressman and Wildavsky's work highlighted the fact that successful implementation, because of the multitude of agencies involved in a policy's implementation, is inevitably delayed due to multiple clearance points.[6] They also point out the necessity of not separating a policy's formulation and its implementation. The two, they feel, must been seen as one, as there is no point in developing an outstanding policy if it has no chance of being successfully implemented.

Before we examine the variables, we must first have an adequate understanding of what is meant by the term "implementation." Eugene Bardach has described

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[3] James March and Robert Simon, *Organizations* (New York: John Wiley Press, 1958.)
[4] David Easton, *A Systems Analysis of Political Life* (New York: John Wiley & Sons, 1965.)
[5] Jeffrey Pressman and Aaron Wildavsky, *Implementation* (University of California Press: Berkeley, 1973,) p. xv

implementation as "an assembly process." It is, Bardach writes, "as if the original mandate...that set the policy or program in motion were a blueprint for a large machine that has to turn out rehabilitated psychotics or healthier old people or better educated children...Putting the machine together and making it run is, at one level, what we mean by the 'implementation process'."[7]

Mazmanian and Sabatier offer the following working definition:

> *Implementation is the carrying out of a basic policy decision, usually incorporated in a statute but which can also take the form of important executive orders or court decisions. Ideally, that decision identifies the problem(s) to be addressed, stipulates the objective(s) to be pursued, and, in a variety of ways, "structures" the implementation process. The process normally runs through a number of stages beginning with passage of the basic statute, followed by the policy outputs (decisions) of the implementing agencies, the compliance of target groups with those decisions, the actual impacts - both intended and unintended - of those outputs, the perceived impacts of agency decisions, and finally, important revisions (or attempted revisions) in the basic statute.*[8]

As you can see, this definition is broad as it includes both actual and perceived impacts of agency decisions, and takes into account policy reformulation. This enables us to move beyond simple agency analysis, and allows us to look at the entire range of factors that affect policy implementation. This broad definition of implementation allows Mazmanian and Sabatier to include variables in their framework for analysis that may be excluded by more limited definitions of implementation.

Dependent Variables

Although the conclusions at the end of this thesis will focus mostly on differences in independent variables, the dependent variables of Mazmanian and Sabatier's framework for analysis, and the dependent variables used in this thesis, should be noted. Five dependent variables are given by Mazmanian and Sabatier; three of which will be explored in this thesis.

1. Policy outputs of the implementing agencies
2. Compliance of target groups with those decisions

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[6] Ibid., 123.
[7] Eugene Bardach, *The Implementation Game* (Cambridge: MIT Press, 1971,) 36.

3. Actual impacts of agency decisions
4. Perceived impacts of those decisions
5. The Political system's evaluation of the statute in terms of major revisions

Policy outputs of implementing agencies

Statutory objectives must be translated into substantive regulations, standard operating procedures for processing individual cases, specific adjudicatory (permit, licensing) decisions, and enforcement of those adjudicatory decisions. Mazmanian and Sabatier hypothesize that, within five to seven years the sovereigns or the implementing officials will (a) change, delay, or ignore the statutory objectives in order to require less change in target group behavior; or (b) reduce opposition through payments of various sorts (e.g., subsidies, tax breaks.)[9] This hypothesis is interesting in the case of the Great Lakes Water Quality Agreement, as it was in 1978, six years after the signing of the 1972 Agreement, that reformulation took place.

In chapter three, we will explore the major programs created by each country to address the problem of contaminated bottom sediment. In chapter 4, we will examine the frameworks in each country that work to reduce airborne toxic substances – specifically mercury. These dependent variables will serve as our starting point for analysis of differences between Canada and the United States in terms of GLWQA implementation.

Target group compliance with policy outputs

Previous studies on policy implementation have shown that the decision of target groups to comply with a given statute will be affected by the following four factors; (a) the probability that noncompliance will be detected and successfully prosecuted; (b) the sanctions available to penalize noncompliance; (c) target group attitudes concerning the fundamental legitimacy of the rules; and (d) the costs to the target groups of compliance.[10]

Actual impacts on policy outputs

According to Mazmanian and Sabatier, a statute will achieve its desired objectives if: (a) the policy outputs of the implementing agencies are consistent with statutory objectives; (b) the ultimate target groups comply with those outputs; (c) there is no

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[8] Mazmanian and Sabatier, 21.
[9] Ibid., 36.
[10] Ibid., 37.

serious "subversion" of policy outputs or impacts by conflicting statutes; and (d) the statute incorporates an adequate causal theory linking behavioral change in target groups to the achievement of mandated goals.[11] The extents to which these four criteria are met are known as the actual impacts. The implementation of a statute may also have actual impacts not articulated in the statute's original specific objectives.

In this thesis, we will see that both Canada and the United States have, for the most part, met the four above-mentioned criteria. We will see in chapter three that each country has met the minimum objectives in terms of contaminated sediment remediation by having created and implemented remediation demonstration programs. However, progress beyond this point has been slow in both countries. In chapter four, we will see that both countries have created frameworks for reducing airborne toxic substance deposition into the Lakes. However, as with contaminated sediment, neither country has fully solved the problem of airborne toxic substances. We will use Mazmanian and Sabatier's independent variables to conclude why each country has fallen short.

Perceived impacts of policy outputs

Although *actual* impacts are deemed most important to policy analysts and administrators, they are often very difficult to measure in a systematic fashion. However, what may be most important to the political system are the *perceived* impacts, as perceived by constituency groups and sovereigns. It is often these *perceived* impacts that may lead to statutory changes. It is the perceived impacts that affect public support, and thus attitudes of sovereigns.

Major revision in statute

The amount and direction of statutory changes will be a function of the perceived impacts of past agency activities; changes in policy priorities among the general public and policy elites as a result of changing socioeconomic conditions; the potential resources of competing groups; and the strategic positions of supportive and opposing sovereigns.[12] As will be noted later, the GLWQA went through at least one *major* revision, in 1978, and two smaller reformulations in 1983 and 1987. These reformulations will be explored more in depth in chapter two.

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[11] Ibid.
[12] Ibid., 38.

Independent Variables

Mazmanian and Sabatier specify sixteen independent variables that affect the implementation process. It should first be noted that these variables are not unique to environmental policy, but are factors in the implementation of all types of public policy. The sixteen variables are broken down into three categories:

1) the tractability of the problems being addressed

2) the ability of the statute to favorably structure the implementation process

3) the net effect of a variety of political variables on the balance of support for statutory objectives.

Tractability of the Problem

Nearly all public policy is meant to solve a specific problem. The success or failure of policy decisions is in large part dependent upon the ability of the "problem" to be clearly defined. In comparison to other policy issues, environmental problems are more difficult to "put your thumb on." Oftentimes a specific environmental problem is the result of a myriad of related problems, as is the case with water quality issues. Effective environmental policy, as well as effective implementation efforts, must be able to clearly define the problem. A policy problem with a broad scope, such as "making the Great Lakes clean," may prove difficult to tract. According to Dean Mann, policy problems are particularly intractable when they first arrive on the scene.[13]

Technical Problems

There is a wide range of technical questions that must be asked when determining the tractability of the problem. Are adequate resources available (financial and/or technological) to determine the success of implementation efforts? For example, is it technically possible to remove contaminated sediment from the bottom of Lake Erie? Implementation programs inevitably involve costs to both taxpayers and target groups. What is the political support for the statute? Do voters in Ontario care enough about the state of Lake Superior to demand that their MLA's see that the Agreement is properly implemented?

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[13] Dean Mann, ed, *Environmental Policy Implementation* (Lexington, MA: Lexington Books, 1982,) 14.

Diversity of target group behavior

Mazmanian and Sabatier define target groups as "the private actors at whom the program is addressed."[14] The more diverse the behavior of these target groups affected by the policy, the more difficult the policy will be to implement. Also, the more difficult it becomes to frame clear regulations, the greater the discretion that must be given to field-level implementers.[15] For example, one of the major obstacles confronting the implementation of the 1972 U.S. Federal Water Pollution Control Amendments has been the extreme diversity in the type and seriousness of discharges from the nation's estimated 62,000 points of discharge.[16] Since most policy is implemented in a manner as to reduce or end a specific behavior by a target group, the more diverse the actions of the target groups, the harder it becomes to successfully implement policy. As we will see, the Great Lakes are affected by a variety of pollutants from a variety of types of sources.

Target group as a percentage of the population

In general, the smaller the target group, the more likely the mobilization of political support in favor of the program and thus the more probable the achievement of it's objectives.[17] Pollution control policy generally involves a smaller target group when compared to a policy that affects the mass public, such as a new speed limit. However, when the pollution control policy is intended to control pollution in an ecosystem the size of the Great Lakes ecosystem, the actions of a large number of people will inevitably be affected.

Extent of behavioral change required

This is determined by the extent of the change that the target group will be required to undertake because of the new statute.[18] The policy is likely to meet heavy opposition if it requires a great amount of change on the part of the target groups. It is important to note that the extent of change required can be judged by the operational complexity of the change as well as the monetary costs of the change. In the case of the Agreement, implementation becomes difficult not simply because of the extent of change

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[14] Mazmanian and Sabatier, 45.
[15] Ibid., 23.
[16] Ibid.
[17] Ibid., 24.
[18] Ibid., 24.

required by individual actors, but by the number and variety of actors that will be required to change.

Ability of Policy Decision to Structure Implementation

A great deal of the success or failure of the Great Lakes Water Quality Agreement (GLWQA) can be attributed to the Agreement itself, and how the implementation process is laid out. According to Mazmanian and Sabatier, the implementation process must be coherently structured by those who create the statute.[19] As we will see with the Agreement, its implementation becomes difficult due to its general failure to specifically structure the implementation process. The second group of variables given by Mazmanian and Sabatier focus on the statute or policy decision.

Precision and clear ranking of legal objectives

Implementation programs must have clearly stated, and clearly prioritized legal objectives. Implementing officials must have unambiguous directives.[20] As we will see later, vagueness of specified objectives can make reformulation a necessity, and possibly lead to a failed policy decision. It is also important that a statute to be implemented by an already existing agency clearly indicate the relative priority that the new directives are to play in the agency's programs. The fact that the Agreement is implemented by different agencies on each side of the border is one reason that a cross-national comparison is so compelling, due to the fact that differences will exist in internal structure and process between those agencies. Existing issues of federalism in each country further confuse implementation authority.

Validity of the casual theory

An adequate casual theory requires (a) that the principal causal linkages between governmental intervention and the attainment of program objectives be understood; and (b) that the officials responsible for implementing the program have jurisdiction over a sufficient number of the critical linkages to actually attain the objectives.[21] As with virtually all environmental policy, the implementation of the GLWQA relies upon good science to establish valid causal linkages. The development of a good scientific and technical base increases the likelihood that the causal linkages will be able to withstand

[19] Ibid., 25.
[20] Ibid.
[21] Ibid., 26.

attack from target groups.[22] Another reason why the cross-national comparison is so compelling is the likelihood that the causal theory will differ on each side of the border. Since Canada and the United States have different federal structures, it is unlikely that each country's implementing agencies will have jurisdiction over the same causal linkages.

Initial allocation of financial resources

Mazmanian and Sabatier state that, "the initial (basic) policy decision establishes the general level of funding. An adequate level of funding can help a program get off to a decent start."[23] The GLWQA, like many other statutes, does not specify a level of funding to be provided by the governments. The Agreement states simply "the Parties commit themselves to seek...the appropriation of funds required to implement this Agreement."[24] This variable is still a worthwhile one for analysis as we can compare funding levels of U.S. Environmental Protection Agency statutes to those of Environment Canada.

Hierarchical integration within and among implementing institutions

"One of the best-documented findings in implementation literature is the difficulty of obtaining coordinated action within any given agency and among the numerous semiautonomous agencies involved in most implementation efforts."[25] Mazmanian and Sabatier state that one of the most important attributes of any given statute is the extent to which it hierarchically integrates the implementing agencies. Once again, analysis of this variable will force us to look outside of the GLWQA itself, and at domestic law of the signatories.

The degree of hierarchical integration among implementing agencies is determined by (a) the number of veto/clearance points involved in the attainment of legal objectives; and (b) the extent to which supporters of those objectives are provided with inducements and sanctions sufficient to ensure acquiescence among those who have potential veto.[26] (Veto/clearance points, according to Mazmanian and Sabatier, involve those occasions on which an actor has the capacity, quite apart from the question of legal

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[22] Mann, 4.
[23] Mazmanian and Sabatier, 26.
[24] IJC, *The Great Lakes Water Quality Agreement of 1978*, Article XI, 2 (a).
[25] Mazmanian and Sabatier, 27.

authority, to impede the achievement of legal objectives.) As we will see with the GLWQA, the hierarchical frameworks involved are quite complex and ever changing, thus making implementation difficult.

Decision rules of implementing agencies

In addition to other things, a statute can influence the implementation process by stipulating the formal decision rules of the implementing agencies. For example, when multi-member commissions are involved, the statute can stipulate the majority required for specific actions.[27] Although this is not specifically the case with the Agreement, it should be worthwhile to examine how the Agreement defines the interplay of such groups as the International Joint Commission, the Water Quality Board, the Science Advisory Board, and the Parties.

Officials' commitment to statutory objectives

No matter how well a statute is structured, there will be little success in meeting the stated objectives without a strong commitment by officials in implementing agencies. Any new program requires implementing officials who are committed to finding ways to deal with target groups.[28] There are a few different ways to ensure this happens. The responsibility for implementation can be assigned to agencies whose policy orientation is consistent with the statute and which will give the new policy or program high priority. Implementation can also be assigned to an existing prestigious agency looking for new programs. This can be constrained however in situations where authority must be given to existing agencies, or to individuals who are protected in the civil service.[29] In the case of the GLWQA, to analyze this variable we must look at commitment by EPA and Environment Canada officials. This variable is affected, in each country, by the inevitable change in "political winds" and changes in environmental agency leadership.

It has also been argued that officials' commitment to statutory objectives is reflected in the amount of funding allocated to the programs that support those objectives. Banting, Hoberg and Simeon write: "government spending is both an indicator of government commitment to a policy area, and a measure of capacity to develop, monitor

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[26] Ibid.
[27] Ibid.
[28] Ibid., 28.
[29] Ibid.

and enforce policy."[30] This correlation enables us to make firm conclusions about the commitment of implementing officials by looking at funding for GLWQA programs.

Formal access by outsiders

Another factor affecting implementation is the extent to which opportunities for participation by actors outside the implementing agencies are biased toward supporters of legal objectives.[31] Just as a statute can influence the implementation process through design characteristics of implementing agencies, it can also affect the participation of two groups of actors external to those institutions: (a) the potential beneficiaries and / or target groups of the program; and (b) the legislative, executive, and judicial sovereigns of the agencies. Statutes that permit citizens to participate in the proceedings of implementing agencies, (given that the public supports the statute's objectives,) are more likely to have their objectives attained.[32] This is an important point to keep in mind, as we look at public involvement in contaminated sediment remediation efforts.

To sum up the statutory variables; legislation that aims to significantly change target group behavior in order to achieve its objectives is most likely to succeed if (a) its objectives are specific and clearly ranked; (b) it incorporates an adequate causal theory; (c) it provides adequate funds to the implementing agency; (d) there are few veto points in the implementation process; (e) the decision rules of the implementing agencies are biased toward the achievement of statutory objectives; (f) implementation is assigned to agencies which support the legislation's objectives and will give the program high priority; and (g) participation by outsiders is encouraged through liberalized rules of standing and through provisions for independent evaluation studies.

<u>Nonstatutory Variables Affecting Implementation</u>

Although a statute establishes the basic legal structure in which the implementation process takes place, implementation is also greatly affected by a wide range of non-statutory variables. In both Canada and the United States, the success of the Agreement's implementation is dictated by existing socioeconomic conditions, public opinion, attitudes of government officials, and commitment of implementing officials. It

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[30] George Hoberg, Keith Banting and Richard Simeon, "North American Integration and the Scope for Domestic Choice: Canada and Policy Sovereignty in a Globalized World," (Prepared for the Annual Meeting of the Canadian Political Science Association, June 6-8, 1999, Sherbrooke, Quebec,) 17.

[31] Mazmanian and Sabatier, 28.

is in these non-statutory variables that we are likely to find the least difference between Canada and the U.S.

Socioeconomic conditions

Undoubtedly, socioeconomic conditions will vary between each country, as well as within each country over time. How do these variations affect the political support for statutory objectives and the eventual achievement of those objectives? First, variation in socioeconomic conditions can affect perceptions of the relative importance of the problem addressed by the statute.[33] If a country has scarce financial resources, how will resources be allocated to implementation programs? As Walter Rosenbaum has stated, "in all environmental policy making, economics is the counterpoint to ecology."[34] Second, implementation is more difficult with large local variation in socioeconomic variables. This results in pressure for flexible rules. Third, the more support for regulation aimed at environmental protection seems to be correlated with the financial resources of target groups, the more probable the effective implementation of statutes imposing nonproductive costs on them.[35]

Public support

Anthony Downs has argued that public (media) attention to many policy issues tends to follow a cycle in which an initial awakening of public concern is followed by a decline in widespread support as people become aware of the costs of "solving" the problem, as other issues crowd it off the political agenda. Conversely, public support may be temporarily reawakened by dramatic new evidence that the problem persists.[36] Given the affect of public opinion upon the actions of legislators and other elected officials, this fluctuation in public support creates problems for statutes that require at least occasional support from government officials for financial allocations. The public can influence the implementation process in at least three ways. First, general public opinion can affect the political agenda. Second, legislators are influenced by constituents when issues directly affect them. Third, the government is influenced by public opinion

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[32] Ibid., 29.
[33] Ibid., 30.
[34] Walter Rosenbaum, *Environmental Politics and Policy,* (Washington, DC: Congressional Quarterly Press, 1991,) 81.
[35] Mazmanian and Sabatier, 31.
[36] Ibid., 31.

polls related specifically to the statute.[37] Since Canada and the United States deal with two different "publics," it is likely that differences will exist between the two in relation to this variable.

Attitudes and resources of target and constituency groups

A challenge to the successful implementation of the GLWQA, or any statute that seeks to change the behavior of one or more target groups, is the fact that public support for the statute is likely to decline over time. Opponents of environmental statutes (usually industry) are more likely to have the resources and invest the time in trying to affect the implementation process. Because opponents of statutes can generally intervene more actively over a longer period than proponents, most regulatory agencies eventually recognize that if a program is to survive, some compromise with the interests of target groups will be more necessary than originally envisioned.[38] An interesting characteristic of broad environmental initiatives, such as the Agreement, is that public support can actually *increase* over time; not specifically for the statute itself, but for the general notion (environmental protection) that it represents, thus helping implementation efforts.

Support from sovereigns (elected officials)

Sovereigns provide support for statutory objectives through (a) the amount and direction of oversight; (b) provision of financial resources; and (c) the extent of new and conflicting legal mandates.[39] (Sovereigns include the legislatures, the chief executive and the courts.) Mazmanian and Sabatier state that when implementing officials receive conflicting directives from various sovereigns, they are most likely to follow the wishes of the one that most affects their resources over the long term.[40] Sovereigns can affect the success of a statute's implementation in a number of ways, most notably through the allocation of (financial) resources. Through the appropriations process, sovereigns in Canada and the U.S. can greatly help, or hinder the success of the Agreement.

Leadership skills of implementing officials

Few variables affect the success of a statute's implementation more than the level of commitment by implementing officials. This comprises two components: (a) the

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[37] Ibid.
[38] Ibid., 32.
[39] Ibid., 33.
[40] Ibid.

direction and ranking of those objectives in officials' priorities; and (b) officials' skill in realizing those priorities, i.e., their ability to go beyond what could normally be expected in using the available resources.[41] Mazmanian and Sabatier argue that the commitment of agency officials will be the greatest in newly formed agencies. This is interesting to look at in the cases of the USEPA and Environment Canada (EC,) both of which were created shortly before the signing of the original Agreement.

Implementing officials must also be skilled implementers. Commitment to statutory objectives will not ensure the policy's success, if the implementing officials are not skilled in using the resources available to them. A comparison of the implementing skills of USEPA and EC officials would therefore be useful, but is very difficult to quantify.

[41] Ibid., 34.

CHAPTER 2

THE AGREEMENT

This chapter is designed to give an overview of the Great Lakes Water Quality Agreement; its formulation, its history and its basic objectives. This chapter will also provide some background as to the role of the two signatories in the implementation process, the roles of the U.S. Environmental Protection Agency (EPA,) and Environment Canada (EC,) the role of the states and provinces, and the role of the International Joint Commission (IJC.)

Pre-Agreement

In 1905, the International Waterways Commission (IWC) was created to advise the governments of both countries about levels and flows in the Great Lakes, especially in relation to the generation of hydro-electricity. Due to its limited advisory powers, the IWC proved inadequate for problems related to pollution and environmental damage. One of the first recommendations of the IWC was for the creation of a stronger institution with the authority for study of broader boundary waters issues and the power to make binding decisions. It was this recommendation that led to the formulation of the Boundary Waters Treaty between Canada and the United States.

The Boundary Waters Treaty was signed in 1909 and provided for the creation of the International Joint Commission (IJC). The IJC, which will be discussed further later in this chapter, was created with the authority to resolve disputes over the use of water resources that cross the international boundary. Since its inception, most of the IJC's efforts for the Great Lakes have been devoted to carrying out studies requested by the governments and advising the governments about environmental problems related to boundary waters.

In 1912, water pollution was one of the first problems referred to the IJC for study. In 1919, after several years of study, the IJC concluded that serious water quality problems required a new treaty to control pollution.[42] This marked the first recommendation by the IJC that an international agreement was needed to adequately address issues of pollution in the Great Lakes basin. However, no agreement was

[42] USEPA website; available from http://www.epa.gov/glnpo/atlas/glat-ch5.html; Internet; accessed 25 September 2000.

reached, with many of today's pollution problems beginning soon after. Additional studies in the 1940s led to new concerns by the IJC. The Commission recommended that water quality objectives be established for the Great Lakes and that technical advisory boards be created to provide continuous monitoring and surveillance of water quality.[43]

Leading up to the Agreement

The Great Lakes Water Quality Agreement (GLWQA) as we know it today grew out of several events that took place in the 1950s and 1960s. A 1950 report to the IJC, on a 1946 reference on growing pollution in the St. Clair, Detroit, St. Mary's, and Niagara Rivers, and Lake St. Clair, had already recommended "urgent action" to set "objectives for boundary water quality control," to establish boards to monitor and report on pollution problems in the connecting channels, and to propose reductions in the discharge of wastes.[44] In response, the IJC released a report in 1951 that identified these problems, but lack of public concern led to an absence of action by governments.[45]

In 1956, the United States proposed a new reference to investigate pollution of Lake Erie, Lake Ontario, and the St. Lawrence River. After Canada agreed, the U.S. suggested a broader study that would address both water quality and water quantity, because of the growing concern about fluctuations of lake levels. Levels that had been high in the early 1950s declined to historic lows by 1964. In October of 1964, Canada and the U.S. formally asked the IJC to undertake yet another study, this time on the whole of the lower lakes.[46]

It took nearly six years for the IJC's technical advisory group to put together its final report. As had already been reported for large lakes in Europe, scientists found that excessive phosphorus was the chief cause of accelerated eutrophication in Lake Erie and Lake Ontario.[47] The report also found that the United States was responsible for the bulk of these excessive phosphate loadings.[48] It was also during this period that public concern over the state of the lakes was heightened by the 1967 fire on the Cuyahoga

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[43] Ibid.

[44] Lee Botts and Paul Muldoon, *The Great Lakes Water Quality Agreement: Its Past Successes and Uncertain Future,* (The Institute on International Environmental Governance, 1996,) 13.

[45] Don Munton and Geoffrey Castle, *The Continental Dimension: Canada and the United States*, in Robert Boardman, ed. Canadian Environmental Policy: Ecosystems, Politics, and Process, (Toronto: Oxford University Press, 1992,) 204.

[46] Ibid.

[47] Botts and Muldoon, 14.

River, and a reporter's interpretation of the news about eutrophication as meaning that "Lake Erie is dying."

Action towards a new binational water quality agreement began to accelerate in 1970. During January and February of that year, the IJC held public hearings on their 1969 report in eight cities around the Great Lakes, with the major focus of these hearings being on levels of phosphates in detergents.[49] 1970 was also an active environmental year in Canada as the Canadian Parliament approved the Arctic Waters Pollution Prevention Act, amendments to the Fisheries Act, and the new Canada Water Act. Because of the 1969 IJC report, the Canada Water Act contained a provision requiring reductions in the amount of phosphates included in household detergents.[50] In the United States, New Year's Day 1970 saw the signing of the National Environmental Policy Act, and it was shortly after then that the U.S. Environmental Protection Agency was formed.

Canadian Minister of Energy, Mines and Resources, J.J. Greene, is reportedly the first person to have suggested that a new bilateral environmental treaty be formed to address issues of water quality in the Great Lakes.[51] The Department of Energy, Mines and Resources and the Department of External Affairs eventually agreed to work for a formal agreement between Canada and the United States. The U.S., troubled by an inter-bureaucratic struggle over which agency would take the lead role on the U.S. side in the pollution issue, was not as committed to the notion.[52] Despite these problems, the first ministerial-level meetings between Canada and the U.S. to address Great Lakes pollution took place in May of 1970. During these meetings, it was decided that a working group would be formed to examine the need for an agreement. In September 1970, the Canada-U.S. Joint Working Group met and established ten sub-groups to address related issues such as objectives and standards, environmental legislation, research coordination, and various sources of pollution. The report released by the working group pointed out that the most difficult issues were the regulation of phosphate detergents, the role of the IJC, vessel waste and the overall form of the proposed agreement.[53]

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[48] Munton and Castle, 204.
[49] Ibid.
[50] Ibid., 205.
[51] Ibid.
[52] Ibid.
[53] Ibid., 206.

The two sides began working on drafts of the Agreement. In December of 1971, negotiating teams from both countries met to consider both drafts. Concerns were raised over the vagueness of the objectives in the American version of the text. Of particular concern was U.S. wording that municipal sewage programs "would be complete *or in the process of implementation*" by December 31, 1975.[54] Although Canadian negotiators did not feel this language was firm enough, the Canadian government would eventually give in on this point.

The 1972 Agreement

After six years of study and two years of intense negotiations, the Great Lakes Water Quality Agreement was signed by Prime Minister Pierre Trudeau and President Richard Nixon on April 15, 1972. The 1972 Agreement expanded the scope of the IJC and added new aspects to the binational relationship of Canada and the United States. The Agreement was similar in character to the Boundary Waters Treaty in two ways: in the operation of joint institutions and in allowing each country to achieve the common objectives under its own political system and laws. Although the Agreement specified common objectives and that the monitoring process was to be joint, the actual pollution control programs were to be administered individually by each country.

The objectives of the Agreement were outlined in Articles III and IV. Article III, which outlined the "general" objectives, included such goals as ensuring the Lakes would be:

- Free from substances that enter the water from human activity and will either form sludge deposits or adversely affect aquatic life.
- Free from floating materials such as oil, debris and scum.
- Free from materials or heat that that will produce harmful or toxic conditions, or produce color odor or taste that will impair the beneficial uses.
- Free from nutrients entering the Lakes from human activity that cerate growths of aquatic life that interfere with beneficial uses.

Specific objectives of the Agreement were addressed in Article IV. Although Article IV did not state specific objectives, it outlined guidelines for the future establishment of such objectives. Specific objectives would be outlined in annexes to the

[54] Ibid., 208.

Agreement. The primary objective of the 1972 Agreement was to stop the process of eutrophication by reducing phosphorus loadings in the Lakes. The overloading of the Lakes with phosphorus contributed to algae growth, which subsequently deprived the Lakes of enough oxygen to support aquatic organisms. To date, one of the biggest accomplishments of the 1972 Agreement was its ability to dramatically alter this process.

The Agreement expanded the scope of the International Joint Commission in many ways. The IJC was now responsible for monitoring an area that was inhabited by nearly 40 million people, and included some of the largest areas of urban development in all of North America. The 1972 Agreement called for the IJC to make several reports in reference to the successes and failures of the Parties, and the Agreement in general. Regular reviews at several-year intervals by the Parties of progress under the Agreement provided flexibility to set new objectives that recognize that problems have been solved or that identify new ones.[55] Between reviews of the Agreement itself, the various boards of advisors reported regularly to the IJC, at first annually and now biennially. However, much of the debate over the actual effectiveness of the GLWQA over the years has centered on the IJC's inability to enforce its recommendations made in such reports.

The Agreement directs that the Water Quality Board (WQB) be the principal advisor to the IJC. The official members of the Water Quality Board include heads of provincial and state environmental agencies. With some exceptions, the tradition has been for the director of the Ontario Regional Office of Environment Canada and the administrator of Region 5 of the U.S. Environmental Protection Agency (USEPA) to serve as co-chairs. To date, the Water Quality Board has had no non-governmental members. In addition to the Water Quality Board, the Science Advisory Board (SAB) (called the Research Advisory Board until 1978) was created to advise the IJC on science-related matters under the GLWQA.

The relative functions of the two advisory boards were somewhat uncertain. The Agreement said simply that the Water Quality Board should "assist" the IJC.[56] The terms of reference (GLWQA-1972) directed the Research Advisory Board (RAB, later the

[55] IJC, *The Great Lakes Water Quality Agreement of 1972*, Article X.
[56] Ibid., Article VII, 1.

Science Advisory Board, SAB) "to work at all times in close cooperation with" the Water Quality Board, without elaboration on relative authorities.[57]

1978 reformulation

The main aim of the 1972 Great Lakes Water Quality Agreement was to change water chemistry enough to reverse eutrophication. The chief water quality success during the first years of the Agreement was the decline of algae growth and other evidence of slowing of eutrophication that followed reductions of phosphorus loadings.[58] Phosphorus inputs were reduced by a variety of measures including improved sewage treatment, adoption of phosphate detergent bans in the U.S. and substantial limitations in Canada, and reductions in agricultural runoff.

There was also success in substantially eliminating other visible signs of pollution such as floating sewage or debris, fish kills, and floating oil.[59] In less than five years, the public interpreted greater water clarity and return of the walleye to Lake Erie, as well as improved conditions in Lake Ontario and Lake Michigan, to mean that lake cleanup had been accomplished. Later, it became routine to point out that, although visible pollution had declined, the public was initially less concerned about toxic contamination because chemicals such as polychlorinated biphenyls (PCBs) "cannot be tasted, seen or smelled."[60]

As was required under Article IX of the 1972 Agreement, the governments began preparing for the five-year review in 1977, taking into account the findings of the previous years' annual reports by the IJC. The Second Annual Report released by the IJC, covering 1973 and part of 1974, for the first time raised the ongoing question about whether progress could "be confirmed on the basis of the scientific data and information supplied to the Commission."[61] The Third Annual Report, for 1974, (released in December 1975,) raised what would eventually become a perennial complaint, about the apparent unresponsiveness of the governments to the recommendations of earlier IJC

[57] Ibid., (Terms of Reference for the Establishment of a Research Advisory Board.)
[58] Paul Bertram, M. Neilson, S. L'Italien, V. Glumac, and D. Williams, "Nutrients: Trends and System Response." Background paper for State of the Lakes Ecosystem Conference, Environment Canada and the U.S. Environmental Protection Agency (Windsor, Ontario, 1995.)
[59] Botts and Muldoon, 18.
[60] Ibid.
[61] IJC, *Second Annual Report on Great Lakes Water Quality* (Ottawa and Washington, D.C.: IJC, 1974,), 1.

reports.[62] The major focus of 1976 recommendations was on the presence and elimination of toxic substances.

Although the revised 1978 Agreement was similar in structure to the 1972 Agreement, some significant changes were made. As plans for a revised agreement took place, both countries drew up a list of hundreds of hazardous chemicals that were to be eliminated from the Lakes. This concern over the presence of toxic substances was reflected in the new agreement as it called for the virtual elimination of approximately 350 "hazardous polluting substances" from the Lakes.[63] The 1978 Agreement also stated that the two countries would have programs in place for the abatement of municipal and industrial pollution by the end of 1983.

1983 and 1987 Amendments

A supplement to the Agreement concerning phosphorus load reduction and target loads for the Lakes was added in 1983. Nineteen eighty-seven saw an important addition to the 1978 Agreement with the addition of the 1987 Protocol. With this Protocol, emphasis was placed on the importance of comprehensive human and aquatic ecosystem health, known now as the "ecosystem approach." The Protocol introduced provisions to develop and implement Remedial Action Plans (RAPs) and Lakewide Management Plans (LaMPs). Remedial Action Plans focus on the 43 (now 42) geographic Areas of Concern, take an ecosystem approach, and draw upon broad local community involvement. Lakewide Management Plans are designed to improve the environmental quality of the open waters of each of the Great Lakes, with a particular focus on Critical Pollutants.[64] In addition, the 1987 Protocol introduced other new annexes focusing on non-point contaminant sources, contaminated sediment, airborne toxic substances, contaminated groundwater, and associated research and development. These annexes now dictate the work around some of the most important issues facing the Great Lakes.

Implementation of the Agreement

The Parties to the GLWQA are the federal governments of Canada and the United States and, by extension, all the other governmental jurisdictions within the Great Lakes

[62] IJC, *1974 Annual Report on Great Lakes Water Quality* (Ottawa and Washington, D.C.: IJC, 1975,), 15.
[63] IJC, *The Great Lakes Water Quality Agreement of 1978,* Annex 10, Appendix 1.
[64] Environment Canada website; available from http://www.on.ec.gc.ca/glwqa/facts-e.html; Internet; accessed on 29 June 2002.

basin. By signing the Agreement, the governments themselves accepted the primary responsibility for achieving the goals and objectives of the Agreement. This point is self-evident but has been subject to confusion by the members of the public who think that the International Joint Commission has the primary authority for implementation. In actuality, the primary responsibility for programs to achieve the objectives of the Agreement rests with the two principal federal environmental agencies for the governments, Environment Canada and the U.S. Environmental Protection Agency (USEPA).

The constitutions of both countries reserve the conduct of foreign affairs to the federal governments, usually represented by the U.S. State Department and the Canadian Department of External Affairs. Under the Agreement, both departments have deferred to the lead federal environmental agencies, USEPA and Environment Canada, on substantive issues, and the departments' chief roles have been to oversee the formal reporting and review requirements and transmittal of federal funds to the IJC.[65] Thus, the two federal environmental agencies are actually the lead agencies under the Agreement.

United States

In the U.S., the lead agency responsible for implementing the Agreement is the EPA. Important to note is the fact that the USEPA was only a few months old when it was charged with the responsibility of implementing the Agreement. The authority for the USEPA to take the lead for implementation of the Agreement comes mainly from the Clean Water Act, the law that was first passed as PL 92-500 in 1972.[66]

After the Agreement was signed, the Washington headquarters of USEPA tended to consider obligations under the GLWQA with Canada an interference with the agency's policy to give priority to national rather than regional issues. Day-to-day liaison with the IJC was left to the Office of International Activities in Washington and the Region 5 office in Chicago took the lead in meeting U.S. Agreement obligations.[67]

Former U.S. co-chair of the Water Quality Board, George Alexander, says that Congressional support was the reason he was able to convince USEPA headquarters in 1976 to establish the Great Lakes National Program Office (GLNPO) in Region 5 with its

[65] Botts and Muldoon, 19.
[66] Ibid., 20.
[67] Ibid.

own line item in the agency budget.[68] The Great Lakes National Program Office, located in Chicago, Illinois, currently has a staff of 46 and an annual budget of almost $15 million. The Great Lakes National Program Office brings together federal, state, tribal, local, and industry partners in an integrated, ecosystem approach to protect, maintain, and restore the chemical, biological, and physical integrity of the Great Lakes.[69] The office monitors lake ecosystem indicators; manages and provides public access to Great Lakes data; helps communities address contaminated sediment in their harbors; supports local protection and restoration of important habitats; promotes pollution prevention through activities and projects such as the Canada-U.S. Binational Toxins Strategy (BNTS); and provides assistance for community-based Remedial Action Plans for Areas of Concern and for Lakewide Management Plans.

Each year, the Great Lakes National Program Office uses its funding to assist Great Lakes partners in these areas through grants, interagency agreements, and contracts. In addition, the Region 5 office of USEPA uses funds from other programs to support its Great Lakes office and the binational activities directly related to implementation of the Agreement.[70] In addition, appropriations for water programs such as sewage control were counted as Great Lakes expenditures when they were made within the Great Lakes basin.[71]

The Agreement states the following in regards to the role of the states and provinces in implementing he Agreement:

> *Article XI - Implementation*
>
> *2. The Parties commit themselves to seek:*
>
> *(c) The cooperation of the State and Provincial governments in all matters related to this Agreement.*

Throughout other portions of the Agreement, no specific provisions are made in regards to the actions of the state or provincial governments. Although it is stated throughout that the Parties should "cooperate" with the states and provinces, the main responsibility to implement the Agreement clearly lies with the federal governments.

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[68] Botts and Muldoon, 20.
[69] USEPA website, available from http://www.epa.gov/grtlakes/glnpoinfo.html; Internet; accessed 10 October 2000.
[70] Botts and Muldoon, 20.
[71] Ibid.

The role of the states under the Agreement reflects their unofficial obligation to implement federal policy but lack of responsibility beyond their boundaries. This is achieved through threats from the federal government to withhold federal funds from states that refuse to comply with federal mandates. Some states initially wanted Lake Michigan excluded but were overruled after Wisconsin Governor Pat Lucy joined forces with a representative of the Lake Michigan Federation to obtain approval of a Congressional resolution recognizing that the Great Lakes form a single connected system.[72]

Satisfaction or frustration of the states with the Agreement has been tied to the availability of federal funding for key programs. State objections to what would now be called "unfunded mandates" grew as federal funding for sewage treatment grants was decreased following the 1977 Clean Water Act and more and more problems in the Great Lakes involving persistent synthetic chemicals were being revealed. Authority for setting and enforcing water quality standards was also delegated to the states, which could and sometimes did adopt standards stricter than the required national minimum.

In the United States, the federal government plays a larger role in environmental policy implementation than do state governments. Although the arena of environmental policy is not mentioned in the U.S. constitution it has, over the past thirty years, become federal domain. This is due, in large part, to liberal interpretations of the interstate commerce clause by the U.S. Supreme Court.[73] "Federal supremacy" in environmental policy making in the U.S. is also influenced by the number of states. As Harrison points out, "the larger number of U.S. states than Canadian provinces makes it more difficult for the states to present a coherent opposition to federal government 'intrusion' in their sphere."[74] This is evidenced in the example of the GLWQA as the Lakes are bordered by eight U.S. states, compared to just one Canadian province.

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[72] Ibid., 22.

[73] Harrison, Kathryn, *The Origins of National Standards: Comparing Federal Government Involvement in Environmental Policy in Canada and the United States*, Patrick Fafard and Kathryn Harrison, eds., Managing the Environmental Union: Intergovernmental Relations and Environmental Policy in Canada, (Kingston: Institute of Intergovernmental Relations, Queen's University and Saskatchewan Institute of Public Policy, 2000,) 67.

[74] Ibid., 69.

Canada

The role of Environment Canada in the implementation of the Agreement is different from that of the USEPA for several reasons. In the early years of the Agreement, differences between the actions of the USEPA and EC were attributable to differences in each country's approach towards phosphates. First, the Canadian federal government had already enacted a ban on phosphates in 1970 as a provision in the then-new Canada Water Act. One factor was the confidence of decision-makers in the conclusion of Canadian scientists and the IJC that phosphorus was the limiting, or most critical, nutrient for eutrophication. Second, there seemed to have been a consensus on the Canadian side that either using a substitute or less phosphate in detergents was acceptable. Third, the provinces were hardly in a position to object to the ban, which would reduce the cost of removing phosphorus for the sewage treatment systems under their jurisdiction.[75] In contrast, U.S. lawmakers were less confident in the science behind the belief that phosphorus was such a problem.

By the time the 1972 Agreement was signed, Canada had already negotiated the Canada-Ontario Agreement (COA). Essentially, the Canada-Ontario Agreement provided that Ontario would implement the obligations set out in the 1972 Agreement if the federal government paid for the needed capital improvements to update the provincial sewage treatment facilities. The Canada-Ontario Agreement, (which has been renegotiated every five to six years since its creation,) highlights the fact that, in Canada, federal environmental initiatives must be carried out in conjunction with the provinces to be successful. Although there is consultation and cooperation with the states in the U.S., the federal-provincial role is unique. In addition to the fact that provincial governments traditionally have jurisdiction over such areas as natural resources, land use, and most wildlife conservation, the fact that Ontario is the only province to border the Great Lakes gives Ontario a naturally larger role to play in terms of the GLWQA. Therefore, although the Ontario Region of EC officially takes the lead in implementing the Agreement on the Canadian side of the border, the Ontario Ministry of the Environment plays a very large role.

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[75] Ibid., 21.

Although in Canada only the federal government can negotiate international agreements on environmental issues, federal-provincial cooperation is required because the provinces have the bulk of legislative authority needed for implementation. This, therefore, gives the provinces (Ontario) more of a voice in implementation of the Agreement. Although the federal government is solely responsible for implementation, analysis of implementation efforts in Canada can virtually begin and end with the actions of Ontario.

In comparison to the United States, the bulk of environmental authority in Canada lies with the provinces. There are a few different reasons for this. First, although the Canadian constitution leaves all residual powers to the federal government, it also gives ownership of nearly all public lands to the provinces. This has strengthened the presumption that the protection of natural resources is a provincial matter.[76] Second, with fewer provinces in Canada than states in the U.S., the voice and concerns of each individual province will carry more weight. In the case of the Great Lakes, 37 percent of the Canadian population resides in Ontario.[77] Finally, the federal-provincial environmental relationship is affected by the party discipline tradition in Canada. Whereas the United States' legislative system contains a separation of powers and therefore weak party discipline, Canadian legislators are more accountable to the executive branch that will be charged with implementation of policy.

Role of the IJC

The actual role of the International Joint Commission in the implementation of the Agreement has been the subject of some confusion. Although there are some who regard the IJC as the body responsible for the Agreement's implementation, this is clearly not the case. The GLWQA, in reference to the Boundary Waters Treaty, gives the IJC the following responsibilities:

1. To collate and analyze data provided by the parties about Great Lakes water quality;

2. To collect, analyze, and distribute information about effectiveness of programs intended to achieve the Agreement's water quality objectives;

3. To advise the parties about water quality problems, with specific recommendations for programs, legislation, or intergovernmental agreements needed to correct them;

[76] Harrison, 67.
[77] Ibid., 69.

4. To assist coordination of joint activities including consultation on "special situations";

5. To assist coordination of research, including advice on research to federal, state, and provincial agencies;

6. To carry out investigations for references from the Parties, including the two references attached to the Agreement: the Pollution from Land Use Reference concerning nonpoint source pollution, and the Upper Lakes Reference on pollution problems of Lake Huron and Lake Superior;

7. To make at least an annual report to the federal, state, and provincial governments and to the public about progress toward the Agreement's objectives, including assessment of the effectiveness of programs, with supplemental special reports on water quality problems at any time;

8. To publish reports on its activities under the Agreement at its discretion; and

9. To exercise authority for independent verification of data and information submitted by the parties.[78]

The Boundary Waters Treaty established the International Joint Commission as an organization designed to resolve disputes and to avoid conflicts that "would inevitably arise between two sovereignties sharing both a continent and a frontier of continental dimensions."[79] In addition to the specific powers under the 1909 Treaty, the IJC provides a procedure for monitoring and evaluating progress under the GLWQA. For this purpose, two standing advisory boards are called for in the Agreement. The Water Quality Board is the principal advisor to the Commission and consists mainly of high-level managers from federal, state and provincial agencies selected equally from both countries. Its responsibilities include evaluating progress being made in implementation of the Agreement and promoting coordination of Great Lakes programs among the different levels of government. The Science Advisory Board consists primarily of government and academic experts who advise the Water Quality Board and the IJC about scientific findings and research needs. The Council of Great Lakes Research Managers, in addition to the Science Advisory Board, was established to provide effective guidance, support and evaluation for Great Lakes research programs. Both groups have substructures involving special committees, task forces and working groups to address specific issues.

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[78] IJC, *The Great Lakes Water Quality Agreement of 1978,* Article VII.

The primary role of the IJC is to oversee the process as an independent binational agency. The presence of such an agency is a unique feature of the Great Lakes Water Quality Agreement. The formal role includes the investigatory function under Article 6, which contained two references. One reference called for examination of remedial actions needed for the Upper Great Lakes (Superior and Huron). The second led to the establishment of a "Pollution from Land Use Activities Reference Group" (PLUARG) to investigate pollution from non-point sources such as runoff from land and, more recently, airborne sources.

Newly acquired responsibilities for the IJC include collection and verification of water quality data and analysis of the effectiveness of government programs. The IJC was also charged with advising the governments about new problems and solutions to existing problems, as well as coordinating binational activities of the parties, as represented by USEPA and Environment Canada. Finally, the IJC was to assist in coordination of research and to inform the public about water quality.[80]

Although the IJC biennially releases a comprehensive report aimed at summing up the past two years' progress under the Agreement, the IJC has been criticized for having little real power. Many feel that the recommendations made by the IJC are ignored by the Parties. This should be kept in mind when applying Mazmanian and Sabatier's variables to this case, as this could be interpreted as lack of support from sovereigns.

Role of the Public

From 1972 to 1978, the IJC made annual reports on progress. From 1978 onward, the Commission has, (with some exceptions,) reported every two years.[81] Since 1975, prior to the drafting of its report, the IJC has held public meetings to receive formal reports from the boards and to discuss the boards' recommendations before it develops its own progress report to the governments. Although members of the audience were allowed only to observe in the earliest meetings, public involvement in the activities of the IJC has increased over time. The increase in public involvement however has had

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[79] Department of State, "The Boundary Waters Treaty of 1909."
[80] IJC, *The Great Lakes Water Quality Agreement of 1972*, Article 7.
[81] *Note:* The Third Biennial Report on Great Lakes Water Quality was delayed until 1986, when a fourth report should have been released.

more to due with citizen demands for such involvement than with the Parties' desires to involve outsiders.

Before the GLWQA, the IJC reported to the governments and, except for public hearings to gather information, generally did not consult with nongovernmental organizations or private parties. Basing its recommendations in part on direct response to the views and wishes of the public and on consultation beyond the advisory boards is a major change in the operation of the IJC in the 1990s. Initially, the audience was allowed only to observe the presentation of board reports and discussion between the boards and IJC commissioners. Later, written questions were submitted during the exchange, and still later special sessions were scheduled to obtain public comments.[82]

By the mid-1970s, several environmental organizations had established special Great Lakes programs and regularly lobbied on behalf of Agreement-related actions. For example, The Lake Michigan Federation worked for phosphate detergent bans in Chicago, Indiana, Michigan, and Wisconsin. The League of Women Voters had a Lake Erie Interleague Committee in Ohio and a four-state interleague group for Lake Michigan, and local league members usually covered IJC meetings wherever they occurred.[83] The Sierra Club formed a binational Great Lakes Committee of member volunteers to develop policy recommendations to the group's U.S. national board of directors and then established a Great Lakes program within its Midwest regional office in Madison, Wisconsin. Later, the Sierra Club was to take the lead in establishing a Great Lakes advocacy presence in Washington, D.C.[84]

Environmental groups in Canada were neither as large nor as affluent as those in the U.S. for a number of reasons. Obviously, the population base is very different. The Parliamentary system of government in Canada does not lend itself to many of the lobbying techniques used in the United States. Further, many of the now-established environmental groups were just finding their feet in the early 1980s. Groups that became very influential, such as Pollution Probe, the Canadian Environmental Law Association, and the Canadian Institute for Environmental Law and Policy, all were formed in 1969 or

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[82] Botts and Muldoon, 30.
[83] Ibid.
[84] The Sierra Club website, available from http://www.sierraclub.org/; Internet; accessed 10 October 2000.

1970, compared to U.S. groups such as the Sierra Club, which was formed in the late 1890s.

CHAPTER 3

CASE STUDY 1: CONTAMINATED SEDIMENT

The next two chapters will examine case studies that will illustrate where the differences lie between GLWQA implementation in Canada and the United States. Specifically, this chapter will look at how each country has addressed the problem of contaminated sediment in the Lakes. After reviewing the objectives of the Agreement in regards to contaminated sediment, and discussing the most recent Biennial Report from the IJC, we will analyze each country's efforts to address the problem of contaminated sediment. Several challenges to contaminated sediment remediation exist including limited funding, regulatory complexity, lack of a decision-making framework, limited corporate involvement, insufficient research, and limited public support. Keeping in mind the variables discussed in chapter one, we will discuss aspects of each county's implementation efforts that speak to those variables, specifically those variables in which variation exists between Canada and the U.S. As we will see in this chapter, the success of each country in remediating contaminated sediment correlates directly with the amount of money they have been able to spend on such efforts. As Mazmanian and Sabatier have pointed out, "allocation of financial resources" is one of the major variables affecting successful implementation. Although both countries have remediated only a small percentage of known sediment, the U.S. has come further faster.

The Problem of Contaminated Sediment

There is a consensus among diverse sectors in the Great Lakes Basin (e.g., government, industry, non-governmental organizations, Remedial Action Plan groups) that contaminated sediment is a major cause of environmental problems and a key factor in many of the impairments to beneficial uses of the Great Lakes. All 42 Great Lakes Areas of Concern have contaminated sediment based on application of chemical guidelines.[85] Contaminated sediment is a major problem currently being addressed in Remedial Action Plans (RAPs) and Lakewide Management Plans (LaMPs), and is known to be an issue in other areas of the Great Lakes Basin.

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[85] IJC, Great Lakes Water Quality Board, Sediment Priority Action Committee, *Overcoming Obstacles to Sediment Remediation in the Great Lakes Basin*, 1997.

Contaminated sediment was first noticed as a serious environmental problem in the early 1970s.[86] Bottom sediment in many harbors and rivers and in the Lakes is poisoned by a variety of persistent toxic substances. Contaminants accumulate in sediments because many contaminants in water cling to suspended particles and fall to the bottom. Thus, contaminated bottom sediment is indicative of past loadings of contaminants to the Lakes. Contaminated sediment is associated with other ecosystem problems, including tumors in bottom fish.[87] They serve as a home for contaminants that are eventually recycled into the food web though resuspension or uptake by bottom-dwelling organisms. Contaminated sediment increases the costs of navigational dredging, owing to the added costs of handling and disposing of toxic materials. In some locations, contamination of bottom sediment has delayed navigational dredging for years.[88] Concern has also been expressed regarding effects, including cancers, of toxic sediments on humans consuming fish from contaminated areas or engaging in water-contact activities.[89] Of all the environmental problems associated with the health of the Great Lakes, contaminated sediment is arguably one of the most complex and most difficult to rectify, as well as the one problems whose elimination is most directly linked to public expenditures to do so.

The Agreement and Contaminated Sediment

The Agreement enunciates, somewhat vaguely, objectives in regards to contaminated sediments in the Great Lakes. In Annex 14 of the Agreement, (added in 1987,) the following objectives are stated:

> *The Parties shall, in cooperation with State and Provincial Governments, identify the nature and extent of sediment pollution of the Great Lakes System. Based on these findings, they shall develop methods to evaluate both the impact of polluted sediments on the Great Lakes System, and the technological capabilities of programs to remedy such pollution. Information obtained through research and studies pursuant to this Annex shall be used to guide the development of Remedial*

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[86] USEPA, *Moving Mud: Remediating Great Lakes Contaminated Sediments*; (A Report on the Sediment Assessment and Remediation Program in the Great Lakes Basin,) Great Lakes National Program Office, 1997.
[87] Ibid.
[88] *Report to Congress on the Great Lakes Ecosystem*, (EPA 905-R-94-004, 1994.)
[89] IJC, *Overcoming Obstacles*, p. 6.

Action Plans and Lakewide Management Plans pursuant to Annex 2, but shall not be used to forestall the implementation of remedial measures already under way.[90]

The Agreement also commits the Parties to biennially evaluate surveillance programs and technology programs, as well as report biennially to the IJC on the overall progress in implementing Annex 14. It is important to note that this Annex of the Agreement does not actually bind the Parties to remediate, or remove contaminated sediment from the Lakes. It simply commits the Parties to determine the extent of the sediment problem and to develop methods to "evaluate" (not eliminate) the problem of contaminated bottom sediment. Therefore, the inability of either Party to remediate sediment may not necessarily signify a failure by the Party to meet the objectives of the Agreement. What should be noted is that contaminated sediment poses problems in efforts to restore 11 of the 14 use impairments specified in Annex 2 of the Agreement. (See Table 1.) It should also be noted that the failure of the Agreement to actually commit the Parties to sediment remediation is seen by many as a major shortcoming of the Agreement, and is probably a major reason that progress related to sediment remediation has been so slow.

The problem of contaminated sediment is actually part of the larger problem of persistent toxic substances, many of which are found in contaminated bottom sediment. Along with Annex 14, Annex 12 of the Agreement, (which directly addresses persistent toxic substances,) and Annex 15 (on airborne toxic substances,) all led to the creation of the Great Lakes Binational Toxics Strategy. Signed in April of 1997, the Great Lakes Binational Toxics Strategy, (BNTS) established a collaborative process between the Parties and stakeholders to address the goal of virtual elimination of targeted persistent toxic substances in the Great Lakes basin.[91] The Binational Toxics Strategy calls for three processes to accomplish its goals: substance-specific workgroups, stakeholder forums and an integration workgroup. Meetings with stakeholders are held twice a year to encourage an open process on Binational Toxics Strategy implementation, and the Integration Workgroup meets merely to discuss issues that are not covered by the substance-specific workgroups. The success of the Binational Toxics Strategy, however,

[90] IJC, *The Great Lakes Water Quality Agreement of 1978,* Annex 14 (1).
[91] IJC, *Tenth Biennial Report,* 24.

relies mainly upon the work of the substance-specific workgroups, and inevitably upon the cooperation of point-source target groups.

The Tenth Biennial Report (2000) and Contaminated Sediment

The Tenth Biennial Report criticizes, among other things, the Parties' efforts to eliminate the problem of contaminated sediments in the Lakes. The report states, "actions required for dealing with contaminated sediment in Great Lakes communities are proceeding far too slowly due to inadequate funding."[92] The IJC acknowledges in the Report that sediment remediation is a large-scale and high-cost problem, and that the problem will only be adequately addressed when the governments commit "large amounts of money" to remediation efforts.[93] With only 2.4 percent of known contaminated sediment remediated in the U.S., and only 0.2 percent in Canada, the IJC concludes in the Report that a more long-term and binational program is needed to adequately address the problem.[94]

The IJC made the following recommendations in the July 2000 report:

- Development of a long-term binational program is needed to address the full scope of the contaminated sediment problem.
- Programs and costs should be made public.
- Timetables for implementation should be made public.
- Adequate resources should be provided to implement programs in accordance with timetables.
- Biennial progress reports should be issued.

It is clear throughout the report that the major issues related to contaminated sediment remediation are time and money. A lack of funding however is an indicator of a larger problem of lack of commitment from implementing agencies to obtain funding. This, too, is dependent upon public support for such programs.

U.S. Implementation Efforts

Efforts by the United States to address the problem of contaminated sediment are directed by two separate, yet similar statutes. In addition to the 1978 Great Lakes Water Quality Agreement, *The Federal Water Pollution Control Act Amendments of 1972*

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[92] Ibid, ii.
[93] Ibid.
[94] Ibid., 19.

declare, as a national goal, that all waters of the United States be made clean enough for fishing and swimming. The Clean Water Act (which is the common name given to the amended The Federal Water Pollution Control Act of 1972) seeks to secure "water quality which provides for the protection and propagation of fish, shellfish, and wildlife, and provides for recreation in and out of the water."[95] Although it is not mentioned by Mazmanian and Sabatier as a variable for analysis, the strength of what I call "supporting statutes" has an effect on the successful implementation of the Agreement. This is also one area on which Canada and the U.S. would most definitely differ in terms of success or failure of Agreement implementation, as supporting statutes differ in the two countries.

Whereas the GLWQA does not specifically charge the U.S. with removing contaminated bottom sediment from the Lakes, section 188(c)(3) of the Clean Water Act, (added by the CWA amendments of 1987,) authorized the EPA to "...carry out a five-year study and demonstration projects relating to the control and removal of toxic pollutants in the Great Lakes, with emphasis on the removal of toxic pollutants from bottom sediment."[96] The 1987 Clean Water Act amendments also specified five U.S. Areas of Concern as requiring priority consideration in conducting the demonstration projects, (Saginaw Bay, Sheboygan Harbor, Grand Calumet River, Ashtabula River, and Buffalo River.) To fulfill these requirements, the Great lakes National Program Office initiated the Assessment and Remediation of Contaminated Sediments (ARCS) Program.

From the beginning of the ARCS program, USEPA recognized that involvement from a wide and diverse range of actors would be necessary for the program to be successful. With that in mind, USEPA sought participation from several federal and state agencies, universities, and public interest groups. (Table 2 gives a listing of participating ARCS program organizations.) The ability of the United States to involve this wide range of stakeholders in addressing contaminated sediment has helped them in meeting the Agreement's objectives.

The ARCS Program was developed with the following goals:

- Assess the nature and extent of bottom sediment contamination at selected Great Lakes Areas of Concern;

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[95] *Moving Mud: Remediating Great Lakes Contaminated Sediments*, 3.
[96] USEPA, *Assessment and Remediation of Contaminated Sediments (ARCS) Program: Final Summary Report*, GLNPO (EPA 905-S-94-001, 1994,) p. 5.

- Demonstrate and evaluate the effectiveness of selected remedial options, including removal, immobilization, and advanced treatment technologies, as well as the "no action" alternative; and
- Provide guidance on contaminated sediment problems and remedial alternatives in the Areas of Concern and other locations in the Great Lakes.

In developing and assessing cleanup approaches, the ARCS program placed an emphasis on developing solutions that were "technologically and economically feasible."[97] Recognizing the financial resource limitations of the various Areas of Concern, the ARCS program sought to develop cleanup strategies that would be fiscally possible to carry out.

In order to meet the above-mentioned goals of the ARCS program, the following issues were identified as necessary to be addressed:

- Determining whether, and if so to what extent, sediments are contaminated with substances that are harmful and/or bioavailable to benthos, fish, wildlife, and/or humans;
- Defining the three-dimensional boundaries of a sediment contamination problem;
- Identifying available remedial alternatives, what their limitations are, and how effective they are likely to be;
- Determining the environmental impacts that might result from a remedial action; and
- Determining the economic costs associated with implementing remedial actions.

Action began in 1990, with the first Field Assessments being completed by November of that year. The first demonstrations were completed by November of the following year at the Buffalo River Area of Concern. By October of 1992, sediment remediation demonstrations had been completed at all five selected Areas of Concern.

The five pilot projects highlighted four general points related to sediment remediation. First, an "integrated sediment assessment approach,"[98] (using chemical analyses, toxicity testing and benthic community surveys,) would be necessary to accurately define the extent of contamination at a specific site. Second, risk assessment

[97] Ibid., 7.
[98] Ibid., 8.

and modeling activities are valuable in determining potential impacts of various remediation techniques. Third, there are a number of different technologies that are effective in removing or destroying contaminated sediment. Finally, the ARCS Program found that broad public involvement and education are necessary in order to develop an adequate understanding of the problem and in assessing the impacts of remedial actions.

As of 1998, the USEPA had undertaken sediment remediation projects at 33 different sites, with plans to remediate sediment at 15 additional sites in the near future.[99] The greatest obstacle to remediating sediment at such sites is cost. The total cost of remediating sediment at the 33 USEPA sites was over $480 million, with an average cost of $15 million per site.[100] Furthermore, that breaks down to a cost of $279.12 (USD) per m^3 of remediated sediment. Even with this amount of money being spent on sediment remediation, the United States has managed to remediate just slightly over 2 percent of known sediment.[101] This shows how much the contaminated sediment issue is affected by funding availability.

Of the USEPA's 48 sediment remediation sites, 18 of those were located within one of the 28 U.S. Areas of Concern, as recognized by the IJC.[102] Each of those eighteen sites is administered somewhat differently, and under a different authority. Most of the sites are administered by a variety of groups including federal and state EPA, university research groups and corporations. The role that each of these groups plays in the administration of each site varies. For example, the lead implementation agency at the Waukegan Harbor site is Region 5 of USEPA, with the principal polluter, Outboard Motor Company (OMC), being responsible for establishing a trust to implement the cleanup via a 1989 Consent Decree. At the Upper Rouge River site, the burden of funding the cleanup effort fell on the state of Michigan, because the principal polluter, Evan's Products Company, filed for bankruptcy.

The remediation site located at the Massena Area of Concern is administered in yet a slightly different manner. The site, known as the "ALCOA site," had been used by

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[99] USEPA, *Realizing Remediation: A Summary of Contaminated Sediment Remediation Activities in the Great Lakes Basin*, GLNPO, 1998, p. 7.

[100] *Note:* Average based on 32 sites, as costs of remediating sediment at the Sheboygan Harbor site were "unknown" in the 1998 report.

[101] IJC, *Tenth Biennial Report,* 19.

[102] *Source:* Most current figures as published by the USEPA in 1998.

the Aluminum Company of America since 1903 for the production of aluminum. For nearly two decades, in the fifties and sixties, ALCOA was responsible for polluting the site with PCBs, potliner, and other hazardous wastes.[103] USEPA issued an Administrative Order under Superfund in 1989 to ALCOA for study and remediation of the St. Lawrence River and Grasse River sediment, (located to the north and to the south of the ALCOA site, respectively.) ALCOA is responsible for 8.5 miles of the Grasse River before it connects to the St. Lawrence. Although the site is not on the National Priorities list, USEPA is responsible for the cleanup of the Grasse River portion of the site.[104] The New York State Department of Environmental Conservation is the lead agency on soil remediation at the site. In 1995, ALCOA began remediation with the removal of approximately 3,500 cubic yards of sediment from a hotspot on the Grasse River. As of 1998, total cost for remediation at the site had totaled $4.8 million (USD,) with an unknown amount expected to be spent for future remediation efforts.[105]

The most recent information published by the USEPA on sediment remediation efforts pertains to the Black River site, located within the Black River Area of Concern in northeastern Ohio. The site is home to the USX/Kobe Steel Company, which has been responsible for polluting the river with polynuclear aromatic hydrocarbons (PAHs), which are found, in high concentrations, in steelmaking coke-plant wastes.[106] In 1979, USEPA sued USS Lorain, (the former name of USX/Kobe,) on the grounds that USS Lorain was in violation of its National Pollution Discharge Elimination System permit issued under the U.S. Clean Water Act. By terms of a 1980 Consent Decree, USS agreed to pay a $4 million (USD) penalty, $1.5 million of which was to be spent on a dust suppression program at the site.

Under their agreement with USEPA, USX began dredging Black River sediment that was contaminated with PAHs in December of 1989, with most of the dredging taking place between July and December of 1990.[107] Studies of Black River sportfish in 1992 and 1993 showed increased levels of tumors (an indication of high PAH levels,) thus

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[103] USEPA, *Realizing Remediation*, 39.
[104] *Note:* Generally speaking, USEPA is only responsible for cleaning up sites listed on the National Priorities list.
[105] USEPA, *Realizing Remediation*, 39.
[106] Ibid, 41.

affirming the belief that dredging redistributes PAH contaminated sediment. However, 1994 studies showed a dramatic reduction in the numbers of tumors found in Black River bullhead. This evidence supported the hypothesis that although dredging is responsible for an initial redistribution of contaminants to sportfish, the long-term environmental and biological benefits of dredging outweigh the initial costs.

In summation, the United States' efforts to address the problem of contaminated are strengthened by three characteristics. First, the United States has been able to secure federal funding for sediment remediation projects. Helping substantially in this sense is the US "Superfund" program, which has made millions of dollars available for pollution clean-up projects such as those carried out in the Great Lakes. Second, the United States has done a good job holding principal polluters responsible for sediment remediation, by legally forcing them to help "foot the bill" for remediation. Third, the US has done an excellent job involving a wide range of actors in their sediment remediation programs. The ability of the US to successfully draw upon the technical and research expertise of US universities has enabled them to come much further in establishing a variety of remediation options to be used.

Canadian Implementation Efforts

In 1989, the Canadian government honored its commitment to the 1987 Protocol to the GLWQA by launching its five-year, $125 million Great Lakes Action Plan (GLAP.) From the Action Plan Fund, $55 million was allocated to the Cleanup Fund to assess and remediate contaminated sediment in Areas of Concern.[108] In 1994, the Great Lakes Action Plan was replaced by the Great Lakes 2000 Program. The Cleanup Fund was extended and subsequently renamed the Great Lakes Cleanup Fund. Although the name has changed, the goal of the Great Lakes Cleanup Fund has remained the same: to help Areas of Concern (and subsequently Remedial Action Plan teams) achieve their environmental targets. The Great Lakes Cleanup Fund does this through granting funds to various groups and companies who wish to undertake specific cleanup projects.

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[107] USEPA, "Health of Bullhead in an Urban Fishery After Dredging," January 2000, available from http://www.epa.gov/glnpo/sediments/bullhead/report.html; Internet; accessed 3 February 2001.
[108] Environment Canada website; available from http://www.on.ec.gc.ca/search/metadata.cfm?; Internet; accessed 3 February 2001.

Several programs were implemented to address protocols for assessing contaminants in sediment and for the development of technologies to remove and treat the contaminated sediment. The program focusing on technologies for the removal of sediment is the Remediation Technologies Program (RTP). A key aspect of this program is the transfer of technology between agencies and organizations potentially faced with sediment removal.

The goal of the Remediation Technologies Program is to identify and demonstrate suitable techniques that have a wide application for the efficient removal of contaminated sediments primarily in Areas of Concern in the Great Lakes Basin.[109] It is expected, however, that once demonstrated, these technologies will have applicability to contaminated sediments in non-Areas of Concern as well as to routine navigational and recreational dredging projects. This goal is being achieved through the development of promising new technologies to a pilot plant stage that can then be subjected to field-testing and evaluation to verify performance and cost data.

The specific objectives of the Remediation Technologies Program are to:

- Identify and develop an inventory of existing sediment removal technologies;
- Assist in the development of new and innovative sediment removal technologies; and
- Carry out field demonstrations at selected sites for the removal of contaminated sediment.[110]

The main Canadian program to address contaminated sediment to grow out of the Cleanup Fund was the Contaminated Sediment Treatment and Technology Program (CoSTTeP.) Began in 1990, CoSTTeP was Canada's immediate response to the mandate set forth by the 1987 Protocol to the GLWQA. The mandate of CoSTTeP was to foster the development and demonstration of "ex-situ"[111] technologies to remediate contaminated sediment, to assist the Remedial Action Plan teams in implementing sediment remediation projects, and to communicate the results of the program to persons

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[109] Ibid.
[110] Ibid.
[111] *Note:* The term "ex-situ" means that only technologies working above the water with dredged sediment were considered.

involved with Great Lakes remediation projects.[112] Funds were provided to CoSTTeP from the Cleanup Fund and were used to sponsor technology demonstration projects and to provide advice to the Great Lakes Cleanup Fund and Remedial Action Plan teams on a variety of issues.

At the start of the Great Lakes 2000 Cleanup Fund, five Areas of Concern were known to have serious contaminated sediment problems. The sites were located at Thunder Bay Harbour, St. Mary's River, Hamilton Harbour, Welland River, and Toronto Harbour. These five sites were picked for sediment-remediation technology demonstrations and samples were then taken from each site to be used for bench-scale tests by potential vendors.[113] The sediment at the five selected sites was found to be contaminated with at least one of the following contaminants; oil and grease, polycyclic aromatic hydrocarbons (PAHs,) or heavy metals. Technologies selected for demonstration therefore had to address one of those contaminants. Any technology was eligible for funding if it had excellent technical merit, was innovative and had the potential to treat Great Lakes contaminated sediment in a cost-effective manner.

Proposals for technology demonstrations were each scored on a 100-point scale. The cost and "technical feasibility" of each proposal were worth twenty points. Six other factors in consideration, (procedural feasibility, adherence to Terms of Reference, ability of firm, environmental regulatory status, timetable, and sampling and analysis plan,) were each worth ten points. Normally, CoSTTeP (through funding from the Clean-up Fund,) would cover up to one-third the cost of the proposed project selected. However, in the case of 29 of the 33 bench-scale technology demonstrations, Great Lakes Cleanup Fund provided up to 80% of the funding.[114]

The first technology demonstrated under CoSTTeP was demonstrated by Eco Logic Thermal Destructor at both Hamilton Harbor and Thunder Bay in 1990.[115] The thermal reduction (alternate thermal) technology demonstrated addressed PAHs, PCBs and chlorinated biphenyls at those sites. By 1996, 32 additional demonstrations would

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[112] Environment Canada, *Contaminated Sediment Treatment Technology Program Final Report*, Great Lakes 2000 Cleanup Fund, p. 5.
[113] Ibid.
[114] Ibid., 9.
[115] *Note:* It is important to note that the same technology was demonstrated by Eco Logic at the Sheboygan River site under the U.S. ARCS Program in the same year.

take place, using bioremediation, chemical treatment, metal removal, and various pre/post treatments. By the conclusion of CoSTTeP, the following important conclusions could be made in regards to sediment remediation efforts in both Canada and the United States:

- Sediment is, by it's very nature, difficult to treat because sediment is wet, fine-grained and often contains a variety of substances that make it hard to work with.
- Sediment treatment technologies have a hard time competing with landfill options as land filling usually costs less than treatment.[116]
- The cost of sediment treatment usually increases with more stringent treatment criteria. In other words, the cleaner one wants the sediment being treated, the more it will cost.

CoSTTeP could be viewed as the Canadian equivalent to the ARCS Program in the United States as the two programs are in many ways similar. During the course of both the ARCS Program and CoSTTeP, the two countries worked closely together and shared all results.[117] Similar to the United States' ARCS Program, Canada's CoSTTeP began in 1990 as a response to the 1987 Protocol to the GLWQA. Both programs were exploratory in nature and served as "trial and error" programs to decide which remediation technologies were suitable for future use. Representatives from the ARCS Engineering and Technology Work Group were invited to participate in selected meetings of CoSTTeP, and vice versa.[118] Staff from the two programs frequently visited demonstration sites on both sides of the border, and the manager of the Engineering and Technology Work Group and the manager of CoSTTeP conferred frequently to avoid duplication of effort.

Summation of Sediment Remediation Efforts

It is clear, as was pointed out in the IJC's Tenth Biennial Report, that the major obstacle to accomplishing the goal of sediment remediation in the Great Lakes is that of funding. The United States has arguably been more successful in remediating sediment, as they have remediated twelve times as much of their sediment than Canada.[119] This "accomplishment" is overshadowed however by the fact that in the 15 years since the

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[116] Ibid.
[117] Environment Canada, *Contaminated Sediment Treatment,* 6.
[118] Ibid, 8.
[119] IJC, *Tenth Biennial Report,* 19.

addition of the Contaminated Sediment Annex to the Agreement, the two countries, combined, have only remediated 1.5 percent of known contaminated sediment in the Lakes.[120]

Implementing agencies in the U.S. have also had more success in obtaining funding for sediment remediation programs. When we compare the two primary sediment remediation programs in the two countries, ARCS and CoSTTeP, we see a major difference in funding. It should also be noted that the United States has been relatively more successful in obtaining the cooperation of industry/"target groups" in remediating sediment. In almost all of the ARCS's sediment clean-up sites, the principal polluter provided at least partial funding for the clean-up efforts. This is mostly involuntary, however, on the part of the polluting industries, but speaks to the relative strength and efficiency of the United States' regulatory framework. Finally, U.S. implementing agencies benefit from the strength of supporting statues, such as the Clean Water Act, and the Superfund program. Funding to sediment remediation programs in the U.S. is obtained primarily under the auspices of the Clean Water Act or the Superfund program.

[120] Ibid., 20.

Table 1 - A summary of use impairments potentially associated with contaminated sediment and the numbers of Areas of Concern with such use impairments.

USE IMPAIRMENT	HOW CONTAMINATED SEDIMENT MAY AFFECT USE IMPAIRMENT	NUMBER OF AREAS OF CONCERN WITH THE IMPAIRED USE (N=42; % in parentheses)
Restrictions on fish and wildlife consumption	Contaminant uptake via contact with sediment or through food web	36 (86%)
Degradation of fish and wildlife populations	Contaminant degradation of habitat; contaminant impacts through direct sediment contact; food web uptake	30 (71%)
Fish tumors or other deformities	Contaminant transfer via contact with sediment or through food web; possible metabolism to carcinogenic or more carcinogenic compounds	20 (48%)
Bird or animal deformities or reproduction problems	Contaminant degradation of habitat; contaminant impacts through direct sediment contact; food web uptake	14 (33%)
Degradation of benthos	Contact; ingestion of toxic contaminants; nutrient enrichment leading to a shift in species composition and structure, due to oxygen depletion	35 (83%)
Restrictions on dredging activities	Restrictions on disposal in open water due to contaminants and nutrients, and their potential impacts on biota	36 (86%)
Eutrophication or undesirable algae	Nutrient recycling from temporary sediment sink	21 (50%)
Degradation of aesthetics	Resuspension of solids and increased turbidity; odors associated with anoxia	25 (60%)
Added costs to agriculture or industry	Resuspended solids; presence of toxic substances and nutrients	7 (17%)
Degradation of phytoplankton or zooplankton populations	Toxic contaminant release; resuspension of solids and adsorbed contaminants, and subsequent ingestion	10 (24%)
Loss of fish and wildlife habitat	Toxicity to critical life history stages; degradation of spawning and nursery grounds due to siltation	34 (81%)

Table 2 ARCS Program Participating Organizations[121]

Federal	U.S. Environmental Protection Agency U.S. Army Corps of Engineers U.S. Bureau of Mines U.S. Department of Energy U.S. Fish & Wildlife Service U.S. Geological Survey National Oceanic & Atmospheric Admin.
State/Local	Erie County Department of Environment & Planing Illinois Natural History Survey Indiana Department of Environmental Management Michigan Department of Natural Resources New York State Dept. of Environmental Conservation Ohio Environmental Protection Agency Wisconsin Department of Natural Resources
Academic	The Citadel DePaul University Memphis State university Michigan State University Saginaw Valley State University State University College at Buffalo State University of New York at Buffalo University of California at Santa Barbara University of Michigan University of Minnesota University of Wisconsin at Milwaukee Wright State University
Additional	Ashtabula Remedial Action Plan Citizens Committee Atlantic States Legal Foundation Battelle Marine Science Laboratory Buffalo Remedial Action Plan Citizens Committee Canada Center for Inland Waters Environment Canada Grand Calumet Task Force Great Lakes United Lake Michigan Federation Michigan United Conservation Clubs National Water Research Institute (Canada) National Wildlife Federation Saginaw Bay Alliance Sheboygan Remedial Action Plan Citizens Committee Sierra Club Smithsonian Institution Wastewater Technology Centre (Canada)

[121] USEPA, *Assessment and Remediation*, 6.

CHAPTER 4

CASE STUDY 2: AIRBORNE TOXIC SUBSTANCES

In this chapter, we will examine how each country has addressed the problem of airborne toxic substances. As in the last chapter, we will first look at how the Agreement structures objectives for airborne toxin reduction and then look at how the IJC has critiqued the Parties' efforts in recent Biennial Reports. We will then examine implementation efforts binationally, in the United States and in Canada. As was the case with contaminated sediment, differences exist in terms of regulatory framework and funding. The two countries have also differed over the years in the "strictness" of their respective clean air legislation. This chapter will illustrate those differences.

The Problem of Airborne Toxic Substances

The Canadian public interest group Pollution Probe summarized, rather bluntly, the problem of airborne toxic substances in a 1986 report stating: "for decades humans have used the atmosphere as a garbage dump. Almost anything that could be spewed out a smoke stack was discarded into the sky."[122] Although industries on both sides of the border had been emitting pollutants into the atmosphere for decades, it wasn't until the 1980s that the problem of air pollution was brought to the forefront of international policy. Research began to prove that almost everything (with the exception of a few gases) that went into the atmosphere eventually found its way back to earth. Never was this fact more evident than with the problem of acid rain, which served as a major irritant to the Canada-U.S. relationship in the eighties.

The air is but one pathway by which toxins find their way into the Great Lakes. However, unlike direct point source pollution, airborne toxic substances are much harder to track, and even more difficult to control. Even if we stopped the discharge of PCBs, mercury and dioxins into the atmosphere now, the toxic fallout of these pollutants will last for centuries. Once they fall to the earth, they continue to move through the ecosystem, through plants, animals, soil and water, until they are released back into the atmosphere only to repeat the cycle.[123]

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[122] Pollution Probe, *The Great Lakes Primer* (Toronto: Pollution Probe Foundation, 1986,) 46.
[123] Ibid., 47.

The problem of airborne toxic substances has forced the Parties to redefine the necessary scope of their implementation efforts, as airborne toxins originate from both local and very distant sources. How will each country, for example, meet the challenge of regulating emissions from coal-fired power plants in Tennessee or Manitoba? How successful will each country be in regulating emissions from fossil fuel powered vehicles? How well do the Parties' own domestic clean air regulations reduce the effects of persistent toxic substances like mercury and dioxins on the Great Lakes? These questions, and others, illustrate the complexity of the airborne toxic substance problem in Canada and the United States.

The Agreement and Airborne Toxic Substances

The Agreement addresses the problem of Airborne Toxic Substances in several ways. Particularly, Annex 15 (added in 1987) states the objectives related to the monitoring and surveillance of airborne toxins that are deposited in the Great Lakes. Some of the key components of Annex 15 include:

- The calling for increased research activities to determine the pathways and effects of airborne toxic substances on the Lakes.[124]
- The establishment, as part of the Great Lakes International Surveillance Plan (GLISP,) of an Integrated Atmospheric Deposition Network (IADN) for the purpose of determining the atmospheric loadings of toxic substances to the Great Lakes. The Agreement charges the Parties to identify which toxic substances should be monitored, decide upon the location of monitoring stations and set up a timetable for the completion of the construction of the monitoring stations.
- The mandate that the Parties shall eliminate "sources of emissions of persistent toxic substances in cases where atmospheric deposition of these substances...significantly contributes to pollution of the Great Lakes System."[125] The Parties are also charged with encouraging the development of pollution control technologies to eliminate airborne toxin deposition.

In addition to Annex 15, Annex 12 requires the Parties to establish monitoring and research programs that are able to "identify...the sources of input of persistent toxic

[124] IJC, *The Great Lakes Water Quality Agreement of 1978,* Annex 15, (2).
[125] Ibid., (5)(a).

substances."[126] In regards to mercury, (which is one of the most problematic airborne toxins,) Annex 1, which sets specific objectives for eleven inorganic substances, states that the concentration of total mercury in a filtered water sample should not exceed 0.2 micrograms per litre.

As called for in Annex 15, the Integrated Atmospheric Deposition Network, (IADN,) has been in operation since 1990. The mandate of the Integrated Atmospheric Deposition Network is reflected in the Canada Ontario Agreement, section 112(m) of the U.S. Clean Air Act Amendments of 1990, and in the 1997 Binational Great Lakes Toxics Strategy.[127] The basic goals of the Integrated Atmospheric Deposition Network are three-fold: to determine the loadings of priority toxic chemicals to the Great Lakes; to acquire air precipitation and concentration measurements; and to help determine the sources of those chemicals. The objectives set forth in the first implementation proposal for the Integrated Atmospheric Deposition Network were met relatively successfully. It is important to note however that the Integrated Atmospheric Deposition Network is simply a data gathering body. Although its findings are essential and helpful in reducing the amount of airborne toxins in the Lakes, the Integrated Atmospheric Deposition Network does little in terms of actually developing or enforcing clean air standards.

The Tenth Biennial Report and Airborne Toxic Substances

The past three IJC Biennial Reports have specifically addressed airborne toxic substances as a major problem hindering the success of the Agreement. The Eighth Biennial Report, released in 1996, pointed out that from 1992 to 1994, although water emissions by member companies were halved, almost 99 percent of the emissions from Canadian Chemical Producers' Association members were reported to be in the air.[128] That Report also pointed out that 73 percent of total releases from manufacturing in the Great Lakes basin were emitted into the air.[129] It is important to note however that emissions from electric power utilities and municipal incinerators – arguably the biggest contributors to the airborne toxin problem – were not factored into that figure.

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[126] Ibid., Annex 12, (4)(c).
[127] *Second Implementation Plan for the Integrated Atmospheric Deposition Network, 1998-2004*, Great Lakes Regional Program Office, 1998, p. 3.
[128] IJC,*Eighth Biennial Report on Great Lakes Water Quality*, 1996, 19.
[129] Ibid.

The Ninth Biennial Report, released in 1998, further highlighted the problem of electric utility and vehicle emissions in controlling airborne toxins. The Report highlighted the fact that toxic substances released into the air from fossil fuel combustion "continue to threaten human and ecosystem health."[130] The Report cited deregulation of the power industry in the U.S. and reconfiguration of the industry in Ontario as possible reasons for increased mercury contamination in the Lakes. The report recommended that the Parties develop a comprehensive strategy for altering established energy production and use patterns.[131] The most recently published Biennial Report, released in July 2000, discussed some problems with the Integrated Atmospheric Deposition Network. As the Report points out, mercury – one of the Lakes' most persistent toxic substances – evaporates easily, and thus requires regional monitoring. However, the Integrated Atmospheric Deposition Network does not currently include mercury among the measured pollutants.[132] The original reason for this was the relative cost of mercury analysis of air samples. The Report points out, however, that given recent advancements in analytical technology, mercury should be included. If the Integrated Atmospheric Deposition Network included mercury, the Mercury Workgroup could then estimate loadings of mercury to the Great Lakes, "thereby assessing the ecosystem effects of its reduction efforts."[133]

US Implementation Efforts

In order to better understand how each country has addressed the issue of deposition of airborne toxic substances in the Great Lakes, we must look at how each country has been able to create and implement clean air regulations within their respective countries. In comparison to Canada, the United States has had a much more centralized system for regulating toxic air emissions, with the federal government playing a large role. Air pollution control in the United States occurs primarily under the authority of the Clean Air Act (originally enacted in 1970.) The Act requires the federal government to set National Ambient Air Quality Standards (NAAQS) for listed pollutants. In addition to the standards set forth in NAAQS, the Prevention of Significant

[130] IJC, *Ninth Biennial Report on Great Lakes Water Quality*, 1998, 25.
[131] Ibid.
[132] IJC, *Tenth Biennial Report,* 22.

Deterioration (PSD) program was created to maintain air quality in areas where the air is already cleaner than the national standards.[134] Therefore, areas of the U.S. that already have clean air will continue to have clean air, rather than be "brought down" to the national standard.

When the Clean Air Act was passed in 1970, it gave the USEPA the authority to list pollutants that would be regulated. In section 112 of the Act, Congress required the EPA to set "health based" emission standards for hazardous air pollutants, but prohibited the EPA from considering evidence of implementation costs and technological feasibility in setting a "safe" or "acceptable" emission standard.[135] This was in sharp contrast to other sections of the Act, such as section 111, which required the EPA to consider costs and technological feasibility in setting emission standards for new sources of nonhazardous pollution.[136] The strict wording of section 112 was likely, in some ways, a product of the U.S. separation of powers, which enables Congress to write strict legislation while passing the burden of implementing that legislation to the executive branch.

The original goal of the 1970 Clean Air Act (CAA) was to achieve NAAQS in every state by 1975.[137] By 1977, most states had failed to meet the new standards, which prompted the federal government to begin work towards amending the Act. The 1990 amendments to the Clean Air Act were intended, in part, to address previously undressed air pollution issues such as acid rain, ground level ozone and mobile source pollution.[138] However, the primary reason for the amendments was the almost complete failure of section 112 to control Hazardous Air Pollutant emissions. The old section 112 imposed standard setting requirements that were so strict that the EPA tried not to use it, resulting in just seven regulated Hazardous Air Pollutants (HAPs.)[139] The new section 112 became

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[133] Ibid., 25.
[134] George Hoberg, *Comparing Canadian Performance in Environmental Policy,* in David Thomas, ed., Canada and the United States: Differences that Count, (Peterborough: Broadview Press, 1993), 105.
[135] Dwyer, John, "The Pathology of Symbolic Legislation," *Ecology Law Quarterly* 17 (May 1990) : 235.
[136] Ibid., 237.
[137] USEPA website; available from http://www.epa.gov/region5/defs/html/caa.htm; Internet; accessed on 25 June 2002.
[138] Ibid.
[139] Reitze, Arnold J. and Randy Lowell, "Control of Hazardous Air Pollution," *Boston College Environmental Affairs Law Review* 28 (2001): 247.

much more complex, establishing a two-tiered regulatory approach consisting of two parts. The first component consists of developing technology-based standards (the "maximum achievable control technology" standards, or MACTs.) The second component was a risk-based approach to assess the success of the MACT standards.[140] This new approach made it much easier for the EPA to impose standards on industry. Under the old section 112, the EPA maintained that the "health-based" standards were so stringent that most industries could not keep their doors open and adopt the standards.[141]

Under the MACT approach, categories of sources are required to develop control technologies that are based upon the best available technology currently in use in the United States. This discourages a "race to the bottom," as many argued was the case under the original Clean Air Act. As of August 2000, the USEPA had issued 45 MACT standards under section 112 of the Clean Air Act.[142]

Section 112(m) of the Clean Air Act specifically directs the USEPA, (in cooperation with the National Oceanic and Atmospheric Administration,) to "identify and assess the extent of atmospheric deposition of air pollutants to the Great Lakes, the Chesapeake Bay, Lake Champlain, and coastal waters, collectively known as the Great Waters."[143] Under the USEPA's "Great Waters Program," many programs under the complementary federal environmental laws are coordinated. An example would be the pulp and paper mill industry's "cluster rule" which, for the first time, integrates, coordinates, and streamlines applicable requirements of the Clean Water Act and the CAA.[144] The ability of the U.S. to streamline efforts under various environmental laws has strengthened their efforts to control airborne toxic substances.

Section 112(b)(2) allows the EPA to regulate a list of pollutants that present a threat of adverse human health effects or adverse environmental effects due to ambient concentration, bioaccumulation, or deposition.[145] It also allows the EPA to add pollutants to that list over time. Mercury, one of the most persistent toxic substances in the Great

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[140] Ibid.
[141] Dwyer, 235.
[142] USEPA website; available from http://www.epa.gov/oar/oaqps/takingtoxics/p1.html#8; Internet; accessed on 26 June 2002.
[143] USEPA website; available from http://www.epa.gov/air/oaqps/gr8water/3rdrpt/execsum.html; Internet; accessed on 26 June 2002.
[144] Ibid.
[145] The Clean Air Act, section 112(b)(2), 42 U.S.C. section 7412(b)(2) (1994.)

Lakes, is one of the 188 regulated substances under section 112 of the Clean Air Act. The United States has taken a number of recent actions to reduce mercury pollution. Once fully implemented, these actions will reduce nationwide mercury emissions by 50 percent of 1990 levels. U.S. domestic actions include:

- Ninety percent reduction in emissions from municipal waste incinerators, which accounted for 20 percent of total mercury emissions in 1990.
- Ninety-four percent reduction in emissions from medical waste incinerators, which accounted for 24 percent of total mercury emissions in 1990.
- Fifty percent reduction in emissions from hazardous waste incinerators, which accounted for 2.5 percent of total mercury emissions in 1990.[146]

It should be noted that emissions regulations for coal-burning power plants, the single biggest source of mercury emissions, have not yet been established. The USEPA plans to have standards set for utilities by 2004. It should also be noted that the U.S. was able to reduce the demand for mercury by 75 percent from 1988 to 1997.[147]

The Clean Air Act was significant in the way that it shaped the federal-state environmental relationship. The Act placed a great amount of emphasis on national standards, including sources of hazardous air pollutants. The specific wording of the Act gave Congress greater powers in regulating and specifying procedures.[148] It also marked the beginning of a period where the federal government played a "hierarchical" role relative to the states in environmental policy.[149]

Canadian Implementation Efforts

Unlike the United States, Canada does not have a stand-alone clean air act. However, that is not to say that there is not a framework for regulating air toxics in Canada. Most of the efforts to control airborne toxics in Canada are carried out under the authority of the Canadian Environmental Protection Act (CEPA) of 1999. According to Environment Canada (EC,) the goal of the renewed CEPA of 1999 is to "contribute to

[146] USEPA website; available from http://www.epa.gov/mercury/information.htm#questions; Internet; accessed on 27 June 2002.
[147] Ibid.
[148] Harrison, 51.
[149] Ibid.

sustainable development through pollution prevention and to protect the environment, human life and health from the risks associated with toxic substances."[150]

Prior to CEPA, air toxics were essentially controlled under the 1971 Canadian Clean Air Act. The 1971 Act gave the federal government the authority to set non-binding guidelines for air quality.[151] Binding air quality standards, and the regulations to achieve them, were issued by the provinces.[152] Therefore, Canada's ability to set basin-wide standards for air emissions was hindered not only by the non-binding nature of the federal guidelines, but also by the differences that existed between provincial standards.

The 1971 Clean Air Act gave the federal government the ability to set nationwide emissions standards for pollutants that "pose a significant danger to the health of persons." However, by 2000 this provision had only been used four times in 25 years, with virtually all emission standards being set by the provinces.[153] The most prominent exception was that of automobile emission standards, which were set by the federal Minister of Transportation under the Motor Vehicle Safety Act.[154] Despite this fact, Canada lagged behind the United States for years with auto emission standards that were, in some places, seven times less stringent than the U.S. standard.[155]

The cornerstone of the 1999 Canadian Environmental Protection Act is a focus on *pollution prevention*. CEPA is a complex piece of legislation that consolidated selected provisions and laws administered by Environment Canada. It replaced the Environmental Contaminants Act of 1975, and subsumed the Clean Air Act, the Ocean Dumping Act, the nutrient provisions of the Canada Water Act and certain provisions of the Department of the Environment Act.[156] CEPA's chief importance is that it provides a framework for the management and control of toxic substances at each stage of their life cycle, from development and manufacture/importation through to transportation, distribution, use, storage and ultimate disposal as waste.

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[150] Environment Canada website; available from http://www3.ec.gc.ca/EnviroRegs/Eng/SearchDetail.cfm?intAct=1001; Internet; accessed on 26 June 2002.
[151] Hoberg, *Comparing Canadian Performance*, 105.
[152] Ibid.
[153] Ibid.
[154] Ibid.
[155] Ibid.
[156] Canadian Parliament website; available from http://www.parl.gc.ca/common/Bills_ls.asp?lang=E&Parl=36&Ses=1&ls=C32&source=Bills_House_Government#Clauses%2090; Internet; accessed on 26 June 2002.

While CEPA is administered by Environment Canada, both Environment Canada and Health Canada are involved in the assessment of substances to determine whether they are toxic, and in the development of regulations, objectives, guidelines and codes of practice.[157] CEPA requires the Minister of the Environment to create a National Advisory Council, consisting of representatives from the provinces and various Aboriginal governments, to advise the Minister on matters related to the implementation of CEPA. This body replaced the former Federal-Provincial Advisory Committee established under CEPA 1988, and possesses a broader mandate. CEPA is consistent with the Canada-Wide Accord on Environmental Harmonization signed by the federal, provincial (except Quebec) and territorial governments in 1998.

CEPA gives the federal government the authority to control toxic substances in Canada. The Minister of the Environment and the Minister of Health, together, make the decision as to which substances are placed on the "toxic substances list.[158] The Act also directs the Minister to develop a "Virtual Elimination List" of substances targeted for virtual elimination and to establish "levels of quantification" for those substances.[159] In section 65 of CEPA, that level is defined as "the lowest concentration that can be accurately measured using sensitive but routine sampling and analytical methods."[160] The government has seven years to complete the review process and determine which substances should be placed on the Virtual Elimination List.

In addition to CEPA, toxics are also regulated by the Canada-wide Standards. Set under the framework of the Canada-wide Accord on Environmental Harmonization, the Standards sub-agreement is a framework of cooperation for federal, provincial and territorial environmental Ministers to set national environmental quality standards. The Standards are not legally binding, and jurisdictional authority is not altered by the Standards.

Mercury, a major cause of Great Lakes pollution, is one of eight substances for which Canada-wide Standards exist. Mercury is also a listed toxic substance under CEPA. There are actually two Canada-wide Standards for mercury, and a third being

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[157] Ibid.
[158] Ibid.
[159] Environment Canada website; available from http://www.ec.gc.ca/ceparegistry/the_act/part5_a.cfm; Internet; accessed on 27 June 2002.

developed. Standards exist for mercury from base metal smelters and incinerators, and for mercury-containing lamps and mercury from dental amalgam wastes. A CWS for mercury emissions from coal-fired electric power generation is currently under development.[161]

The Canada-Ontario Agreement, which has major implications for the Great Lakes, also contains provisions for mercury reduction. The most recent Canada-Ontario Agreement, effective March 2002, calls for an 85 percent reduction in mercury releases, compared to releases in 1988, by 2005 and a 90 percent reduction by 2010.[162] The primary means by which these goals will be realized is through the successful implementation of Canada-wide Standards for mercury emissions form coal-fired power plants.

Binational Implementation Efforts

Many of the two countries' efforts to reduce airborne toxins, like the Agreement as a whole, are binational in design. Even with binational programs such as the Integrated Atmospheric Deposition Network however, differences exist across borders. For example, the implementation of the Integrated Atmospheric Deposition Network is coordinated by five cooperating agencies: the USEPA in the United States; and Environment Canada's Atmospheric Environment Service, National Water Research Institute, Ecosystem Health Division of Ontario Region, and the Ontario Ministry of Environment in Canada.[163] This means that the management of the Integrated Atmospheric Deposition Network's implementation plan is spread out among four different agencies in Canada. The U.S. therefore has an easier time carrying out its responsibilities in regards to the Integrated Atmospheric Deposition Network.

The Great Lakes Binational Toxics Strategy, 1997

In order to analyze each country's efforts to reduce airborne toxins, we must put them in the broader picture of persistent toxic substances. The Great Lakes Binational

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[160] Ibid.
[161] CCME website; available from http://www.ccme.ca/initiatives/standards.html?category_id=4; Internet; accessed on 27 June 2002.
[162] Ontario Ministry of the Environment website; available from http://www.on.ec.gc.ca/coa/agreement_e.html; Internet; accessed on 27 June 2002.
[163] *Second Implementation Plan for the Integrated Atmospheric Deposition Network*, 3.

Toxics Strategy was created in 1997 as a response to the 1987 Amendments to the Agreement. The stated objective of the Strategy is as follows:

> *...to restore and protect the Great Lakes, the purpose of this binational strategy (the Strategy) is to set forth a collaborative process by which Environment Canada (EC) and the United States Environmental Protection Agency (USEPA), in consultation with other federal departments and agencies, Great Lakes states, the Province of Ontario, Tribes, and First Nations, will work in cooperation with their public and private partners toward the goal of virtual elimination of persistent toxic substances resulting from human activity, particularly those which bioaccumulate, from the Great Lakes Basin, so as to protect and ensure the health and integrity of the Great Lakes ecosystem.*[164]

The BNTS is designed to serve four related functions: gather information, analyze current regulations and initiatives that manage and control substances, identify cost-effective options to achieve further reductions, and implement actions to work toward the goal of virtual elimination.

The BNTS, unlike the Agreement, has laid out specific "challenges" for each country, to move towards the realization of the goal of "virtual elimination" of persistent toxic substances, including airborne toxins. For example, the BNTS challenges the United States to "confirm by 1998, that there is no longer use of alkyl-lead in automotive gasoline," and challenges Canada to "seek by 2000, a 90 percent reduction in use, generation, or release of alkyl-lead consistent with the 1994 Canada-Ontario Agreement."[165] The BNTS has been effective in the sense that it has been able to set clear goals for the reduction of persistent toxic substances while respecting the uniqueness of each country.

In November of 2001, the IJC's Water Quality Board released a report that reviewed the progress of the parties under the BNTS. Although the report concluded that many of the overall objectives of the BNTS have been achieved, it highlighted several areas where the Parties have fallen short. For example, the report pointed out deficiencies by the Parties to provide baseline data for several specific toxic

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[164] Binational Executive Committee, *The Great Lakes Binational Toxics Strategy: Canada – United States Strategy for the Virtual Elimination of Persistent Toxic Substances in the Great Lakes*, 1997, p. 1.
[165] Ibid., 8.

substances.[166] Without baseline data, there is no way to measure progress. The United States has failed to provide baseline data for dioxins / furans and Canada has yet to provide baseline data for PCBs.[167]

The report went on to site several areas where Canada has either failed to collect data, or failed to make data available to the public. The report states that the BNTS's website is "outdated and contains largely American data and information."[168] The most recent BNTS progress report (February 2001) reports that there has been a 25% reduction between 1990 and 1995 of mercury emissions in the U.S. but does not provide any information on Canadian progress in meeting its challenge.[169] Whether true or not, this gives the perception that there has been no progress made by Canada in meeting its challenges. When Canadian information *is* made available, it is sometimes confusing, as the following excerpt from the progress report points out:

> *"...The 1999 BTS progress report reported that Canada had achieved a 61% reduction in HCB releases. Similarly, we calculated that there had been a 67% reduction in releases in HCB between 1988 and 2000, which is within the range reported in 1999. The 2001 BTS progress report states that the Canadian government has achieved a 60-90% reduction in HCB releases, which seems to be a rather large range considering the other two figures are in the 60-70% range. What does this range mean?"*[170]

It is difficult to compare how each country has fared in meeting the specific challenges stated in the 1997 BNTS. In general, the challenge year targets are 2000 for Canada and 2006 for the United States, (with a few exceptions.) Thus, the United States still has four years to fully meet most of its challenges. What can be concluded at this point however is that Canada has failed to meet many of its challenges. Canada has not met the challenge targets for B(a)P, HCB, mercury, dioxins / furans, or OCS. Table 3 shows where Canada has fallen short in meeting its challenges for 2000. Although

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[166] IJC, *Review of Progress Under the Canada – United States Great Lakes Binational Toxics Strategy: A Report to the Great Lakes Water Quality Board by the Progress Review Work Group*, 13 November 2001, Part II, Section 1, III., 5.
[167] Ibid.
[168] Ibid., Part II, Section 1, III, 3.
[169] Ibid.
[170] Ibid.

Canada has not met most of its challenges, it should be noted that significant reductions have been made.

Great Lakes Regional Air Toxic Emissions Inventory

One of the major binational initiatives to address airborne toxic substances in recent years was the creation of the Great Lakes Regional Air Toxics Emissions Inventory. The purpose of the Inventory was "to present researchers and policy makers with detailed, basin-wide data on the source and emission levels of toxic contaminants."[171] As the last IJC Biennial Report pointed out, there has been a need for the Parties to improve emissions inventories. Having a thorough and comprehensive emissions inventory is an essential first step in eliminating or reducing emissions of certain toxic substances.

Work towards the creation of the Great Lakes Regional Air Toxic Emissions Inventory (hereafter refereed to as "the Inventory") began in 1986, with the signing of the Great Lakes Toxic Substances Control Agreement. The Great Lakes Toxic Substances Control Agreement stated, "The States agree to cooperate in quantifying toxic substances loadings originating from all sources."[172] It should be noted that the Great Lakes Toxic Substances Control Agreement was an initiative of the U.S. states. Although Ontario eventually signed the Great Lakes Toxic Substances Control Agreement in 1987, the U.S. was responsible for getting the project off the ground.

Initial funding for the creation of the Inventory was secured in 1989 from the Great Lakes Protection Fund.[173] The Great Lakes Protection Fund was created in 1989 by the Governors of the Great Lakes states to support programs that improve the health of the Great Lakes ecosystem. The Great Lakes states initially pledged $97 million to create the permanent endowment.[174] To date, the Fund has allocated $37 million to regional programs, and has given back $32 million to Great Lakes states for local clean-up

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[171] Great Lakes Commission website; available from http://www.glc.org/air/overview.html; Internet; accessed 29 April 2002.
[172] Council of Great Lakes Governors, *The Great Lakes Toxic Substances Control Agreement of 1987*; available from http://www.cglg.org/pub/toxics/index.html; Internet; accessed 30 April 2002.
[173] Great Lakes Regional Air Toxic Emissions Inventory website, available from http://www.glc.org/air/timeline.gif; Internet; accessed 30 April 2002.
[174] Great Lakes Protection Fund website, available from http://www.glpf.org/; Internet; accessed 30 April 2002.

programs. In addition to aiding the creation of the binational Inventory, the Fund has helped numerous local and regional initiatives in the United States.

Although the Inventory is officially referred to as a binational initiative, it is clear after examining the origins and the initial funding of the Inventory that the United States was the driving force behind its creation. It was the Governors of the Great Lakes states that created the agreement that led to the creation of the Inventory, and it was the Governors that helped secure the private funding to bring the inventory to fruition. The case of the Great Lakes Regional Air Toxic Emissions Inventory illustrates how differences in private funding availability and philanthropic tradition can affect policy outcomes.

The Case of Mercury

Binational activities by the Parties to reduce mercury emissions are coordinated by the Mercury Workgroup, which is an initiative of the Binational Toxics Strategy. Although the Workgroup is binational in nature, the overwhelming majority of information available on the Workgroup's website is related to U.S. mercury reduction efforts. As was stated before, this could give the perception that there simply are not activities underway in Canada to address mercury. This ability of the United States to make information readily available to the public is one strength of its mercury reduction efforts.

In 1998, the Mercury Workgroup issued a report titled "Mercury Reduction Activities Reported from Around the Great Lakes." The stated purpose of that report was to describe "a diverse array of activities that have been undertaken by local, industrial, non-profit, Tribal, First Nation, State, Provincial, or Federal entities in the Great Lakes Basin and which are responsive to the goals and objectives of the Binational Toxics Strategy (BNTS)."[175] The report highlighted specific actions that had been taken by the Parties to reduce mercury in the Lakes. However, the report contained only one Canadian and one binational "success story." The remaining 37 "success stories" highlighted U.S. activities. The report also highlighted the variety of initiatives and the variety of partnerships undertaken in the U.S. The United States has been successful in

[175] USEPA, *Mercury Reduction Activities Reported from Around the Great Lakes*, available from http://www.epa.gov/glnpo/bnsdocs/stakeholders1198/mercsuccess.html; Internet; accessed 5 May 2002.

creating mercury awareness programs at the state, local and tribal levels; has successfully involved municipal sanitary disposal offices and various groups from industry in mercury recycling and disposal initiatives; has involved General Motors, Chrysler and Ford in reducing production of mercury-based parts in their automobiles; and has effectively partnered with the electric industry to reduce mercury emissions from various power plants.[176]

Differences also exist in availability of funding for mercury reduction programs. The United States benefits from a vast array of funding opportunities, through government and private sector grants. For fiscal year 2001, the USEPA listed 34 potential sources of funds for mercury related projects.[177] In contrast, Environment Canada's website listed 19 general funding programs, of which approximately 11 could be solicited for mercury related projects.[178] Therefore, the United States would seemingly have an easier time obtaining funding for projects intended to reduce the presence of mercury.

A thorough comparison of each country's mercury reduction efforts should also make mention of the role that non-profit citizens groups play in each country. Both Canadian and U.S. public policy is shaped by pressure from citizen groups. In regards to mercury, however, the United States has a slight advantage over Canada. This is due, in large part, to the influence of the Mercury Policy Project in the United States. The Mercury Policy Project is a non-profit organization created solely for the purpose of shaping and monitoring mercury policy in the U.S. The group works to promote policy that eliminates mercury use, reduce the export of mercury, reduce exposure to mercury, and educate the public about mercury exposure.[179] No equivalent organization exists in Canada. As Mazmanian and Sabatier have pointed out in their framework for implementation analysis, public support, (which in this case manifests itself in the form of a mercury-specific citizens' organization,) is an important variable in the success or failure of a given policy's implementation.

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[176] Ibid.
[177] USEPA website, available from http://www.epa.gov/glnpo/seahome/resources/funding_sources2001.htm; Internet; accessed 30 April 2002.
[178] Environment Canada website, available from http://www.ec.gc.ca/fund_e.html; Internet; accessed 30 April 2002.

Summation of Airborne Toxic Substance Reduction

As was the case with contaminated sediment in the previous chapter, what Mazmanian and Sabatier call "socioeconomic conditions," in this case the availability of funding, significantly affects each country's ability to address the problem of airborne toxic substances. This was evidenced by the following examples in this chapter:

- The IADN failed to include mercury among its list of pollutants because, until recently, mercury sampling was very expensive.
- According to recent reviews of the BNTS, Canada has done a poor job of making information available on its websites, and to the IJC in general. This is most likely due to a lack of funding for staff to compile and report such information. The fact that U.S. information is more readily available indicates that the U.S. has greater amount of money with which to fund such efforts.
- The failure of the Unites States and Canada to provide baseline data for certain toxins to the BNTS review board most likely stems from a lack of domestic funding for such research, than from a lack of desire to meet the objectives of the BNTS.
- The United States was able to take the lead role in the creation of the Great Lakes Regional Air Toxic Emissions Inventory due to available funding from such sources as the Great Lakes Protection Fund.
- In the case of mercury, there are easily twice as many funding sources for mercury reduction initiatives in the United States as in Canada. This is due to greater financial resources of both the public and non-profit sectors in the U.S.
- Although both countries' domestic air toxics frameworks are quite strong on paper, the U.S. apparently has more of a commitment to the programs specifically carried out under the mandate of the Great Lakes Water Quality Agreement.

Unlike the problem of contaminated sediment however, funding alone does not dictate the success or failure of each country to address airborne toxic substances. The Parties implementation efforts are affected by their own domestic air pollution control

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[179] The Mercury Policy Project website, available from http://www.mercurypolicy.org/; Internet; accessed 30 April 2002.

efforts. Differences in "supporting statutes" such as the U.S. Clean Air Act and the Canadian Environmental Protection Act affect policy outcomes. The ability of the United States to set binding ambient air quality standards has not only affected U.S. air emissions to date, but will continue to do so in the future. To use Mazmanian and Sabatier's terminology, it took Canada over twenty years to get sufficient "support from sovereigns" to enact tougher, more binding air quality standards. The fact that the federal government played the lead role in environmental policy in the U.S. facilitated a more centralized approach to policy formulation as well as information gathering, which has been a major factor in addressing airborne toxic substances in the Great Lakes.

Table 3

Canadian Toxic Emissions Reductions, 1988-2000, for Selected Toxins[180]

Toxin	2000 Target %	2000 Actual %
B(a)P (Benzo(a)pyrene)	90	44
HCB (Hexachlorobenzene)	90	67
Dioxins / furans	90	79.6
Mercury	90	77.5
OCS (Octachlorostyrene)	100	87
PCB (Polychlorinated biphenyls)	90	unknown

[180] IJC, *Review of Progress.*

CHAPTER 5
CONCLUSIONS

As Mazmanian and Sabatier have stated, thorough implementation analysis should address the following questions:

1. *To what extent are the policy outputs consistent with the official objectives enunciated in the original statute?*
2. *To what extent were the objectives modified?*
3. *What are the principal factors affecting the extent of goal attainment, the modifications in goals and strategies, and any other politically significant impacts?*

In regards to the Great Lakes Water Quality Agreement, question one is difficult to answer. The answers to question one – the degree to which the Parties have met the objectives of the Agreement – serve as the dependent variables by which we measure each country's implementation success. The most recent IJC Biennial Report stated, "the power of the vision of the [Great Lakes Water Quality] Agreement has not been reflected in the two governments' implementation efforts."[181] However, does this mean that the policy outputs of Canada and the U.S. are "inconsistent" with the official objectives in the original Agreement?

Although many of the specific objectives of the Agreement have not been realized by the Parties, the policy outputs have been consistent with the original statute. For example, neither country, arguably, has come as far as they can on the issue of airborne toxic substances. However, that is not to say that the policy they are putting forth in regards to airborne toxic substances is "inconsistent" with the original statute. The question becomes an arguable one because the "official objectives" of the Agreement are rather vague in nature. The vagueness of the objectives is (as we will see later) a major shortcoming of the Agreement itself. However, the Parties themselves should not be to blame for the vagueness of the objectives. The Agreement requires that the Parties stop the discharge of chemicals in "toxic amounts" into the Lakes, yet fails to define "toxic amounts." It also says that the discharge of persistent toxic substances will be "virtually

[181] IJC, *Tenth BiennialReport.*

eliminated" but does not define what is meant by the word "virtually."[182] Therefore, it can depend on one's own definition of such ambiguous words as to whether or not one believes that the official objectives have been met. However, few, if any, actually feel that the objective of virtual elimination has been met.

What *can* be determined is that, where specific objectives exist in the Agreement, the Parties' actions have been consistent with them. Annex 14 of the Agreement, which sets objectives for contaminated sediment, committed the Parties to meet by December 31, 1988 for the purpose of developing a standard approach for the management of sediment. This objective was successfully met. Annex 15, which sets objectives for airborne toxic substances, committed the Parties to establish an Integrated Atmospheric Deposition Network. This objective was also successfully met. Although neither issue was addressed in as timely a manner, or as thoroughly as many would have liked, the Agreement's specific objectives were met by the Parties. The ability of the Parties to meet objectives when specific objectives are articulated raises the question of how the GLWQA may be strengthened if more specific objectives were to be put into the Agreement.

Mazmanian and Sabatier's second component of implementation analysis – determining the extent to which the original objectives were modified – is relatively easy to address in the case of the GLWQA. As was pointed out in Chapter 2, the Agreement has been modified three times since originally signed in 1972. However, the objectives of the Agreement have been strengthened, rather than weakened by these modifications. The 1978 amending of the Agreement added the goals of eliminating a list of approximately 350 toxic substances, and of abatement of industrial and municipal sewage. In 1983, a supplement was added on phosphorus load reduction and 1987 saw the addition of annexes on the establishment of RAPs and AOCs, contaminated sediment, airborne toxic substances and an ecosystem approach to pollution management.

Mazmanian and Sabatier variables

The third aspect of thorough implementation analysis – identifying the factors which affect goal attainment – is best addressed by examining the dependent and independent variables as laid out in Chapter 1. Some of the variables apply to the

[182] IJC, *The Great Lakes Water Quality Agreement of 1978,* Article II (a).

Agreement in general, whereas others allow us to highlight differences that exist between the two countries' implementation efforts. In this thesis, the dependent variables – or the actual policy outputs of the Parties – were discussed in length in chapters three and four. For the sake of relevance, in this chapter we will only mention those variables that lead us to a better understanding of the Parties' implementation of the Agreement.

Tractability of the Problem

One of the biggest problems facing the Parties in implementing the Great Lakes Water Quality Agreement is one of tractability. Some policies are, simply put, relatively easy to deal with. For example, a policy that aims to improve public school facilities has an easily tractable problem. The problems are clear, and the solutions are nearly obvious. In the case of the GLWQA, tractability is a complex issue. The Great Lakes have problems within problems.

Technical Problems

Much of the difficulty in implementing the Great Lakes Water Quality Agreement lies in the challenge of trying to virtually undo decades of pollution of the Lakes. As Mazmanian and Sabatier have pointed out, policy can sometimes give implementing agencies mandates that are technically difficult, (if not all together impossible,) to achieve. For example, Article III of the Agreement, which sets general objectives, commits the Parties to work towards a point where the Lakes are "free from substances...that will adversely affect aquatic life," "free from floating materials such as debris, oil [and] scum," and, "free from materials...that...will produce conditions that are toxic or harmful to humans."[183] The broadness of these objectives then creates a myriad of technical problems for the Parties.

Technical problems include the availability of resources (both financial and technological) to adequately address the problem. This is, in several ways, perhaps the greatest obstacle to achieving the objectives of the Agreement. The absence of adequate technology to fulfill the objectives of the Agreement was evident in both of the case studies discussed in this thesis. The Tenth Biennial Report was critical of the Parties efforts to remediate contaminated sediment saying, "actions required for dealing with

[183] IJC, *The Great Lakes Water Quality Agreement of 1978,* Article III, (a)(b)(d).

contaminated sediment...are proceeding far to slowly."[184] Although arguably true, this is a bit critical given the fact that the Agreement does not obligate the Parties to remediate a certain amount of sediment, nor does it set specific deadlines by which they must develop remediation technologies. Much of the failure of the Parties to move forward with sediment remediation as quickly as the IJC would like stems from the sheer technical enormity of the problem.

Technical problems have also plagued airborne toxic substance reduction efforts. For years, Canada and the United States have struggled to fully track the sources of various airborne toxins. Much of the Parties' efforts have been spent in simply trying to come to a complete understanding of where the various air pollutants, such as mercury and dioxins, originate. Thus, part of the reason why the two countries have yet to sufficiently reduce the deposition of airborne toxic substances into the Lakes stems from the technical complexity of the issue.

Diversity of Target Group Behavior

Mazmanian and Sabatier have stated, "the more diverse the behavior being regulated...the more difficult it becomes to frame clear regulations."[185] This is clearly an issue with the GLWQA. To fully achieve the Agreement's objectives in regards to persistent toxic substances, including airborne toxins, the Parties must find a way to regulate the actions of a very diverse target group. Neither country seems to have an advantage in this area, as both Canada and the United States must deal with a wide range of sources of both point and non-point pollution in the Great Lakes Basin. This is not a "weakness" of the Agreement however, as the nature of Great Lakes pollution requires that the Parties take a "big picture" approach to pollution prevention. It is simply a challenge with which each country will most likely struggle for decades to come.

Target Group as a Percentage of the Population

There are a couple of points worth mentioning in regards to this variable. Mazmanian and Sabatier have stated that the smaller the group adversely affected by a given policy, the easier it will be to mobilize political support around the policy. The question here, however, is "who is the 'target group' affected by the policy?" The

[184] IJC, *Tenth Biennial Report,* 24.
[185] Mazmanian and Sabatier, 23.

obvious members of the target group are the industries directly responsible for Great Lakes pollution. We can refer to them as the "primary" target group. One could go a step further to argue that the target group includes all individuals whose behavior must change for the given policy to be implemented effectively. This could include the individuals who work for a polluting industry, people who drive a car that is partially responsible for air pollution, citizens who receive their power from a coal-burning power plant and vacationers who spend time on the Lakes. We can call these people the "secondary" target group.

The province of Ontario is the primary province affected by the Great Lakes Water Quality Agreement. Approximately 36 percent of Canada's nearly 30 million people live in this province. In contrast, the eight Great Lakes states, (Minnesota, Wisconsin, Illinois, Indiana, Ohio, Michigan, Pennsylvania and New York,) combine to make up only about 29 percent of the U.S. population.[186] Factor into that the fact that many of the largest cities in those U.S. states – New York City, Philadelphia, Pittsburgh, Cincinnati, Minneapolis and Indianapolis – do not sit on or near the Great Lakes. This means that in Canada, the target group is a larger percentage of the population. This likely influences the ability of the federal government to enact strict environmental policies that will affect Ontario. Furthermore, Canada's federal balance-of-power is such that provinces have more control over environmental matters than the federal government.

Extent of Behavioral Change Required

The extent of behavioral change required by target groups in each country is practically the same. However, the United States benefits from a stronger regulatory tradition. U.S. industries are used to the process of having to come into compliance with federal regulations. For example, in Chapter 4 we saw that the United States has become a global leader in auto emissions standards, in spite of the political power that the "big three" automakers have in the U.S. Therefore, although the extent of behavioral change required is the same in each country, the ability of each country to achieve a desired level of change is greatly affected by the strength of its regulatory tradition.

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[186] *The World Almanac and Book of Facts 1999,* (World Almanac Books, 1999,) 380, 773.

Ability of Policy Decision to Structure Implementation

The second set of Mazmanian and Sabatier variables deal with the ability of the policy decision to structure the implementation process. Many of the shortcomings in the two countries' implementation efforts stem from the fact that the Agreement does not clearly structure the implementation process. In the Agreement's defense, this was not intended to be done through the Agreement itself. Rather, the Agreement was intended to guide the Parties in the development of their own domestic policies and programs. It is fair, however, to analyze the ability of the Agreement to structure the implementation process because the Agreement sets forth objectives and commits the Parties to take certain action by certain dates. If the Agreement is going to set forth objectives and desired outcomes, then it should, at least somewhat, attempt to structure the implementation process.

Precision and Clear Ranking of Legal Objectives

Mazmanian and Sabatier state that, when implementing a given statute, "implementing officials must have unambiguous directives."[187] The Great Lakes Water Quality Agreement has been critiqued by many for its relatively vague directives. The Agreement is clearly very powerful and visionary in terms of its objectives, and is designed to push the Parties environmental policy forward for years to come. However, the objectives of the Agreement are almost so broad and all-encompassing that implementing agencies often struggle to develop specific program priorities. The Agreement contains objectives for several key problem areas; contaminated sediment, alien invasive species, airborne toxic substances and contaminated sport fish to name a few. The Agreement does not rank these objectives, however, but leaves it up to the implementing agencies to prioritize issues.

Validity of Causal Theory

Mazmanian and Sabatier have stated:

> *"An adequate causal theory requires (a) that the principal causal linkages between governmental intervention and the attainment of program objectives be understood; and (b) that the officials responsible for*

[187] Mazmanian and Sabatier, 25.

implementing the program have jurisdiction over a sufficient number of the critical linkages to actually attain the objectives."[188]

In regards to (b), the United States has a slight advantage over Canada due to the fact that the U.S. has developed a better environmental regulatory system with the federal EPA and the states. Although the Canadian government has jurisdiction over the critical linkages to attain the Agreement's objectives, Environment Canada lacks the regulatory tradition to make that jurisdiction as effective.

Initial Allocation of Financial Resources

The Agreement states the following in regards to funding: "The Parties commit themselves to seek: The appropriation of funds required to implement this Agreement..." This places the burden on the implementing agencies to determine what the "appropriate level of funding" is to implement what are sometimes quite vague objectives. Throughout this thesis, we have seen that the ability of the Parties to address specific water quality issues is ultimately based on the availability of adequate funding.

As we saw in the case of contaminated sediment, the majority of the Parties' efforts have been in developing the necessary technologies to remediate sediment, which is an extremely costly endeavor. We saw an almost direct correlation between the amount spent on sediment remediation and the percentage of known sediment remediated by each country. Mazmanian and Sabatier have stated, "the level of funding...is proportional to the probability of achieving...objectives."[189] In Chapter 3, we saw that the United States had spent nearly 11 times as much money on sediment remediation than Canada. We also saw that the United States had remediated 12 times as much known sediment. This seems to prove Mazmanian and Sabatier's theory that the attainment of program objectives correlates directly to the amount spent on those programs. Therefore, we could conclude that future success on very cost-contingent issues, such as contaminated sediment, will depend on the amount of financial resources each country is able to spend.

We saw in chapter 4 that efforts by the Parties to address the problem of airborne toxic substances were also greatly affected by adequate funding. The establishment of

[188] Ibid., 26.
[189] Ibid., 26.

the Great Lakes Regional Air Toxic Emissions Inventory stalled until the Great Lakes Governor's (through the Great Lakes Protection Fund) were able to secure funding for its creation. United States' efforts to reduce mercury are also strengthened by the availability of various funding sources for mercury reduction programs in the country. Thus, in both of the case studies examined in this thesis, we saw that funding availability is a major factor, and one from which the United States (in comparison to Canada) has benefited.

Formal Access by Outsiders

The ability of the policy decision to give formal access to outsiders is another factor that affects implementation. Mazmanian and Sabatier point out that actors who are supporters of the policy's legal objectives should be involved. They state "statutes which permit citizens to participate as formal interveners...are more likely to have their objectives attained."[190] The Agreement does stipulate that the public be consulted in all action taken pursuant to Remedial Action Plans and Lakewide Management Plans.[191] It is then up to each individual RAP and LaMP team to determine how they will involve the public. Given the very limited budgets of RAP teams, it is likely that one of the main reasons they have been at all successful has been their ability to involve various outside actors.

We saw in Chapter 3 that the United States was able to bring a diverse group of stakeholders to the table as part of their Assessment and Remediation of Contaminated Sediments (ARCS) program. (See Table 2.) Included in that list were several citizen organizations, such as the Sierra Club, Great Lakes United and the National Wildlife Federation. This is likely one reason that the ARCS program was more successful than Canada's CoSTTeP program.

Non-Statutory Variables

While the actual policy decision influences the success of the implementation process, implementation is also greatly affected by several non-statutory variables. Any statute whose successful implementation is contingent upon adequate funding must benefit, from time to time, from a surge in political support for its objectives. Since the

[190] Ibid., 29.
[191] IJC, *The Great Lakes Water Quality Agreement of 1978*, Annex 2, section 2(e).

Agreement itself does not always provide clear directives to implementing agencies, those implementing agencies are subject to influence from a range of other factors. These include the socioeconomic conditions of the country, or area affected; public support; resources of constituency groups; support from sovereigns; and the skills of implementing officials. These non-statutory variables will inevitably differ between Canada and the United States.

Socioeconomic Conditions and Technology

Mazmanian and Sabatier borrow from Richard Hofferbert in identifying socioeconomic factors that affect policy implementation.[192] It is fair to say that the United States has benefited from a stronger economy in recent decades than has Canada. Mazmanian and Sabatier point out that socioeconomic conditions can affect perceptions of the relevant importance of the problem addressed by the statute, given that various social programs compete for scarce government resources.[193] Socioeconomic conditions become more of a factor given the fact that many of the Agreement's objectives are dealt with at local levels. Therefore, the Agreement is not only affected by economic differences between its two signatories, but also by differences in various localities.

Mazmanian and Sabatier point out that policies that are directly tied to technology, (such as pollution control,) are affected by changes in technological state of art. Although the greater number of universities and research institutions in the United States have led to more pollution control technology being developed in the U.S., this fact is offset by the fact that the two countries have shared technology. The Agreement commits the Parties to exchange technological information in regards to contaminated sediment, and the Parties have done so. (See Chapter 3.) However, it should be pointed out that economic conditions have resulted in the United States taking the lead on many technological development issues related to the Agreement. In Chapter 4, we saw that the U.S., because of greater financial resources, was the driving force behind the development of the Great Lakes Regional Air Toxic Emissions Inventory.

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[192] Richard Hofferbert, *The Study of Public Policy*, (Indianapolis: Bobs-Merrill, 1974.)
[193] Mazmanian and Sabatier, 31.

Support from Sovereigns

Sovereigns can provide support for a given policy through (a) amount and direction of oversight; (b) provision of financial resources; and (c) the extent of new and conflicting legal mandates.[194] Although it is hard to measure (a) in terms of the Agreement, we can make a few observations in regards to (b) and (c.) Sovereigns from both countries have allocated significant amounts of money to Great Lakes programs. Whether the governments have spent enough on Great Lakes pollution could be debated. In the case of airborne toxic substances, we saw in Chapter 4 that the Great Lakes governors took initiative in creating the Great Lakes Protection Fund. This initiative was crucial in the creation of the Great Lakes Regional Air Toxic Emissions Inventory.

U.S. sovereigns have also supported the Agreement through new legal mandates. The Great Lakes governors signed the Great Lakes Toxic Substances Control Agreement in 1986, which, among other things, committed the states to work together in quantifying toxic releases in the Basin. This has helped the states in securing funding for toxic release inventories. The United States' efforts to reduce airborne toxic substances have also been strengthened by the U.S. Clean Air Act, which, (unlike its Canadian counterpart,) has set binding air emissions standards. Although the U.S. Clean Air Act was not created for the expressed purpose of strengthening the Agreement, it has helped nonetheless.

Summary

When analyzing the success or failure of the two countries' implementation efforts, we can do so by asking one of the following two questions: "Was the optimal level of objectives obtained?" or, "Were more of those objectives attained than would have been the case without the Agreement?" The answer to the first question would be "no." As the IJC itself has pointed out in recent biennial reports, the power of the vision of the Great Lakes Water Quality Agreement has not been reflected in the two countries' implementation efforts. Neither country has allocated adequate funding to completely fulfill the objectives of the Agreement. The Agreement itself has failed to adequately structure the implementation process. This stems in part from the Agreement's oftentimes-vague directives. Canada has, in recent years, lagged behind the U.S. in

[194] Ibid., 33.

reporting specific progress to binational groups, such as the Binational Toxics Strategy review board. Both countries have managed to remediate less than 3 percent of the known contaminated sediment, and neither country has fully met the goals laid forth in the Binational Toxics Strategy.

Analyzing the Agreement via the second question would lead us to a different answer. "Were more of those objectives attained than would have been the case without the Agreement?" Although it is speculative to say what would or would not have happened without the Agreement, it is almost impossible to envision the Lakes would be in *better* condition had the Agreement not been signed some thirty years ago. Although the progress of the Parties in meeting the Agreement's objectives has been slow, it is progress nonetheless. We need to remember that the problems facing the implementing agencies did not happen overnight. Nor will their solutions.

Although it is difficult to measure which country has done a better job implementing the Agreement, given the vague objectives by which we have to measure success, we can conclude from the case studies in this thesis that the United States has come further, faster, in meeting the Agreement's objectives. In the case of contaminated sediment, the US has had more success in obtaining funding for sediment remediation programs. The US has done a better job involving a diverse group of actors, including industry, academic and non-profit organizations, in their sediment remediation efforts. Moreover, the United States has been more successful in actually remediating contaminated sediment, as they have remediated almost twelve times as much of known sediment in their country than has Canada.

In the case of airborne toxic substances, the United States has done a much better job making information available to the Binational Toxics Strategy review board. The US has been more successful in meeting the specific goals of the BNTS. The US was able to take the lead in creating the Great Lakes Regional Air Toxic Emissions Inventory, through financial support. Finally, the US has done a better job in securing a variety of funding sources for mercury reduction initiatives.

The case studies of contaminated sediment and airborne toxic substances allow us to make conclusions about the two Parties' implementation of the Agreement, in general, for two reasons. First, the cases are currently two of the most pressing pollution issues in

the Great Lakes, as evidenced by their prominence in recent IJC Biennial Reports. Looking at how the two countries have responded to the most pressing current issues in the Lakes demonstrates their overall commitment to the Agreement's objectives. Second, since the problems of contaminated sediment and airborne toxic substances are addressed in such different manners, they are case studies that allowed us to highlight different independent variables, and more thoroughly utilize Mazmanian and Sabatier's framework for analysis.

Lastly, a note about the using the Mazmanian and Sabatier framework for implementation analysis to analyze the binational implementation of the Great Lakes Water Quality Agreement: There does not exist an analytical framework that is perfectly suited for the type of analysis this thesis worked to achieve. The Mazmanian and Sabatier framework was originally designed to analyze the implementation of domestic US legislation and programs. However, there are factors that come into play when analyzing the implementation of bilateral or multilateral international agreements, such as the GLWQA, that aren't addressed by their framework. Their framework does not lend itself to analyzing the ability of governments to translate international agreements into domestic policy. The interplay between the foreign affairs arm and the domestic legislative branch of government is an important variable that should be analyzed, but is not addressed within the Mazmanian and Sabatier framework. Also, the Mazmanian and Sabatier framework does not emphasize the role that supporting statues play in an agreement's objectives being attained. Furthermore, the framework contains many variables that, although important to implementation, are extremely difficult to quantify.

The Mazmanian and Sabatier framework was sufficient, however, as it is the best available framework to apply to this case. Many political scientists, such as Oren Young, have developed frameworks to analyze the process of formulating international environmental agreements, but there has yet to be a framework specifically designed to analyze the implementation of international environmental agreements. The Mazmanian and Sabatier framework for analysis was sufficient in this case as it allowed for the in-depth analysis of variables essential to the Agreement's implementation. The number and variety of the variables is also helpful, as it enables one to look at a wide range of factors affecting implementation.

Mazmanian and Sabatier have said that all policy goes through the same life cycle of formulation, followed by implementation, then reformulation and again by implementation.[195] It has been fifteen years since the last addition was made to the Agreement. Although future research may show the need for yet another Annex being added to the Agreement, there is no need to alter its core objectives. Canada and the United States need to continue working towards the Agreement's stated objectives, securing political support and subsequently securing additional funding along the way. Citizens groups, in both countries, need to continue to be a force by ensuring that program goals are met in a timely manner. Moreover, all those whose lives are touched by the Lakes must continue to recognize the Lakes for what they are – an invaluable environmental, economic and cultural resource for both Canada and the United States.

[195] Ibid., 8.

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