

The Law of the Ecosystem: Evolution of Governance in the Great Lakes - St. Lawrence River Basin

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Introduction

The Great Lakes-St. Lawrence River Basin is one of the world's major freshwater systems, of enormous importance to the social and economic development of the two countries that share it, Canada and the United States. These waters became one of the first international water bodies subject to treaty, resulting in a long history of dispute resolution and joint management. Over time, management has evolved from a system based primarily on the dictates of national sovereignty to one increasingly based on scientific principles. The Basin is well-known as the home of the "ecosystem approach" to water management. This is because the 1978 Great Lakes Water Quality Agreement was one of the first international agreements which adopted such an approach. Since then, the ecosystem approach has

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influenced the development of international and domestic environmental law, so that it is now explicitly recognized in a number of agreements and laws, and implicitly in others.²

In the Great Lakes-St. Lawrence River Basin, however, while there is broad acceptance of the ecosystem approach as the appropriate guiding vision for Basin management, implementation has lagged and many challenges remain. The purpose of this essay is to review the evolution of the ecosystem approach as a key principle of Great Lakes governance, then consider how its adoption has affected Great Lakes governance and what remains to be done in the future to continue the long process of implementation.

Background to the Great Lakes-St. Lawrence River system

The Great Lakes-St. Lawrence River system is the world's largest freshwater ecosystem, accounting for almost 20% of the world's available surface water. The system contains about 23,000 km³ and covers an area of 244,000 km². The watershed comprises approximately 521,830 km².³ There are five lakes of differing sizes and characteristics, with five "connecting channels" and numerous tributaries that flow into the St. Lawrence River and thence into the Atlantic Ocean 3,200 km from the headwaters.

Almost 40 million people call the Great Lakes basin home, 10% of the American population, and 1/3 of the Canadian population, living in eight states and two provinces.⁴ The waters have long provided a foundation for the economic, social and cultural life of the region. However, the pressures on the ecosystem are enormous. First Nations thrived on abundant resources. Commercial exploitation of resources, starting with furs, fish and logs, helped ensure early settlement of the region by Europeans. Mining and smelting of minerals, steel making and heavy manufacturing became well established by the late 19th century, and continue today, accompanied by demands on the water due to urban development, agriculture, pulp and paper and chemical manufacturing, commercial fishing, transportation, drinking water supply, power development and recreation.

Despite their size, the Great Lakes are vulnerable to toxic contamination and other stresses. Retention times are long, ranging from 191 years for Lake Superior to 2.6 years for Lake Erie, so that only 1% of the water in the system cycles through each year.⁵ This allows contaminants to become more concentrated, cycling through food webs. Large surface areas make the Lakes vulnerable to accumulations of pollutants from atmospheric

² See, Owen McINTYRE, "The Emergence of an 'Ecosystem Approach' to the Protection of International Watercourses under International Law", (2004) 13 *Review of European Community and International Environmental Law* 1-14.

³ GOVERNMENT OF CANADA AND U.S. ENVIRONMENTAL PROTECTION AGENCY, *The Great Lakes: An Environmental Atlas and Resource Book*, 3d Ed., 1995, p. 3.

⁴ The states are Minnesota, Wisconsin, Illinois, Indiana, Michigan, Ohio, Pennsylvania and New York. The provinces are Quebec and Ontario.

⁵ GOVERNMENT OF CANADA AND U.S. ENVIRONMENTAL PROTECTION AGENCY, *op. cit.*, note 3, p. 3.

deposition. As well, soil erosion rates are high in some areas, contributing fertilizer, wastes and pesticides from agricultural operations. Current environmental problems stem from the combination of a legacy of historic contamination, continuing inputs of known and newly-identified toxic substances, increasing numbers of alien invasive species, growing demand for water, lower water levels, increased run-off and natural heritage destruction due to urban development, changes in agricultural production, energy development and waste disposal practices.

What is the Ecosystem Approach?

While the ecosystem approach is recognized as a norm of Great Lakes governance, there is no single authoritative definition found in Great Lakes instruments. Instead, it is usually discussed in contrast with traditional approaches to resource or environmental management:

“The traditional approach to environmental and resource management has been media-specific and conducted in a piecemeal fashion. The institutional responsibilities for management have been fragmented so that ... agencies and other organizations are often at odds and sometimes in direct conflict...”⁶

Focusing on single problems for single species in isolation was not entirely unsuccessful as a management approach,⁷ but by the early 1970s scientists questioned its adequacy as a basis for solving more complex problems of environmental degradation.

In contrast, the ecosystem approach emphasizes a set of principles that flow from scientific understanding of the nature of ecosystems.⁸ Some of the key elements of this understanding are:

- the physical, chemical and biological elements of natural systems (which can be defined at different scales from the local to the global and as nested, linked systems) are interconnected; a change in one aspect will affect other aspects at other points or at other times. This means that to understand (and attempt to solve) one problem, one needs to understand how the parts of the whole system interact internally and externally.
- natural systems are dynamic, not static, and are complex and self organizing; the interconnected, dynamic and complex character of ecosystems makes it difficult

⁶ IJC, *Practical Steps to Implement an Ecosystem Approach in Great Lakes Management*, co-sponsored by U.S. EPA and Environment Canada in cooperation with the International Joint Commission and Wayne State University, Detroit, 1995, p. 5.

⁷ M.L. JONES and W.W. TAYLOR, “Challenges to the implementation of the ecosystem approach in the Great Lakes Basin,” (1999) 2 *Aquatic Ecosystem Health and Management* 249-254, at pp. 250-1.

⁸ Some writers also emphasize the philosophical underpinnings of ecosystem-based management, with an implied shift away from a utilitarian view of nature and toward greater deference towards nature and adapting “human activities to fit better with natural processes.” See, George FRANCIS, “Ecosystem Management”, (1993) 33 *Natural Resources Journal* 315-345, at p. 319.

to predict the consequences of particular actions and impossible to ever eliminate uncertainty.

- humans are part of natural systems, not separate; our actions and our well-being are “inextricably connected to the ecosystem in which [we] live.”⁹

To be effective in water management in the long term, these elements must be taken into account. One definition of the ecosystem approach that incorporates all of these elements is:

“a strategic and adaptive method for sustainable and comprehensive thinking, planning and management for protecting or restoring natural ecosystem components, functions, and values. It broadly considers all environmental and natural resources within the ecosystem ... as well as their interactions and cumulative effects on the ecological, social, and economic health, and sustainable development of the ecosystem communities.”¹⁰

Beyond attempts to define the ecosystem approach, some commentators have identified core principles that taken together would add up to such an approach to management.¹¹

Condensing these ideas, a management framework adopting the ecosystem approach requires at least the following components:

- use of ecological, rather than political, boundaries as the unit of management, e.g., a watershed that may transcend several political jurisdictions and multiple sectoral agencies. Ecosystem-focused management will require development of a shared vision and cooperation and coordination of policy and implementation actions across a wide range of stakeholders both public and private;
- a comprehensive approach that includes recognition of the interrelationships between air, land and water, between living things and the physical environment, and between economic and social development on the one hand and ecosystem functioning on the other. This will require a high level of scientific data, continuing monitoring and feedback, an integration of decision-making processes and action on multiple sources of ecosystem stress;

⁹ *Id.*, at p. 252.

¹⁰ IJC, *Priorities 2003-2005: Priorities and Progress under the Great Lakes Water Quality Agreement*, Report to the International Joint Commission by the Great Lakes Water Quality Board, Great Lakes Science Advisory Board, International Air Quality Advisory Board and Council of Great Lakes Research Managers, June 2006, p. 15.

¹¹ One example includes the following eight principles: long-term sustainability as a fundamental value; clear, operational goals; sound ecological models and understanding; understanding complexity and interconnectedness; recognition of the dynamic character of ecosystems; attention to context and scale; acknowledgement of humans as ecosystem components; and commitment to adaptability and accountability. N.L. CHRISTENSEN, et al., “The report of the Ecological Society of America Committee on the Scientific Basis for Ecosystem Management”, (1996) 6-3 *Ecological Applications*, 665-691, as cited in JONES and TAYLOR, *loc. cit.*, note 7, p. 252.

- institutions that can accept uncertainty, learn from continual updating of information on environmental response, and adapt to new information and changing conditions;
- a goal of restoring and protecting ecosystem “integrity”, that is, a healthy level of ecosystem functioning and productivity. This will require an emphasis on conservation and sustainable use of resources and pollution prevention.

Successful implementation of the ecosystem approach necessitates changes in traditional governing structures to make them more flexible, open, collaborative and accountable. It may also mean that new structures are required to address issues at a scale more appropriate to the nature of the particular problem.

Evolution of the Ecosystem Approach in the Great Lakes-St. Lawrence River Basin

Canada and the United States have been addressing issues in their shared waters for most of their common history. As population and industrial development grew rapidly at the turn of the 20th century, both countries came to accept the need for a permanent arrangement for addressing such problems. The first step in creating this arrangement was negotiation of a bilateral treaty, known as the *Boundary Waters Treaty* of 1909,¹² which established the institutional structure and the basic rules. This initial arrangement has been modified extensively over the last nearly 100 years, in ways that reflect a changing understanding of the system being managed and the nature of the problems affecting it.

The *Boundary Waters Treaty* reflects a fragmented view of water systems. Political boundaries and sovereignty outweighed the importance of natural systems and their linkages. For example, although it applies to all shared waters along the entire boundary, not just the Great Lakes and St. Lawrence River, shared waters are restrictively defined, being classified as either “boundary waters”, “waters flowing across the boundary” or “tributary waters”. For boundary waters, the treaty recognizes for each country an equal right of use and free navigation, but requires prior approval for obstructions that would affect the other party. For waters flowing across the boundary and tributary waters, the treaty reserves absolute territorial sovereignty to each party for control of waters on each side of the boundary, subject to recognition of a limited right to a remedy if injury results. The focus of the *Boundary Waters Treaty* is only on surface water, with little recognition of the link between tributaries and boundary waters and no acknowledgement at all of groundwater and its relationship to surface water. For the Great Lakes, the narrow definition of boundary waters meant that Lake Michigan, which is hydrologically connected to Lake Huron, was excluded other than with respect to navigation rights.

The *Boundary Waters Treaty* did establish a new binational organization known as the International Joint Commission, or “IJC”, as the primary vehicle for resolving boundary

¹² *Treaty Between the United States and Great Britain Relating to Boundary Waters, and Questions Arising Between the United States and Canada*, signed at Washington, D.C., January 11, 1909.

waters problems. The IJC operates in all of its subsidiary structures with membership from both Canada and the United States. The powers of the IJC include authority to approve all uses, obstructions or diversions of boundary waters and waters flowing across the boundary that affect water levels on the other side of the boundary, and when requested by the parties to investigate and report on “matters of difference arising between them involving the rights, obligations, or interests of either in relation to the other or to the inhabitants of the other, along the common frontier...”¹³

Over its first century, the IJC was drawn more and more into Great Lakes issues. Starting with its first reference in 1912, the IJC has repeatedly been asked to study and give advice on issues within the region related to water pollution, air pollution, land use, water levels and diversions. Over time, understanding of the complexity of such issues, and their linkages, has grown gradually. This can be seen in the IJC’s changing views of the issue of water quality.

In its report pursuant to the 1912 reference, the IJC found that although water quality in the lakes themselves was pristine, in the connecting channels (the Niagara, Detroit, St. Clair and St. Mary’s Rivers), the water was “unsightly, malodorous and absolutely unfit for domestic purposes” as a result of human sewage. Despite this, treatment of drinking water became the preferred remedial action, rather than pollution reduction.

The problems grew steadily worse. In 1950 the IJC reported that bacteriological concentrations in the waters of the connecting channels were three to four times greater than when studied for the 1912 reference and industrial wastes were by then the major problem contributing to adverse health and economic effects.¹⁴ In that report, the IJC recommended to the parties that they adopt common water quality objectives to apply to boundary waters, which they did. Some progress in pollution abatement was achieved. Around the same time, the two nations established a separate binational organization, the Great Lakes Fishery Commission, to deal with threats to fisheries, primarily from sea lamprey predation, but later from pollution and other stresses.¹⁵ The two commissions were not then seen as addressing similar or related issues.

By the late 1960s, the IJC concluded in the report on a reference about the lower lakes that pollution was so serious and extensive that it was causing “injury to health and property on the other side of the boundary.” The problems were attributed primarily to wastes discharged to the boundary waters by industries and municipalities. This report precipitated the signing of the *Great Lakes Water Quality Agreement* (“GLWQA”) in 1972.¹⁶

In this Agreement, the two governments focused their control efforts on waters of the drainage basin of “the Great Lakes System”, including Lake Michigan for the first time.

¹³ *Id.*, Articles VIII and IX, respectively.

¹⁴ IJC, *Report on the Pollution of Boundary Waters*, 1950.

¹⁵ Established pursuant to the Canada-United States Convention on Great Lakes Fisheries, 1954.

¹⁶ Agreement Between the United States and Canada on Great Lakes Water Quality, April 15, 1972, 23 U.S.T. 301.

The parties agreed on common water quality objectives for all the Lakes and set new general and specific common objectives for phosphorus concentrations (and a few other forms of pollution), with the goal to “restore and enhance water quality” in the Lakes. Although implementation was left to each country within its own legal system, the Agreement directed each party to include programs for controlling discharges of municipal sewage and industrial pollution. The main actions taken by the parties were to improve sewage treatment, eliminate or significantly reduce the use of phosphorus in detergents and to reduce fertilizer use in agriculture. Despite recognition of the integrated nature of the Great Lakes system, the approach in the 1972 Agreement was to tackle the single problem of nutrient loading, rather than a broader array of stresses.

The 1972 Agreement gave extensive responsibility to the IJC to oversee the parties’ implementation activities. The Commission was also asked to investigate and report on the status of the upper lakes and on the contribution of land use activities to contamination of the Lakes. This latter work became known as PLUARG, the acronym for Pollution from Land Use Activities Reference Group. The PLUARG process was extensive, involving broad consultation and study.¹⁷ Its findings laid the foundation for an understanding of the important contribution of non-point sources to water quality in the lakes and thereby helped lay the foundation for adoption of the ecosystem approach.¹⁸

At the same time, scientists involved with the IJC’s Research Advisory Board agreed that the focus of the 1972 Agreement and its “water quality objectives approach” was too narrow to resolve the problems that were facing the Great Lakes, including the growing evidence of toxic contamination.¹⁹ The RAB in 1977 developed a dramatically different management approach and recommended its adoption to the IJC. In its annual report to the parties, the IJC endorsed a shift to “an ecosystem approach to problem identification, research and management” in the Great Lakes.²⁰ Further work by the RAB refined the concept.²¹

¹⁷ This method was important to the development of a Great Lakes NGO community: see Jack MANNO, “Advocacy and Diplomacy: NGOs and the Great Lakes Water Quality Agreement”: in Thomas PRINCEN and Matthias FINGER, eds., *Environmental NGOs in World Politics: Linking the Local and the Global*, London and New York, Routledge, 1994, pp. 99-105.

¹⁸ Lee BOTTS and Paul MULDOON, *Evolution of the Great Lakes Water Quality Agreement*, East Lansing, MI, Michigan State University Press, 2005, p. 67.

¹⁹ W.J. CHRISTIE, “The Ecosystem Approach to Managing the Great Lakes: The New Ideas and Problems Associated with Implementing Them”, (1994-95) 24 *University of Toledo Law Review* 279-304. A water quality objectives approach deals with single pollutants discharged directly to water, individual point sources and local impacts. (p. 280).

²⁰ INTERNATIONAL JOINT COMMISSION, *Sixth Annual Report on Great Lakes Water Quality*, 1978, p. 15.

²¹ GREAT LAKES RESEARCH ADVISORY BOARD, *The Ecosystem Approach: Scope and Implications of an Ecosystem Approach to Transboundary Problems in the Great Lakes Basin*, Special Report to the IJC, July 1978.

Responding to the Commission's advice, in 1978, the parties adopted a revised GLWQA which superseded the 1972 Agreement.²² In the new Agreement, the parties acknowledged that "restoration and enhancement of the boundary waters cannot be achieved independently of other parts of the Great Lakes Basin Ecosystem with which these waters interact" and they set the Agreement's purpose as restoration and maintenance of "the chemical, physical and biological integrity of the waters of the Great Lakes Basin Ecosystem..." The Great Lakes Basin Ecosystem was defined to mean "the interacting components of air, land, water and living organisms, including humans, within the drainage basin of the St. Lawrence River" above the international boundary. This language is widely viewed as evidence of the parties' adoption of an ecosystem approach.

Soon after, in 1980, the Great Lakes Fishery Commission adopted a management plan that also took an ecosystem approach.²³ Then, in 1987, the 1978 GLWQA was amended by a Protocol following a formal review and a series of assessments that identified lack of progress toward Agreement objectives. The parties added new annexes to address non-point source pollution, contaminated sediments, airborne toxic substances, groundwater, and monitoring. Annex 2 established two new processes that were to operate on a more localized scale. One process, known as a Remedial Action Plan, was to be developed for each of 43 geographic areas with significant pollution problems; the other process, known as a Lakewide Management Plan, was to be developed for each lake. Both processes charged with the goal of redressing impairments to specific "beneficial uses" and both were required to operate on the principle that they "embody a systematic and comprehensive ecosystem approach..."²⁴

Other changes after adoption of the 1987 Protocol affected how the parties would interact in future and the oversight role of the IJC. A Binational Executive Committee, or "BEC", was established in the early 1990s with members from Canadian and American federal agencies. The BEC's role was to set priorities and provide strategic direction for binational programs, coordinate those programs, evaluate progress to GLWQA goals, and provide advice to governments. One of BEC's core functions has been the development and continuing implementation of a Binational Toxics Strategy, intended to be a coordinated effort to overcome the existing set of disjointed national programs and thereby achieve the GLWQA goal of virtual elimination of persistent toxic substances. The parties through BEC began organizing biennial conferences, known as State of the Lakes Ecosystem Conferences, which has worked to develop a suite of indicators of ecosystem health as a tool for assessing progress toward the goal of ecosystem integrity.

²² 30 U.S.T. 1383.

²³ GREAT LAKES FISHERY COMMISSION, *Joint Strategic Plan for Management of Great Lakes Fisheries*, 1981 (revised 1997 and 2001). This Plan adopted the ecosystem approach as the basis for fisheries management, set substantive goals that included healthy aquatic ecosystems and economic, aesthetic and recreational values, that supported native biodiversity, natural recruitment and habitat protection. The plan also addressed the need to coordinate efforts with the IJC and implementation of the GLWQA and with federal and state and provincial environmental agencies and implementation of their programs.

²⁴ See, Protocol Amending the 1978 Agreement between Canada and the United States of America on Great Lakes Water Quality, November 18, 1987, T.I.A.S. No. 11551, Annex 2.

Subsequent initiatives by diverse agencies and jurisdictions throughout the basin underscored the common thread of the fundamental norms of the ecosystem approach and the goal of ecosystem integrity. For example, in 1993, the Great Lakes Commission drafted an Ecosystem Charter with a set of common principles to guide all actions in the basin. Agencies, organisations and individuals were invited to sign on, committing themselves to following these common principles.²⁵ Another example is the work of the Council of Great Lakes Governors and Premiers in adopting a common water management framework, starting with the Great Lakes Charter in 1985 and most recently with the signing of the Great Lakes St. Lawrence River Basin Sustainable Waters Resources Agreement in December 2005.²⁶ This latter agreement also established a new Regional Body to oversee implementation of the agreement, develop policies and resolve major disputes.

All major instruments addressing Great Lakes governance since the late 1970s and all major actors have consistently articulated a commitment to managing through the ecosystem approach. Even so, implementation, that is, instituting the changes in the practices of agencies and other stakeholders that will realize this commitment on the ground, has proved quite challenging.

Implementation of the ecosystem approach in the Great Lakes Basin

As suggested earlier, an ecosystem approach requires that management, at least:

- use ecological boundaries,
- include humans (by considering social, cultural, economic and health impacts),
- be comprehensive, collaborative, coordinated and adaptive, and
- pursue the goal of ecosystem integrity.

At the time the concept was first adopted, there was little understanding of how to implement the ecosystem approach in any practical sense. Since then, the IJC and its members individually and jointly, along with many others, have worked to try to advance understanding of the concept and find ways to operationalize it.

The work of the IJC's Great Lakes Science Advisory Board (formerly the Research Advisory Board) was instrumental in pushing the Commission and the parties to apply the ecosystem approach.²⁷ In annual reports, workshops, and in other ways, members of the Great Lakes community worked with the Board to build an understanding of the concept

²⁵ See, www.glc.org/ecochart/.

²⁶ Both treat the basin as a unified whole. The Charter dealt primarily with regional decision-making on the issue of diversions. The Agreement is a comprehensive framework of common principles, standards, criteria and procedures for water management. The Agreement is discussed in detail in Noah D. HALL, "Toward a New Horizontal Federalism: Interstate Water Management in the Great Lakes Region", (2006) 77 *University of Colorado Law Review* 405.

²⁷ Leonard B. DWORSKY, "Ecosystem Management: Great Lakes Perspectives", (1993) 33 *Natural Resources Journal* 347-365, at pp. 349-350.

and the means of implementing it. In 1993, the Science Advisory Board commissioned a report to update its 1978 report. This report discussed foundational concepts of ecosystems, the ecosystem approach and ecosystem integrity as they had come to be understood in the years since the approach was first proposed.²⁸ One important early effort was started by the IJC and the GLFC in 1980. This group met over several years, developed working papers and convened a workshop of representatives from a wide range of disciplines in 1983 to address the issue of how to overcome obstacles to application of an ecosystem approach.²⁹ Similarly, in 1995, the U.S. Environmental Protection Agency, Environment Canada and the IJC brought a large number of stakeholders together to discuss and elaborate on practical ways to implement an ecosystem approach.³⁰ Another approach to operationalizing the concept was to attempt to develop a model decision process framework that could be adapted to individual situations.³¹ These exercises elicited useful suggestions and some were adopted by governments, at least in part.

To what extent have these initiatives resulted in changes to Great Lakes governance and improvements in environmental quality? The Great Lakes agreements and some domestic implementing regulations use geographic rather than political boundaries to define their focus of action. The GLWQA itself defines the drainage basin (i.e., the surface watershed) as an ecosystem that is the object of restoration efforts. Nested within the larger Basin-wide ecosystem objective are requirements to adopt plans for each of the lakes and for local “areas of concern”. The state and provincial Great Lakes Charter and the 2005 Sustainable Water Resources Agreement incorporate an even broader reach by including Québec, the ultimate downstream jurisdiction for the system. The Sustainable Water Resources Agreement illustrates a geographic rather than sovereign focus most dramatically because it prohibits the transfer of water out of the basin even if it is to be used within the same state or province. Both Canada and the U.S. have special programs and offices devoted exclusively to Great Lakes cleanup efforts, even though the Lakes also benefit from general

²⁸ Timothy F. H. ALLEN, Bruce L. BANDURSKI and Anthony W. KING, *The Ecosystem Approach: Theory and Ecosystem Integrity*, Report to the Science Advisory Board (IJC, 1993).

²⁹ W.J. CHRISTIE, *loc. cit.*, note 19, p. 283.

³⁰ IJC, *Practical Steps to Implement an Ecosystem Approach in Great Lakes Management*, co-sponsored by U.S. EPA and Environment Canada in cooperation with the International Joint Commission and Wayne State University, Detroit, 1995. Some of the proposals included the use of comprehensive watershed-based planning and management to address non-point sources and habitat issues, the use of pollution prevention and product stewardship to address point sources, the use of complementary programs and partnerships, and concerted effort toward sustainable economic development.

³¹ For example, one suggested framework contained the following elements: involve stakeholders and develop vision statement (agree on guiding principles); secure commitment of top leaders; agree on information needs and problem definition; develop action plan (identify ecosystem objectives, set priorities, define benchmarks, identify options, identify preferred actions, identify responsible agencies and secure commitments and determine sequencing of actions and ensure linkages); implement action plan; monitor results and celebrate milestones; rigorous review of results and evaluation; determine whether ecosystem objectives and benchmarks have been met and whether stakeholders are satisfied; if not, review action plan, if yes, continue efforts. As discussed in John H. HARTIG, Richard L. THOMAS and Edward IWACHEWSKI, “Lessons from practical application of an ecosystem approach in management of the Laurentian Great Lakes”, (1996) *2 Lakes & Reservoirs: Research and Management* 137-145, at p. 143.

national or regional environmental programs. Watershed based land use planning is used in some jurisdictions, including Ontario, but there a limited linkages to the larger lakewide ecosystem.

In addition to using ecological boundaries, the ecosystem approach requires that governments move away from a single medium, water quality objectives based model to one that addresses multiple stresses on the ecosystem and their interactions while pursuing the critical objectives of restoration and maintenance of ecosystem integrity. The GLWQA has moved in this direction with the inclusion of annexes on air deposition, groundwater contamination, wetland destruction, contaminated sediments, and so on, but some significant stresses are not included, such as alien invasive species, nearshore impacts and climate change.

Despite an increasingly comprehensive focus, action to implement the binational commitments has not meant deliberate innovation or reform in governing institutions. Instead, action is pursued through numerous collaborative efforts. A complex web of formal and informal, permanent and ad hoc networks that include binational, intergovernmental and governmental agencies, non-governmental organizations, scientists and private firms work in partnership on a wide range of issues, but too often with limited coordination.

Authority remains quite fragmented between jurisdictions and across agencies. At the binational level, the IJC shares jurisdiction over binational waters with the Great Lakes Fishery Commission. Within each country, governmental responsibility is divided between the national governments and the states and provinces. There are also aboriginal communities with some governing authority over water.³² In addition, there are thousands of municipalities and special purpose agencies within the basin with authority over decisions affecting land use, waste management, sewage treatment and stormwater management, but these are not well-integrated into Great Lakes management.³³ The states and provinces cooperate on regional environmental issues through the Great Lakes Commission, created under U.S. law in 1955 and recognized by Congress as an interstate compact, and through the Council of Great Lakes Governors and Premiers, established in 1983 and the new Regional Body created in 2005.

One of the most influential elements in shaping the values and policies in the basin has been the inclusion of a rich diversity of civil society. Participation has included hundreds of public interest groups within each country, organized from the national level down to the local, scientists and other university researchers, policy experts, industry, labour unions, health professionals, recreational users, and many others. There are multiple networks that

³² In Canada, First Nations have constitutionally protected rights; they govern their communities and must be consulted, and their interests accommodated, whenever government action has the potential to interfere with their rights. Tribes in the U.S. have been recognized as having authority equivalent to that of states for purposes of environmental regulation.

³³ Many local governments in the region now participate in an umbrella organization known as the Great Lakes and St. Lawrence Cities Initiative, www.glslcities.org.

bring together each of the categories of groups from both sides of the border.³⁴ The relationships among all of these diverse actors are not static, and leadership shifts over time and across issues. Power to influence the outcome of decisions is not shared equally. However, the breadth and depth of this participation by diverse constituencies has become a fixture in regional policy development and management decisions.³⁵

Because of this institutional complexity, there is a risk of program duplication or gaps, inconsistent commitments and programs working at cross purposes, as well as considerable potential for confusion, inertia and conflict. While “many Great Lakes agencies and jurisdictions utilize elements of an ecosystem approach to comprehensive management even if they do not specifically use that term,”³⁶ the ecosystem approach “is still not employed in the Great Lakes basin on a sufficiently broad basis to ensure coordination, integration and synergy among government programs. In addition, many stressors to the Great lakes, such as invasive species and climate change, are not receiving the attention they deserve. As a result, the Agreement’s objectives are not being achieved as expeditiously as they should.”³⁷

No agency or entity plays a central coordinating role. The IJC was never given the authority or the resources to do so and, given increasing awareness of the complexity of the ecosystem, no agency likely could play such a role with much efficacy. However, there is a very real need for coordination and improved accountability, to ensure that all of these efforts reinforce each other and move the system in one direction, ever closer to the goal of ecosystem integrity.

Even within one order of government and one country, coordination is a challenge. For example, in the U.S., a 2003 study found that 148 federal and 51 state programs funded some aspect of Great Lakes restoration, with no mechanism to coordinate these programs or to ensure coordinated monitoring.³⁸ Considerable work has been undertaken to improve

³⁴ Discussed in Marcia VALIANTE, Paul MULDOON and Lee BOTTS, “Ecosystem Governance: Lessons from the Great Lakes”, in Oran R. YOUNG, ed., *Global Governance: Drawing Insights from the Environmental Experience*, Cambridge, MA, MIT Press, 1997, pp. 197-225.

³⁵ The effectiveness of different types of multi-stakeholder collaboration has been extensively studied. See, for example, Michael E. KRAFT, “Sustainability and Water Quality: Policy Evolution in Wisconsin’s Fox-Wolf River Basin”, (2006) 10-3 *Public Works Management and Policy*, pp. 202-213 and cites therein. I do not mean to suggest that all such consultations and partnerships have been equally successful, or that there is no need to pay close attention to the design of such collaborations, but only that there is a rich tradition of such partnerships at all levels within the Great Lakes-St. Lawrence Basin.

³⁶ INTERNATIONAL JOINT COMMISSION, *Advice to Governments on Their Review of the Great Lakes Water Quality Agreement, A Special Report to the Governments of Canada and the United States*, Washington, D.C. and Ottawa, August 2006, p. 11. Examples include watershed planning by Ontario Conservation Authorities and state agencies that manage fisheries, wildlife and water on a geographic basis.

³⁷ *Id.*, p. 10.

³⁸ GOVERNMENT ACCOUNTABILITY OFFICE (U.S.), “Great Lakes: An Overall Strategy and Indicators for Measuring Progress Are Needed to Better Achieve Restoration Goals”, GAO-03-515, April 2003. This report criticized EPA for lack of progress on Great Lakes restoration, emphasizing the need for coordination within the US federal government and between the federal government and state and local governments.

program coordination. One attempt to pull the threads together and begin an ongoing process to coordinate all U.S. programs began in 2003.³⁹ In 2004, Pres. Bush established the Great Lakes Interagency Task Force and directed the Director of U.S. Environmental Protection Agency to convene a regional collaboration. Over one year, more than 1500 stakeholders participated in the development of a strategy, which was adopted in December 2005.⁴⁰ In 2006, the participants agreed to an Implementation Framework, a process designed to achieve ongoing coordination and accountability. The key ingredient required to move toward its goals will be sustained, multi-year funding, and so far that has not been forthcoming.

In Canada, the federal and Ontario governments coordinate their respective Great Lakes programs through an intergovernmental agreement, known as the Canada-Ontario Agreement or “COA”.⁴¹ In the past, there has been criticism of this arrangement for lack of focus and inconsistent commitment, resulting in lack of progress toward ecosystem restoration. The newest version of COA, adopted in 2007, tries to overcome some of this criticism by setting more specific short and long term goals, prioritizing actions and identifying expected results. Collaboration among government agencies and programs occurs through a management committee made up of representatives of all agencies that participate in activities covered in one of four annexes, but not municipalities or other stakeholders. The annexes deal with RAPs, harmful pollutants, lake and basin sustainability, and monitoring, research and information coordination. A parallel agreement applies between the governments of Canada and Québec with respect to the St. Lawrence River. Through this agreement, a St. Lawrence Plan for Sustainable Development 2005-2010 was adopted with the objective of promoting ecological integrity, environmentally responsible economic activities, community commitment and informed, concerted and integrated management of the St. Lawrence River. Clean-up efforts in areas of concern are coordinated by a concertation committee comprised of Environment Canada, Environnement Québec and a non-governmental organization representing 14 local committees.⁴²

It is at the more localized level, away from the basin-wide scale, that greater success with implementing an ecosystem approach has been achieved. RAPs, authorized under the 1987 Protocol, require the national governments to cooperate with state and provincial governments and consult with all affected stakeholders so that there is broad participation in problem definition, plan development, priority setting and implementation. Because they

³⁹ The GAO report catalyzed Congressional action, with several legislative proposals coming forward: see detailed discussion in BOTTIS and MULDOON, *op. cit.*, note 18 p. 159. The Great Lakes Congressional Delegation asked the Council of Great Lakes Governors to establish priorities, based on the premise that “coordinated planning is needed to achieve comprehensive restoration and protection of the Great Lakes while making efficient use of limited resources.” See, www.cglg.org/projects/priorities/index.asp.

⁴⁰ Great Lakes Regional Collaboration, Strategy for the Restoration and Protection of the Great Lakes, <http://www.glrc.us>.

⁴¹ Canada-Ontario Agreement Respecting the Great Lakes Basin Ecosystem, 2002, revised June 2007. www.on.ec.gc.ca/greatlakes/default.asp?lang=En&n=D11109CB-1.

⁴² See, www.planslaurent.qc.ca/plan/accueil_e.htm.

are intended to address a broad array of local issues, each situation brings together a unique constellation of environmental conditions and problems, legal parameters, and stakeholders. Stakeholders must agree on criteria for “de-listing” the area as contaminated or degraded and must pursue action on multiple sources of multiple problems, not single issues. RAP activities began in 1987, and although progress has been made,⁴³ it has occurred slowly. There are still only two areas fully de-listed, and two “in recovery”, where all possible actions have been taken and monitoring will determine when restoration is complete. Many RAPs are stalled at the implementation stage, in large part because of a lack of sustained funding commitments for research, monitoring and clean up – especially for expensive remedial actions such as removal and treatment of contaminated sediments, and replacement of infrastructure.⁴⁴ The IJC recently grouped obstacles to RAP success into two main categories: the lack of continuing availability of locally-relevant research and monitoring, and inadequate leadership and accountability.⁴⁵

Many stresses that contribute to local problems can only be managed at a broader scale. LaMPs are the only structures beyond the two nations operating at an intermediate scale between the very localized areas of concern and the basin-wide level. LaMPs were called for in 1987 Protocol and were then primarily aimed at problems associated with critical pollutants. However, because an ecosystem approach was mandated, the LaMPs included a large number of stakeholders to help define the problems and as a result expanded their considerations to include “land use, nutrients, natural resource use and disturbance, chemical and biological contaminants, and non-native invasive species” in the case of Lake Erie.⁴⁶ While some have suggested that this may be the most appropriate scale for implementing the ecosystem approach, progress to date has been much slower than expected. In 1999, the Binational Executive Committee called for accelerated effort on LaMPs, demanding that plans be developed by 2000, with ongoing review and updating, to reflect an adaptive approach, but with concurrent implementation. One of the challenges is how to structure decision-making to coordinate implementation and reinforce existing work at the local and watershed levels.⁴⁷

⁴³ HARTIG, THOMAS and IWACHEWSKI, *loc. cit.*, note 31. Also see, John JACKSON, *Great Lakes Hotspots: Ontario Citizens Speak Up*, Ontario Public Advisory Council, October 2006; Susan Hill MACKENZIE, *Integrated Resource Planning and Management: The Ecosystem Approach in the Great Lakes Basin*, Washington, DC, Island Press, 1996.

⁴⁴ IJC, *Beacons of Light*, Special Report on Successful Strategies Toward Restoration in Areas of Concern under the Great Lakes Water Quality Agreement, March 1998. In some cases there is disagreement over who should be funding the clean-up.

⁴⁵ IJC, *2003-2005 Priorities*, *op. cit.*, note 10, p. 76. “In addition to understanding the cause of impairment and how it impacts the beneficial use, each RAP team needs to understand the ecological ... characteristics of their ecosystem in order to determine the goals of restoration and the remedial measures most promising to achieve them.”

⁴⁶ See, Lake Erie LaMP, *Update 2005/06*, p. 3, www.binational.net.

⁴⁷ As an example, the Lake Erie LaMP was adopted in 2000 and there have been biennial progress reports, but it is only now moving from assessment and planning to implementation. See, ENVIRONMENT CANADA, U.S. ENVIRONMENTAL PROTECTION AGENCY, *2006 Lake Erie Lakewide Management Plan Report*.

Conclusion

The ecosystem approach was accepted in the Great Lakes-St. Lawrence River Basin because it seems intuitively right – it better reflects the actual state of the natural system and it is in tune with changing social values toward the environment. The ecosystem approach is not a once-and-for-all solution to environmental and resource management problems. Rather, it is a process to follow repeatedly to identify problems and solutions that move us toward the goal of improved ecosystem health. However, while the concept is widely accepted in the Basin, at the moment it remains true that

“any move toward ecosystem management within the Basin is very much a work in progress. Serious impediments serve both to limit the impact of current initiatives and to endanger their long term viability. In particular, the multi-institutional system that has evolved remains vulnerable to uneven – and ever-changing – levels of commitment from its respective jurisdictions. ... Indeed, the links between numerous policy initiatives remain very tenuous, often dependent upon policy entrepreneurs who cannot be relied upon to serve as permanent champions.”⁴⁸

Because governments rely on existing structures, the need for coordination remains a high priority.

It has also proved difficult to break free of the traditional approach to water management:

“The very complexity that led scientists ... to argue for an holistic, ecosystemic approach leaves us unequal to the task of predicting the consequences of our actions and thus prescribing the most socially and economically acceptable actions to take. ... These questions are for more difficult, and since we cannot presume to know the answers, they call for us to manage adaptively, that is, to use management decisions themselves as a tool to reduce uncertainty and seek acceptable solutions. Institutions have traditionally avoided this approach, viewing the notion of ‘management as experiment’ as culturally unacceptable.”⁴⁹

Some scholars suggest that adopting the ecosystem approach is impossible, too difficult, inefficient, or even contrary to the rule of law.⁵⁰ Others suggest it is an excuse to consider everything and as a result solve nothing. Finding a way to use the insights of the science and build effective institutions to operationalize the ecosystem approach is a formidable challenge but the outcome should ultimately be more effective and more efficient management that yields better results than are possible with traditional approaches.

⁴⁸ Barry RABE, “The politics of ecosystem management in the Great Lakes basin”, (1997) vol. 27, Issue 3, *The American Review of Canadian Studies*, pp. 411-

⁴⁹ JONES and TAYLOR, *loc. cit.*, note 7, p. 252.

⁵⁰ See discussion in Bradley KARKKAINEN, “Collaborative Ecosystem Governance: Scale, Complexity, and Dynamism”, (2002-2003) 21 *Virginia Environmental Law Journal* 189-243, at pp. 233-235.

In the Great Lakes-St. Lawrence River Basin, much of the emphasis has been on extensive consultation in setting goals, collaboration in research and information-gathering, and coordination of programs between agencies. While in the past much of this effort was ad hoc and informal, it is increasingly becoming formalized. These three aspects – extensive stakeholder participation, collaboration, and coordination of programs – are essential elements of implementing an ecosystem approach. They are important and useful steps and necessary components of an ecosystem approach, but they have so far been inconsistently applied and less than comprehensive⁵¹ and have resulted in little change in the structure and function of existing agencies and governance institutions that carry out programs, mostly adding on a layer or two rather than resulting in wholesale reform or replacement with more integrated institutions. There is also little evidence of a shift to an adaptive approach to management.

Recent attention to the need for more collaboration among agencies and greater policy coherence in both countries is evidence that the parties recognize they have fallen short of their commitments. However, cooperation among agencies and jurisdictions and coherence among policies and programs, while necessary, are insufficient to realize the commitment to the ecosystem approach. The substantive element requires that those efforts be directed toward achieving the goals of ecosystem integrity and sustainability. While RAPs and LaMPs may be moving slowly toward this, many domestic programs lag behind.

The Great Lakes Water Quality Agreement is under review by the parties. This has sparked a debate within the Great Lakes community about whether the agreement should evolve further into an ecosystem restoration agreement, or continue to focus on water quality.⁵² Even if it continues as a water quality agreement, as the IJC has recommended, there appears to be a consensus that the parties should renew and strengthen their commitment to the ecosystem approach. This will mean that the Agreement's scope will continue to broaden to include factors affecting water quality, such as invasive species, land use, non-point sources, biodiversity, climate change and unpredicted future problems.

The review of the agreement provides an opportunity for the parties to reduce the impediments to implementation of the ecosystem approach by more precisely defining the concept, identifying indicators of ecosystem integrity, by setting targets and deadlines, by developing and refining tools for better integration of programs and more open and effective decision-making, by committing themselves to comprehensive monitoring, and by catalysing change in the institutions that manage these issues. Together these actions will help achieve a more consistent, adaptive and progressive approach across the basin. Leadership is the necessary ingredient. Add and stir.

⁵¹ For example, municipalities and First Nations are not always included.

⁵² IJC, *Advice to Governments on Their Review of the Great Lakes Water Quality Agreement*, A Special Report to the Governments of Canada and the United States, August 2006.