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The Great Lakes Water Quality Agreement
Its Past Successes and Uncertain Future

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THE GREAT LAKES WATER QUALITY AGREEMENT: ITS PAST SUCCESSES AND UNCERTAIN FUTURE

Short version
by PAUL BOTTS

Based on a report by
LEE BOTTS and PAUL MULDOON

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Preface

This summary presents the chief findings and recommendations resulting from a major report on the effectiveness of the Great Lakes Water Quality Agreement between Canada and the United States.

Active themselves in the community that developed around the Agreement, Lee Botts and Paul Muldoon interviewed over eighty persons, consulted the extensive literature and reviewed key documents in order to understand its history. The purpose of this short version of the full report is to make the results more easily accessible to persons who care about the future of the agreement, which is due for another review by the governments in 1999.

The complete report is available from the Institute on International Environmental Governance of Dartmouth College, the sponsor of the project with the Canadian Environmental Law Association. It would not have been possible without the support of many individuals and institutions. Financial support was provided by the Joyce Foundation, the George Gund Foundation, the C.S. Mott Foundation, the Laidlaw Foundation, the United States Environmental Protection Agency and the Embassy of Canada in the United States. An Advisory Group reviewed the draft report, but the findings and conclusions remain the responsibility of the authors and the project staff.

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Lee Botts and Paul Muldoon
A Summary by Paul Botts

Introduction: A Success Story Still Unfolding

In the 1990s, summer afternoons swimming and bodysurfing along beautiful beaches where the water stretches beyond the horizon are again as natural a part of growing up in the Great Lakes region as white Christmases. Not very long ago, many of those beaches were closed as public health hazards, and not many people were eager to swim there anyway.

In the 1960s, people could see many signs of what news reports called the "death" of Lake Erie. Many citizens, institutions and the governments of Canada and the United States share credit for successes in cleanup and restoration. One ironic side effect of the heroic efforts to reverse the obvious pollution that caused the agreement to be signed is much greater understanding of the "hidden" toxic contamination that is proving much harder to deal with.

Because the Agreement exists the Great Lakes are much better off in many respects than they once were and continuing problems are better understood. These achievements are due mainly to the unique flexibility and to other characteristics of the Great Lakes Water Quality Agreement between Canada and the United States.

Most of the efforts to achieve the objectives of the Agreement came about because a strong community of citizens, scientists and dedicated government personnel came together in the activities

organized by the International Joint Commission (IJC). Environment Canada and the U.S. Environmental Protection Agency are the lead agencies for the governments that are the parties to the Agreement. By sharing information with each other and the legislatures in Ottawa, Washington, the states and provinces, members of the community worked for adoption of new programs and policies necessary to clean up pollution and to make progress against toxic contamination.

Still today, the future of the Agreement and of the lakes is uncertain both because of new problems such as the invasion of exotic species and because the Great Lakes community is not working together as well in the 1990s as it did in the 1970s and 1980s. The 12 recommendations of this report outline measures to keep the Agreement strong to be taken by the lead agencies for two governments that are the parties to the Agreement, by the IJC and by the nongovernmental members of the Great Lakes community. These are the agencies and the people who must continue to work together to restore ecological integrity of the lakes and protect the health of fish, wildlife and people who depend on them.

The story of the Great Lakes Agreement began when scientists and the public became alarmed in the 1950s and the 1960s about the signs of growing pollution.

Sounding the Alarm

From Lake Superior in the west, through Lakes Michigan, Huron, Erie, and Ontario, only about 1 percent of the water in the lakes flows out each year through the St. Lawrence River to the Atlantic Ocean, making this virtually closed system a series of natural sinks to collect pollution due to human activities. In 1909, before pollution had become obvious, Canada and the United States signed the Boundary Waters Treaty. The International Joint Commission was established to advise both governments how disagreements over use of shared waterways could be resolved between neighbors determined to live peaceably in spite of their differences.

By the 1950s, industrialization and urbanization had taken their toll across the system. Sturgeon, certain pike, herring, and other fish species had become extinct or nearly so, and the invading sea lamprey had virtually eradicated the top predator, the prized lake trout. In both Canada and the US, vast natural forests and wetlands had given way to cities and farmlands. Many beaches were closed, and iron mine tailings turned Lake Superior red for miles along the shore. Other wastes from industries that had made the region's economy strong flowed into Lakes Michigan, Erie and Ontario and their tributaries. In 1956, the IJC began a new study of the causes of pollution in Lake Erie, Lake Ontario and the St. Lawrence River.

By the 1960s, huge mats of decaying algae were familiar sights and beaches from Milwaukee to Detroit to Toronto were routinely closed due to bacteria from raw sewage in the water. In 1967 in Chicago, city snowplows scraped dead alewives off the beaches in midsummer. Virtually nothing lived in some rivers flowing into the lakes except certain worms that scientists dryly described as "pollution-tolerant." By the time the Cuyahoga River in Cleveland seemed to burn in 1969 as oil and other residue smoldered on the surface, an infamous newspaper headline that screamed "Lake Erie Is Dying!" stirred up public demand for action in both countries.

In field work for the IJC study, scientists found that phosphorus was the limiting nutrient for eutrophication in Lake Erie and Lake Ontario. Eutrophication is a process by which a lake's natural balance collapses when excess nutrients (in this case, mainly phosphorus) inspire drastic increases in algae population. Algae, like all organic matter, consume oxygen. The most visible result, besides the dead algae themselves, is "dieoffs" of fish.

Public agitation grew after a 1968 oil spill off Santa Barbara, California, coincided with rumors that oil drilling was to begin in Lake Erie. The IJC responded in 1969 with public hearings on results of the pollution study. Recommendations in a 1970 report called for new pollution control programs and ongoing authority for the IJC to coordinate, evaluate and verify the results.

When the two federal governments acknowledged that the pollution problem was inconsistent with the goals of the 1909 treaty, a working group was formed to negotiate an agreement for Great Lakes cleanup. 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.

A Declaration of Interdependence

The Great Lakes Water Quality Agreement is an executive agreement that acknowledges that the two countries depend on each other for the wellbeing of the Great Lakes.

First signed in 1972, the Agreement was revised in 1978 and 1987. The next review of its objectives and terms is due in 1999.The U.S. Environmental Protection Agency (USEPA) and Environment Canada are considered the lead agencies for the two governments.

Activities under the Agreement are monitored by the IJC. The IJC has six members, three from each nation. For technical information and policy advice, the IJC has depended chiefly on boards or special committees to conduct investigations with equal participation from both sides. The members are mainly staff of government agencies with appropriate authority and expertise.

The Agreement calls for two principal standing boards of the IJC. The Water Quality Board is designated as the principal advisor to the Commission. The Science Advisory Board (called the Research Advisory Board until 1978) advises the IJC on science-related matters.

From 1972 to 1978, the IJC made annual reports on progress to the governments. From 1978 onward, the Commission has generally reported every two years. Since 1975, the IJC has held a public meeting to receive formal reports from the boards and to discuss the boards' recommendations before it develops its own progress report. A community of scientists, environmentalists, government agency staffs, politicians and others has grown around the Great Lakes Agreement and is one of its most important results. Participation in activities and events of the IJC is the major reason for the existence of this community.

1972-1978: Basic Cleanup and Reduction of Phosphorus Loadings

The Agreement has evolved in three phases, each with its own character. The first phase was from 1972 to the renegotiation of a new Agreement in 1978. In this period the governments had significant success and strong public support in reducing the phosphorus loadings that were originally conceived to be the chief threat to Great Lakes water quality.

Better sewage treatment, lowering of the phosphorus content of detergents and reductions in runoff of agricultural fertilizers all helped accomplish the main aim of the 1972 Agreement: to change water chemistry enough to reverse eutrophication. From 1972 to 1978, approximately $4.5 billion of US state and federal funds were provided under the Clean Water Act to improve sewage treatment. Funding was also authorized for research and interagency projects to demonstrate alternative waste treatment technologies .

The Army Corps of Engineers was given $5 million to study nonpoint source control from agriculture for Lake Erie. This work led to involvement of the U.S. Department of Agriculture and the beginning of a growing national movement for conservation tillage .

In Canada, the federal government negotiated the Canada-Ontario Agreement (COA) to obtain the cooperation that is required for the Great Lakes because the provinces have the bulk of responsibility for implementation of the Agreement. The first COA that was signed on August 13, 1971, committed $50 million, mostly for improving sewage treatment systems on the Canadian side of the Great Lakes. The Canada Centre for Inland Waters was also created to carry out research obligations.

1978-1987: Learning About Toxic Contaminants

The second phase, from 1978 to the addition of a new protocol in 1987, was dominated by confirmation of the complexity and seriousness of toxic contamination of the ecosystem, and by growing public concern about how this problem could be managed. The new agreement retained the commitment to follow through on phosphorus reduction but called for a pioneering concept called an "ecosystem approach to management." The focus of attention shifted from reduction of phosphorus loadings to a new call for "virtual elimination" of persistent toxic substances that concentrate to higher levels in the food chain within the lakes.

The presence of both DDT, a widely used pesticide, and PCBs (polychlorinated biphenyls), a class of chemicals widely used in industry, in fatty fish tissues had been discovered before the 1972 Agreement was signed. Research in the Great Lakes disclosed the bioaccumulation in the food chain of many additional persistent toxic chemicals, especially certain chlorinated hydrocarbons. These toxic substances were found to be reaching the lakes from many sources, including direct discharges, the atmosphere, and from groundwater.

The importance of atmospheric deposition was confirmed in 1975 when the highest levels of PCBs yet recorded were found in lake trout on remote Isle Royale in Lake Superior. PCBs were not the only problem: the pesticide Mirex was found in Lake Ontario and downstream in the St. Lawrence River.

By the mid-1970s, hundreds of toxic contaminants had been identified in Great Lakes fish and waters, and more were being found all the time. What had been thought to be a "water quality" problem was understood now by officials, scientists, and the environmentalists active in the Great Lakes community to be an air problem, a land runoff problem, a contaminated site problem, and potentially a human health problem.

Progress continued toward reduction of phosphorus loadings, and understanding increased about toxic contamination and its effects in the Great Lakes ecosystem. Through the 1980s, scientific research continued to disclose the problems toxic contaminants could cause for aquatic life, wildlife, and humans. Although monitoring disclosed some decline in PCB levels, they continued to be a major problem because of their pervasiveness and chemical stability.

The Science Advisory Board worked to determine which of the nearly one thousand different toxic chemicals that had been reported in the Great Lakes posed the most danger. Eventually agreement was reached on a list of 11 critical contaminants that continue to be the principal targets for virtual elimination.

As more attention was focused on the effects of exposure to toxic contaminants in the environment, tumors in fish were linked to exposure to polyaromatic hydrocarbons in sediments. Birth defects and reproductive disorders in birds and mammals were found to be associated with exposure to dioxins and other chemicals. By the early 1980s, persons who regularly ate certain fish from Lake Michigan were found to have higher levels of PCBs in their blood. Later research has revealed subtle effects on neurological development of children born to women with high PCBs in their bodies.

The 1972 Agreement had called only for restoration and enhancement "of water quality in the Great Lakes System" by improving water chemistry. The new Agreement of 1978 aimed "to restore and maintain the chemical, physical, and biological integrity of the waters of the Great Lakes Basin Ecosystem." The new version borrowed from the U.S. Clean Water Act in calling for elimination of discharge of toxic substances "in toxic amounts" but went further by calling for their "virtual elimination." Human health was identified as a concern by a broad definition which called substances toxic if they could cause behavior abnormalities "after concentration in the food chain." The 1978 Agreement was the first international accord with such broad goals.

New Canada-Ontario Agreements were negotiated in 1982 and again in 1986. Both essentially continued the same money transfer

structure, with the federal government committing to provide about 15 percent of the costs, the province contributing about 40 percent and the municipalities assuming the balance. Ontario established a new water quality regulatory program called the Municipal-Industrial Strategy for Abatement (MISA). The purpose of the new program was to set technology-based effluent limits that would "virtually eliminate" discharge of toxic substances to the waterways of Ontario.

As involvement of environmental organizations increased in Agreement-related activities, at times state environmental agencies would work with environmental organizations to use the Great Lakes Agreement to prevent weakening of state laws or the water quality standards adopted for compliance with the Clean Water Act. In Indiana, environmentalists cited the Great Lakes Agreement in fighting repeal of the state phosphate detergent ban in nearly every biennial session of the legislature. In Wisconsin, a paper company attempt to weaken PCB discharge limits was defeated.

In the 1980's, the states and Ontario also helped begin Remedial Action Plans. The locations that the Water Quality Board called "Areas of Concern" where objectives of the Agreement were not being achieved. In 1983, a "Master Plan" for cleanup and restoration of the watershed of the Grand Calumet River and Indiana Harbor and Ship Canal in Lake County, Indiana, had been produced by the Indiana Board of Health, Region 5 of USEPA, and the Lake Michigan Federation's Grand Calumet Task Force project. The proposal that such plans be developed for all the Areas of Concern was seen as part of the ecosystem approach called for in the 1978 Agreement.

1987-Present: Struggling With the Next Steps

The third phase, from 1987 to the present, brought major changes in relationships between the parties and the IJC and in the operations of the Agreement's institutions that are still evolving. This period has also been marked by greater industry participation in the community involved in implementation of the Agreement.

In the early 1980s, as another review of the Agreement was being considered, more and more environmental organizations were increasingly dissatisfied with failures to reduce toxic contamination. Great Lakes United, a binational coalition formed across the border in 1983, took the lead in involving citizens in considering what needed to be done. When a new review began in 1986, all sides agreed that the fundamental features of the 1978 Agreement should be preserved, while changes were needed to deal with toxic contamination. For the first time, citizens from both sides were invited to participate in the negotiations as observers.

Most of the changes in the 1987 Protocol amending the Agreement added to or reinforced provisions of the 1978 version, except for the role of the parties (the national governments), and the relationship between the parties and the IJC. The thrust of the new language was that the lead agencies of the parties should pursue joint activities on behalf of the Agreement and communicate with each other directly, rather than through the IJC.

This change was sought by the agencies because of their view that participation in the joint institutions managed by the IJC, especially the committee structure of the advisory boards, consumed too many resources that might better be used otherwise. The nongovernmental observers believed the new language would hold the governments more accountable for results. New annexes also called for development of Remedial Action Plans (RAPs) and Lakewide Management Plans (LAMPs).

The direct relationship between the lead agencies now includes their own biennial State of the Lakes Conference (SOLEC) that is independent of the IJC, and a Binational Executive Committee (BEC) through which the governments consult directly. There is more separation between activities that Environment Canada and the USEPA each carry out on behalf of the Great Lakes and binational activities that are coordinated through the IJC.

The Remedial Action Plan (RAP) process involving local governments, industry, and residents, known as "stakeholders,"

proceeded in 43 Areas of Concern, principally in urban areas. Three "binational" RAPs are underway for the St. Marys, St. Clair, and Detroit rivers, 17 are in Canada, and the remainder are in the U.S. For both the Niagara and St. Lawrence River Areas of Concern, two separate RAPs are underway because New York and Ontario have not agreed on binational processes.

The RAP process has three stages: (1) identification of the problems in the area, (2) identification of appropriate remedial measures and the parties responsible for carrying them out, and (3) monitoring of the results. The IJC has the authority to recommend new or previously unrecognized Areas of Concern and to comment on the adequacy of each phase of the RAP process.

In 1995, differing views about the success of the RAPs ranged from considering that they are at the forefront of clean-up programs using a multi-media approach, to frustration at the lack of progress. RAPs have been described as a "blueprint for action" and a means to achieve "ecological democracy" in the Great Lakes. After a decade of effort, 32 RAPs have completed Stage 1 of the process, 10 have completed planning for Stage 2, and only one area, Collingwood Harbor in Ontario, has been removed from the list.

The Great Lakes continued to set the pace for water quality management in both countries. In 1987, the U.S. Clean Water Act was amended to recognize the objectives of the Great Lakes Agreement in national water policies and programs. In 1989, USEPA Administrator William Reilly announced that the Agency would use the Great Lakes experience as a model for a new approach to policy based on preservation of ecological integrity.

In 1988 the Canadian federal government combined five statutes into a new Canadian Environmental Protection Act (CEPA). Part II required assessment of the toxicity of substances as a precondition for the federal government to act on controls.

The Ontario water quality program, MISA, moved slowly. Technology-based effluent regulations for the large direct dischargers commenced with petroleum refineries in the early 1990s, with eight other sectors following by 1994. In announcing the tough new limits, The Ontario Environment Minister relied heavily on work for the Agreement coordinated by the IJC.

In the U.S., expansion of control of hazardous air contaminants in Section 112 of the 1990 Clean Air Act was based substantially on legislation originally introduced to address problems with atmospheric deposition in the Great Lakes. The 1991 Great Lakes Critical Programs Act set deadlines for several programs called for in the 1978 Great Lakes Agreement, including Remedial Action Plans, Lakewide Management Plans, and consistent water quality standards by the Great Lake states to achieve virtual elimination of toxic contaminants. The USEPA carried out major demonstration projects on technology for removing contaminated sediments in five Great Lakes locations.

Agreement obligations were cited in 1990 to explain the ecosystem-approach-to-management principle of a new U.S. Great Lakes Fish and Wildlife Restoration Act. Meanwhile, the USEPA undertook new initiatives to encourage voluntary pollution prevention by major industries in the Great Lakes region, including automobile manufacturing and steel production. The Council of Great Lakes Governors worked for the same ends with the printing industry.

A new Canada-Ontario Agreement (COA) was signed in 1994. The new 1994 COA differs from its predecessors in having an ecosystem perspective and measurable targets for achieving basic objectives. Another difference is that both levels of government share responsibility for achieving Great Lakes objectives. Finally, unlike the previous COAs, the 1994 version did not specify the federal share of costs. The federal government refused to pay the additional costs of upgrading sewage treatment plants in fulfillment of the Great Lakes Agreement obligations on the grounds that such costs should be completely recovered through fees on water and sewage treatment plant users.

Tackling Persistent Toxic Contamination: IJC Policy Innovations

From the mid-1980s, the IJC worked at developing new policies and concepts that would assist control of persistent toxic contaminants. It recommended that the onus should be on the producers and users of such substances to establish that they are safe rather than on the governments to prove that they are harmful.

The Commission also recommended that government action should be based on the weight of accumulated evidence of harm rather than on the need for absolute proof that may take many years to demonstrate. Finally, the IJC promoted the "sunset" approach that calls for phase-out of the use of certain substances and classes of chemicals rather than simply trying to control their release into the environment.

In applying these concepts, one of the most dramatic and controversial issues was the IJC recommendation in its 1992 Sixth Biennial Report that "the parties develop timetables to sunset the use of chlorine and chlorine-containing compounds as industrial feedstocks and that the means of reducing or eliminating other uses be examined."

The chlorine recommendation galvanized industry to lobby against the recommendation inside and outside the IJC. From 1992, industry, and particularly the Chlorine Institute, began to take notice of the work of the Commission and to devote considerable effort seeking to discredit the recommendation.

Active debate continues about the scientific justification for the recommendation. It has been widely recognized that some chlorine compounds create problems and should be dealt with in an appropriate way, but the scientific community is divided on whether the entire family of chlorine compounds needs to be phased out.

The chlorine controversy has affected the IJC itself. Questions have been raised about whether the IJC has provided its justification for the recommendation. New attention has focused on the question of how decisions are best made in the face of scientific uncertainty.

It is nevertheless apparent that the IJC action contributed to growing global debate on the environmental implications of chlorine chemistry.

Tackling Persistent Toxics: Changing the Rules

In the early 1990s, the USEPA developed a new approach to regulation of persistent, bioaccumulative toxic contaminants. The Great Lakes Water Quality Initiative, also called the Great Lakes Initiative or GLI, distinguishes between substances for which there is some assimilative capacity in the environment and contaminants that can bioconcentrate to dangerous levels if they are present in any amount.

Industry was joined by municipalities in a Great Lakes Water Quality Coalition organized to question the GLI, based on estimated costs of compliance and arguments that it would damage the competitiveness of Great Lakes companies. Environmentalists argued that the Great Lakes region would benefit from protection of living components of the ecosystem, and that Great Lakes industry would benefit from being forced to adopt less-polluting processes that will ultimately define competition in the world market.

In 1997, the Great Lake states are developing regulations necessary to apply the federally adopted GLI criteria to their own water quality standards and the issuance of permits required by the Clean Water Act. With technical assistance from the National Wildlife Federation, Great Lakes environmental activists are participating in the process in each state.

Lake Superior: Preserving the Most Pristine Great Lake

Special efforts to protect Lake Superior have also grown out of the Great Lakes Agreement, inspired by members of the Great Lakes

community. The Lake Superior Binational Forum was established as a separate organization whose purposes derive from the regime that developed around the Agreement. The largest of the five lakes, Superior holds half the water in the whole system and has the longest retention time, about 200 years. It is also the most pristine, with the least degradation of water quality and the greatest part of its shoreline unaffected by human activity.

The inspiration for the Lake Superior program was a proposal at the 1989 IJC meeting in Hamilton by Bruce Hyer, a citizen activist and businessman from Thunder Bay, Ontario, that Lake Superior be used as a laboratory to demonstrate how to achieve the goal of zero discharge.

The concept was then backed by a coalition of environmental groups called the Lake Superior Alliance and supported by the IJC in its Fifth Biennial Report in 1990. At the 1991 IJC meeting in Traverse City, both federal governments plus Ontario, Michigan, Minnesota, and Wisconsin agreed to establish "A Binational Program to Restore and Protect the Lake Superior Basin." A Lake Superior Forum was set up in 1991 to oversee the program, which is also being used to develop the Lake Superior Lakewide Management Plan called for in the US Great Lakes Critical Programs Act.

Getting the Public Involved

The early meetings of the IJC in preparing to make progress reports to the governments were mainly spectator events for environmentalists and other members of the public, although they did provide an opportunity to interact with agency and IJC staffs, scientists and activists from both countries. After 1989, the meetings became more interactive and participatory for a much larger and broader audience.

The decision of a working coalition of environmental groups to increase the public presence at the 1989 biennial meeting in Hamilton, Ontario was the result of frustration about the limited public role in earlier meetings. Nearly a thousand persons attended the meeting, about twice as many as had attended any previous IJC meeting. Environmental demonstrations were added to official presentations.

The 1991 meeting in Traverse City, Michigan, followed essentially the same format as the meeting in Hamilton but with a more complex agenda; about 1,600 persons attended. Release of various reports by environmental groups was timed to provoke media focus on the Great Lakes and the meeting. For the first time, many industry representatives were also present.

High-level government officials from both sides also came, including Canadian Minister of the Environment Jean Charest and USEPA Administrator William Reilly as well as Ontario Minister of the Environment Ruth Grier. Charest announced that his government would sponsor a consultation to examine how to phase out use of persistent toxic chemicals. Grier committed to promote pollution prevention and to identify toxic substances to phase-out. Reilly discussed how USEPA now considered protection of the Great Lakes a national, not just a regional, issue.

About 2,000 persons attended the 1993 biennial meeting in Windsor, Ontario, including 300 industry representatives and 500 members of environmental organizations. The main event was an intense debate between representatives of Greenpeace and the Chlorine Chemistry Council that had been established to oppose chlorine phase-outs for industry. Almost as many persons registered for the 1995 meeting in Duluth, Minnesota.

The style and substance of the reports submitted to the governments by the IJC has changed since the 1989 biennial meeting. Earlier reports had relied principally on the board reports and the IJC's own analysis of their significance and required knowledge of the context of the ongoing implementation process for the Great Lakes Agreement.

The Fifth Biennial Report that followed the 1989 meeting was more understandable outside the Great Lakes community. Part I

outlined the public's concern as articulated at the meeting. Part II responded to those concerns by urging that the governments set timetables for achieving the zero discharge of toxic contaminants that had been demanded so forcefully at Hamilton.

The Sixth Biennial Report to the Parties that followed the 1991 meeting became the most controversial, mainly because of the recommendation that the governments should develop timetables to sunset the use of chlorine and chlorine compounds in industrial feedstocks. The Seventh Biennial Report following the 1993 meeting suggested that the governments report on progress in eliminating toxic contaminants with a biennial State of the Lakes Ecosystem report starting in 1995.

Scorecard: Evaluating Results of the Agreement

Overall Results.—By 1995, achievement of the chief aim of the 1972 Agreement to reduce phosphorus levels, could be shown. Total target loadings of phosphorus set for each lake had been met and target concentration levels set for open waters had been maintained for 10 years, except in Lake Erie, where they were exceeded only in 1982, 1984 and 1990. Progress has also been made on toxic contamination, although the ultimate aim of virtual elimination set by the 1978 Agreement has not yet been achieved.

During the 1980s, direct discharges of toxic contaminants decreased and were followed by declines in levels in both open waters and fish tissues. Initial concerns about the relationship of fish tumors to toxic substances and reproduction of wildlife were extended to growing concerns about potential effects on growth and development of human infants and ultimately to reproductive capacity of adults exposed to a wide range of contaminants.

The 1994 Great Lakes Initiative in the US introduced the concept of the need to regulate persistent bioaccumulative chemicals in a different way than conventional pollutants that decompose more quickly in the environment. In Canada it could be argued that the 1994 Chlorine Action Plan and the 1995 Toxic Substances Management Plans were both federal responses to IJC recommendations coming out of the Great Lakes Agreement process. In 1997, negotiations of agreements on the use of persistent organic pollutants (POPs) under the United Nations Environment Program and the Convention on Long Range Transboundary Air Pollution by the United Nation Economic Commission are both being influenced by information from the Great Lakes.

Contributions to Science.—All of the environmental management efforts and innovations under the Great Lakes Agreement have depended on what the IJC in 1993 called ". . .a large community of knowledgeable, committed environmental scientists." Much of the worldwide scientific consensus on the gravity of the toxics problem for nature and for humankind developed as a result of research that began in the Great Lakes region.

Discovery of concentrated contaminants in fish tissues was followed by identification of the multiplicity of ways they enter the lakes and affect not just aquatic life but wildlife that depends on the lakes for food and human health through fish consumption. The most comprehensive research commitment in the 1990s is for mass balance studies of how toxic contaminants cycle within the ecosystem between air, water, land and biota. The base of data on the Great Lakes is already considered the most complete for any large aquatic ecosystem in the world.

Growth of the Great Lakes Community.—The Great Lakes constituency bound together by its commitment to protection and restoration of the Lakes ecosystem is a major achievement of the Agreement. The broad community involved in implementation includes scientists, government agency staffs, environmental activists, representatives of industry, private foundations and politicians. Scientists, building a vast body of empirical knowledge of the Great Lakes' biology, chemistry, hydrology and natural processes for more than three decades, have worked and published together in a binational community with its own association and peer-reviewed Journal of Great Lakes Research.

Over time, the broad Lakes community has gained influence in Ottawa, Washington, and state and provincial capitals. During an annual "Great Lakes Week" in Washington which the Sierra Club began organizing in 1986, members of Congress, the states represented by the Great Lakes Commission, labor unions and environmental organizations joined forces to lobby for Great Lakes interests, often with Canadian participation.

State officials also credit the Agreement with creating a sense of Great Lakes Community and more regional action than would otherwise have occurred. A Great Lakes Charter, signed by the states in 1985, dealt with diversion rather than water quality issues, but helped set the stage for a Great Lakes Toxic Substances Control Agreement in 1986 in which the governors committed to achievement of the GLWQA goals for contaminants.

A Council of Great Lakes Governors organized in the early 1980s was given responsibility for coordination and oversight duties in the toxics agreement. On November 3, 1986, the premiers of Ontario and Quebec and the governors signed a Memorandum of Understanding on the Control of Toxic Substances in the Great Lakes Environment, similar to the states' toxics agreement.

The Great Lakes Agreement expanded the aims and operating principles of the Boundary Water Treaty in an ongoing process by which two different nations with different political systems, different cultures, and very unequal populations and economies, address their mutual concerns for a shared natural resource. Canada and the U.S. are peaceably accountable to each other as well as to the binational community that has developed around the Agreement.

Even when they have disagreed on other issues such as acid rain, the parties to the Agreement have continued working together through the joint institutions of the IJC. Their participation in a separate process to address the toxic pollution of the Niagara River from hazardous waste disposal sites on the U.S. side was also inspired by their joint commitment to the goals of the Great Lakes Agreement.

Features Contributing to Effectiveness of the Great Lakes Regime

Promotion of Community.—It is unlikely that the architects of the GLWQA anticipated that the strength of the Agreement would be not just its actual provisions, but in the inspiration and evolution of a powerful binational community committed to its implementation. The inclusion of nongovernmental participants in IJC processes—the biennial meetings, workshops, the Science Advisory Board and its committees and work groups—has facilitated interaction between environmentalists and scientists who share concern about the environmental threats being revealed by research, and government staff responsible for programs. Over time, the community has gained influence in government at the state and federal levels, and spread awareness of the Lakes' problems and promise across the region.

Binationalism.—The binationalism that historically has characterized the operations of the IJC has been essential to the success of the Great Lakes Agreement. The IJC has been a single independent entity, with identification of problems and solutions undertaken cooperatively and collectively. In the 1980s, however, the IJC began to operate more in terms of national "sections," working against the sense of binationalism that had been a strength.

Equality and Parity.—Like the 1909 Boundary Waters Treaty, the Great Lakes Agreement assumes equality and parity between the parties in the structure of its institutions and in their obligations. Each side has the same number of members on the IJC, the advisory boards, and any special task force, committee or work group. Costs of any joint efforts are also shared equally.

This equality is essential to assure equal respect when there is such disparity between the economic resources, political power, and size of the population as exists between the U.S. and Canada. The issue of "equality and parity" is complicated by the importance of the states and provinces in implementation of the Agreement, which will grow if the current trend towards decentralization of

responsibility from the central governments continues. Moreover, First Nations and tribal councils are increasingly asking for formal recognition as separate entities.

Common Objectives.—The Great Lakes Agreement states common objectives for the ecosystem protection that are adopted by both governments, and then are to be achieved under the laws and management programs of each side. This principle allows each side to complain about the adequacy of the other's efforts without forcing acceptance of the same approach; disagreement does not necessarily lead to a parting of the ways. In practice, this principle of the Agreement has allowed negotiation toward mutual agreement and even in some cases adoption by one party of an approach used by the other.

Joint Factfinding.—The Great Lakes Agreement applied another principle of the Boundary Waters Treaty in the requirements for joint factfinding and research. The Agreement recognizes that ongoing research is needed and also calls for ongoing joint monitoring to measure progress and help identify new problems.

Research has boosted accountability by informing the public as well as governments about progress, or lack thereof, toward Agreement objectives. Research has also identified problems not previously recognized, and improved the flexibility that characterizes the Great Lakes Agreement.

Flexibility and Adaptability.—One of the most unusual characteristics of the Great Lakes Agreement is its built-in flexibility and capacity to apply new knowledge to adapt objectives of the Agreement to new circumstances. The required periodic reviews both assess long term progress and allow any needed changes in the Agreement. Thus, after research revealed the extent and seriousness of toxic contamination, the review required after five years resulted in the very different Agreement signed in 1978.

Accountability and Openness.—Several features of the Agreement allow the accountability and openness that in turn foster involvement by a large community beyond the governments. One such feature is the requirement for periodic review. Another is the requirement for regular progress reports by the advisory boards to the IJC and by the IJC to the governments, to be followed by the governments' responses. All of this process is open to public scrutiny.

In general, the governments have also maintained a policy of openness, publishing many documents and involving nongovernmental participants in Agreement-related activities. With the July 1996 decision to allow observers, the more recent Binational Executive Committee apparently will now operate the same way.

Looking Forward: Recommendations for the Next Agreement

As the time approaches for another required review by the parties, forces and trends within and without the Great Lakes regime are creating uncertainties about the continued effectiveness of the GLWQA process. It is clear that the future of the Agreement depends on continued involvement and strength of the whole Great Lakes community.

External factors include political trends that may undermine commitment of the governments to the Agreement. In the mid-1990s, environmental agencies face decreased priority and major funding reductions in both countries. Unlike the way the Great Lakes community rallied to protest and resist funding cuts in the past, there has been much less concerted challenge to recent reductions specifically on behalf of the Great Lakes.

Another challenge is the need for more coordination with the Great Lakes Fishery Commission, another binational agency, as it seeks to promote a more ecological approach in fisheries management. Neither has the relationship of the IJC been clarified with the new trilateral Commission for Environmental Cooperation for North America, even though it is also dealing with toxic contamination issues.

The Canadian government continues to be distracted by the

constitutional crisis caused by the possibility of independence for Quebec. In Canada, fewer environmental groups are involved in Great Lakes issues.

Within the Great Lakes regime, changes in the operation of the IJC and in the way the binational environmental community now functions raise issues for the future. Frequent wholesale changes in membership of the Commission, diminished interaction between the Commission and the lead agencies, and decreased reliance on the advisory boards have weakened the binational process that has been a major strength of the regime.

Since 1991, the Commission has tended to rely more on sources of information outside the advisory board structure and on their own views of actions needed in responding to the views of members of the public. Many parties agree with the IJC's strong recommendations in the Fifth, Sixth and Seventh biennial reports, but the price may include a decline in the agency's former reputation for basing its decisions on objective fact-finding.

This summary report is based on a major three year study of Great Lakes governance. The study includes the following recommendations for action by government agencies and other members of the Great Lakes community.

Recommendation 1: No change should be made in the Great Lakes Water Quality Agreement except to enhance its operations and progress toward its present goals.

The effectiveness of the Agreement as it stands has already been demonstrated against eutrophication and toxic contamination. Its flexibility and the goal of an ecosystem approach to management will allow new problems to be addressed, such as preservation of habitat and biodiversity, provided operational changes are made to enhance coordination and communication.

Recommendation 2: The goals of institutions of the regime must be consistent with the goals of the Great Lakes Water Quality Agreement and their programs must reflect these goals.

Shared commitment to the goals of the Agreement are the foundation for the sense of community which in turn has been essential to its success. The commitment must be renewed in the 1990s because of signs that it may have declined in parts of the community.

Recommendation 3: Those jurisdictions, institutions and persons who believe in the goals of the Great Lakes Agreement must consciously work together to maintain and expand the sense of community on which its continuing progress depends.

The strength of the Great Lakes community depends on contributions from all its members and on their willingness to work together for the goals they have accepted in supporting the Great Lakes Agreement. In recent years, appreciation seems to have diminished for the value and contributions by different parts of the community for each other.

Recommendation 4: The IJC should clearly describe to the parties the information it needs in order to assess the effectiveness of government programs.

Since the lead agencies for the parties, Environment Canada and the U.S. Environmental Protection Agency, began to work together directly rather than through the IJC following the 1987 Protocol, the IJC has less knowledge about how the governments are addressing issues and problems. The IJC can help improve the situation by telling the governments exactly what information it needs in order to fulfill its responsibility for assessing the effectiveness of programs.

Recommendation 5: Environment Canada and the U.S. Environmental Protection Agency should design the SOLEC and other joint processes to provide information needed by the IJC to assess progress and the effectiveness of programs.

Formerly, the governments provided information to the IJC through the Water Quality Board. Since this is no longer happening, the lead agencies should make certain that their new State of the Lakes Conferences provide information that the IJC needs.

Recommendation 6: In order to maintain one of the strengths of the regime, the lead agencies must maintain the spirit of binationalism in their direct actions with each other. Within its own operations, the IJC must also ensure its binationalism and its independent ability to collect, analyze and verify information and data with a joint institution such as the Water Quality Board.

This recommendation is needed because the separate activities of the lead agencies and the IJC and the resulting decreased communication and exchange of information have undermined the binationalism that has been one of the regime's greatest strengths.

Recommendation 7: In addition to providing the data and information needed to satisfy the requirements for consultation and review in Article 10 of the Agreement, Environment Canada and USEPA and the states and provinces should inform the IJC and the public how they will coordinate their work plans to make further progress toward the goals of the Agreement.

The openness that assisted nongovernmental participation in the Great Lakes Community in the past depends on information about how the governments intend to address problems. The 1997 Protocol specifically stated that the agencies should coordinate their workplans in working for common purposes but the public has not, for example, been informed whether such coordination is planned for the Binational Virtual Elimination Strategy.

Recommendation 8: The parties should consider how to maintain parity and equality in their operations and institutions in light of evolution in the relationships between the federal governments, the provinces and states, and tribal and First Nation/aboriginal constituencies. Within its own operations, the IJC should also seek to further the principles of equity and parity in a similar manner.

It is not clear how the parity and equality between the parties can be maintained as the federal governments on both sides turn over of responsibility for environmental programs to the states and provinces nor how it will be handled as tribal councils and First Nations are given more autonomy nor how these changes will affect operations of the IJC. This recommendation urges attention to the consequences of the current trends toward decentralization of authority in both countries.

Recommendation 9: The flexibility essential to the continuing evolution of Agreement processes must be maintained. Flexibility requires that the IJC ensure that its processes can be sufficiently responsive to identify new and emerging issues in the Great Lakes. Specifically, the IJC should provide discretionary resources to the Science Advisory Board and use the Water Quality Board for program coordination as well as policy debate.

Flexibility in sources of information has been diminished since the IJC is setting the agenda for the two advisory boards. Without resources of its own, the Science Advisory Board can no longer initiate attention to new and emerging issues as it did in the past. Neither does the Water Quality Board provide a forum for program coordination between government agencies or initiate policy debate as it did formerly.

Recommendation 10: The IJC should create a forum for debate and greater participation by representatives of nongovernmental interests in the regime, in a Citizens Advisory Board.

Although nongovermental participation is essential in the democratic systems of both countries that are parties to the Agreement, the lack of other opportunities for participation has been a factor in the character of recent IJC meetings to which some have objected. Provision of a formal mechanism for nongovernmental input would strengthen the community committed to the goals of the Great Lakes Agreement.

Recommendation 11: The governments should stagger appointments to the IJC in order to assure continuity, stability and leadership by commissioners.

The conduct of IJC business has been delayed by gaps in IJC membership and the time required for new commissioners to learn the issues and processes. Lack of continuity also increases dependence of new commissioners on staff for guidance. Both problems could be solved by staggering appointments.

Recommendation 12: The IJC should seek clarification of its relationships with the Great Lakes Fishery Commission and the Commission on Environmental Cooperation (CEC), and should consider taking a more active role in relevant international forums outside the Great Lakes basin.

An ecosystem approach to management requires that the functions of the IJC be coordinated with those of other agencies that deal with matters of mutual concern. The need for coordination between the IJC and the Fishery Commission has grown with the problem of invasion of exotic species and the new concerns about the importance of habitat preservation. In the case of the CEC, such coordination could be the means to address the problem of long range transport of toxic contaminants into the Great Lakes from outside the basin.

SUGGESTED OTHER READINGS

The National Research Council of the United States and the Royal Society of Canada, *The Great Lakes Water Quality Agreement: An Evolving Instrument for Ecosystem Management*, National Academy Press, Washington, D.C., 1985.

Theodora E. Colborn, et al, *Great Lakes, Great Legacy?* The Conservation Foundation, Washington, D.C., and the Institute for Research on Public Policy, Ottawa, Ontario, 1990.

Great Lakes United, *Unfulfilled Promises: A Citizen's Review of the International Great Lakes Water Quality Agreement* (Buffalo, N.Y., GLU, February 1987).

Gordon Durnil, *The Making of a Conservative Environmentalist*, Indiana University Press, Bloomington, 1995.

International Joint Commission, The Fifth, Sixth and Seventh Biennial Reports, Ottawa and Washington.

Further information about the IJC and its reports can be obtained from: http://www.ijc.org/

This document is based on an assessment of the Great Lakes water quality regime by Lee Botts and Paul Muldoon. The full report is available upon request from the Institute on International Environmental Governance at Dartmouth College. The assessment draws on interviews with more than eighty key actors in the Great Lakes region, the existing literature and access to most of the documents. It also benefits from the authors' own involvement in the Great Lakes community.

This document fulfills two functions: it provides a brief, authoritative account of the development of the Great Lakes Water Quality Agreement. At the same time, it makes a unique contribution to our understanding of the effectiveness of international environmental regimes. It argues eloquently that the "Great Lakes community" that has grown up around the Great Lakes Water Quality Agreement and the International Joint Commission is the main reason for the Agreement's effectiveness. This has important implications for future activities to strengthen the Agreement and ensure that it continues to meet the needs of the people who live and work in the Great Lakes basin.