



Spring 1986

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Recommended Citation

Leonard B. Dworsky, *The Great Lakes: 1955-1985*, 26 Nat. Resources J. 291 (1986).
Available at: <https://digitalrepository.unm.edu/nrj/vol26/iss2/7>

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LEONARD B. DWORSKY*

The Great Lakes: 1955–1985

INTRODUCTION

The Great Lakes are the most important natural resource shared by Canada and the United States. The joint responsibility for this shared resource has produced large-scale cooperative arrangements such as the St. Lawrence Seaway, the Niagara Falls Treaty, the Great Lakes Water Quality Agreement, the Great Lakes Fisheries Commission, and three Lake Levels Boards of Control (International Section of the St. Lawrence River, Lake Superior, and Niagara River).¹

Because the United States and Canada contain two highly dynamic societies in which social, economic, and technologic change are accepted norms, solutions to problems occurring at one time may not remain pertinent at some future date. In addition, new problems must be confronted as the two societies evolve in relation to one another and to the world environment.

A reaffirmation of this statement is contained in a January 1985 advisory by the International Joint Commission of Canada and the United States (IJC) to the two governments.² The main themes on which the Commission's advice is centered are contained in three excerpts from that advisory:

[t]he need to consider the interrelationship of Great Lakes water quantity and water quality in the context of an ecosystem, including the other than economic importance of this vast body of water to the millions of people who live and will live in the basin.

* * *

[T]he Commission considers that, based on the experiences of the United States and Canada with regard to the 1972 and 1978 *Great Lakes Water Quality Agreements*, the two Governments would be well advised at this stage to engage in broad but systematic discussion of their use of Great Lakes water before they are faced with any

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1. *Great Lakes Water Level Problems. Hearings before the Senate Comm. on Foreign Relations, 94th Cong., 2d Sess. 33-34 (1976).*

2. INTERNATIONAL JOINT COMMISSION. GREAT LAKES DIVERSIONS AND CONSUMPTIVE USES (Jan. 1985).

sense of crisis, actual or imminent, and before any relationships deteriorate or become jeopardized.

* * *

[T]he shared waters of the Great Lakes have a regional, national and international significance that requires that they be treated as a joint responsibility of the Governments and peoples of both nations. They are a priceless resource in their own right. The multiplicity of uses to which they are put makes it imperative that closest attention be paid not only to the present needs of diverse users but also to the needs of future generations. The waters must be protected, conserved and managed with insight, determination and prudence if they are to continue to play the role they have played in the past. The Commission therefore urges the Governments of the two nations and the people whom they represent to examine carefully the conclusions, recommendations, observations and counsel to be found in this Report. The Commission stands ready to provide whatever assistance the Governments may request in this regard.³

This article attempts a comprehensive overview of the management of a shared binational resource, management that is an outstanding example of international comity. It also traces many of the forces that evolved over the thirty year period that led to the IJC advisory and which, over time, will provide the basis for marked changes in management of the Great Lakes. Presented first is a tabulation of major events, followed by a description of the current setting. Tabular information on the uses of water and related land resources of the Great Lakes and examples of environmental effects are next, followed by a detailed discussion of issues and the status of efforts to manage them. The concluding section addresses current institutional (primarily governmental) arrangements for management, describes some proposals that have been suggested for change, and recommends specific measures for change as a result of the author's experience.

TABULATION OF MAJOR EVENTS UP TO 1959⁴

- 1570 Hiawatha legend dates the founding of the five, later six nation Iroquois Confederation on the Great Lakes by Haion-Hwe-Tha about this time.⁵
- 1535 Jacques Cartier reaches Montreal.
- 1615 Samuel de Champlain sights the Great Lakes.

3. *Id.* pt. 2, at 41.

4. ENGINEERING INSTITUTE OF CANADA & AMERICAN SOCIETY OF CIVIL ENGINEERS, PROCEEDINGS OF GREAT LAKES WATER RESOURCES CONF. (June 24-26, 1968), [hereinafter cited as EIC&ASCE PROCEEDINGS].

5. R. ERDOES & A. ORTIZ, AMERICAN INDIAN MYTHS AND LEGENDS (1984).

- 1701 Detroit founded.
- 1749 Toronto (York) founded.
- 1797 Northwest Fur Company built small lock for canoes and bateaux on St. Mary's River, Sault Ste. Marie.
- 1804 Ft. Dearborn (Chicago) founded.
- 1825 First diversion of Niagara River to Erie Canal.
- 1826 Erie Canal opened.
- 1829 Original Welland Canal opened.
- 1829 Welland Canal diversion between Lakes Ontario and Erie.
- 1829 St. Lawrence Canals opened.
- 1848 Lake Michigan to Illinois River diversion through Illinois and Michigan Canal.
- 1855 State of Michigan lock opened at Sault Ste. Marie.
- 1856 St. Clair-Detroit River system opened by dredging.
- 1880 Alewife Fishery entered Lake Ontario.
- 1881 First U.S. electric generating station at Niagara Falls.
- 1893 First Canadian hydroelectric plant at Niagara Falls.
- 1900 Beginning at this time, studies for lakes regulation were done in 1911, 1920, 1926, and 1952.
- 1909 Chicago Sanitary and Ship Canal completed; Lake Michigan to Illinois River Basin.
- 1912 First reference to IJC by Canada and the United States to survey pollution in the Great Lakes.
- 1921 Sea lamprey recorded in Lake Erie.⁶
- 1932 Welland Canal (Canada) completed.
- 1933 Sea lamprey taken in Lake Huron.⁷
- 1939 Long Lake diversion from Hudson Bay drainage to Lake Superior.
- 1943 Ogoki River diversion from Hudson Bay drainage to Lake Superior.
- 1946 Second reference to IJC by Canada and the United States to survey pollution in the Great Lakes.
- 1950s Last large expansion of power plants: Sir Adam Beck (Canada) and Robert Moses (United States).
- 1950 Niagara River Treaty for power and Niagara Falls preservation.
- 1955 Great Lakes Fishery Commission.
- 1959 St. Lawrence Seaway opened.

THE CURRENT SETTING

The Great Lakes and their connecting channels and the St. Lawrence

6. J. LEGAULT & T. KUCHENBERG. REFLECTIONS IN A TARNISHED MIRROR: THE USE AND ABUSE OF THE GREAT LAKES (1978).

7. *Id.*

River System provide a continuous 2,400 mile deep-draft waterway that extends from the Atlantic Ocean into the heart of the North American continent.⁸ The system serves the eight Great Lakes states, eleven contiguous states, and the Canadian provinces of Ontario, Manitoba, and Saskatchewan. For the purpose of this inquiry, the Great Lakes Basin extends from the downstream end of the International Rapids Section of the St. Lawrence River to fifty miles west of Duluth on Lake Superior.⁹ A map of the Great Lakes Basin is shown in Figure 1. Physical,¹⁰ hydrologic, and rainfall and runoff data on the Great Lakes are presented in Table 1.

About 83 percent of the population within the Great Lakes Basin reside in the United States, and 17 percent in Canada.¹¹ The United States portion of the basin produces one-sixth of the national income and accounts for over one-fifth of manufacturing employment and capital expenditure. In Canada the figures are more dramatic, for the basin produces nearly one-third of the national income, and accounts for over one-half of the manufacturing employment and capital expenditure.¹² Basin agricultural production accounts for 7 percent of all United States output and 25 percent of total Canadian output. There are 59,000 square miles of commercial forest in the U.S. portion of the basin, and over 70,000 square miles in the Canadian portion. Iron-ore, coal, limestone, and grain account for 85 percent of the 220 million tons of water-borne freight carried each year on the waterway. The remaining 15 percent includes overseas general cargo, petroleum products, cement, and chemicals.

8. The Great Lakes, with the exception of Lake Michigan, are divided approximately mid-way between the United States and Canada. Seldom do reports from either country provide a total perspective. For such a perspective, see INTERNATIONAL JOINT COMMISSION, *FURTHER REGULATION OF THE GREAT LAKES* Ch. 3 (1976). An additional excellent Great Lakes perspective is to be found in *GREAT LAKES TOMORROW. Natural Setting for the Ecosystem*, in *DECISIONS FOR THE GREAT LAKES* (1982).

9. The maximum dimensions of the Great Lakes Basin are approximately 740 miles from north to south and 940 miles from east to west. The total area of the basin, both land and water, is 298,500 square miles. The basin is unique in that water covers approximately one-third of its total area, that the land areas which drain into the lakes are only from ten to one hundred miles from the shoreline, and that it has no dominant tributary systems.

10. Most of the Great Lakes Basin is within two major physiographic regions. The areas north and west of Lake Superior and north of Lake Huron are in the Laurentian Uplands dominated by hills, a few low mountains, many lakes, and numerous swamps. The Central Lowlands cover most of the remainder of the basin. The eastern limit of the basin is in the foothills of the Adirondacks: the basin's outlet is in the wide St. Lawrence Valley, a relatively flat marine plain.

11. One-seventh of the U.S. population resides in the Great Lakes Basin which includes four of the twelve largest cities in the United States: Chicago, Cleveland, Detroit, and Milwaukee. The relative importance in Canada is even greater because one-third of that country's population lives in the Ontario portion of the basin and, if the wholly-Canadian portion of the St. Lawrence River Basin is added, the proportion of the total population rises to 60 percent.

12. The region accounts for 40 percent of U.S. and 80 percent of Canadian iron and steel production.

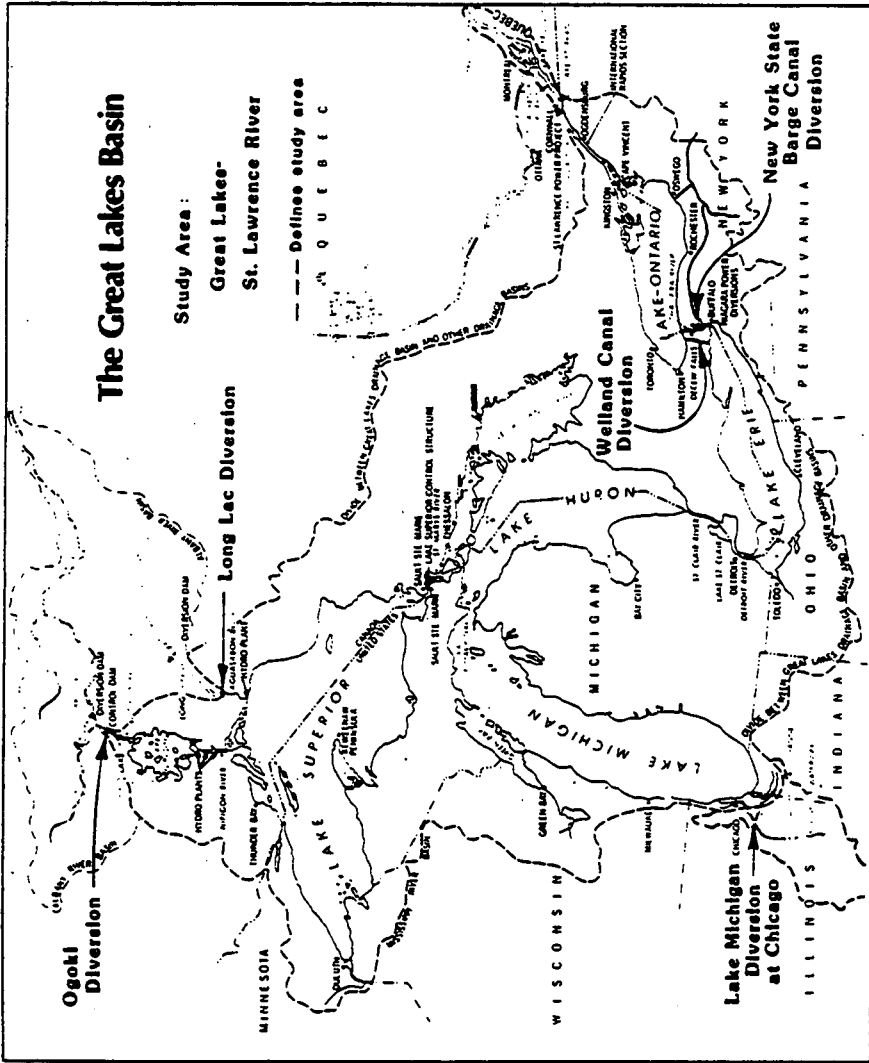


Figure 1

The hydroelectric installations in the Great Lakes Basin produce much cheaper power than thermal plants using fossil or nuclear fuels. They produce far more energy than most other hydroelectric plants of the same installed capacity because the Great Lakes have the unique feature of an extremely high degree of natural regulation.¹³ The existing hydroelectric

13. The existing hydroelectric plants affected by regulation of the Great Lakes have a total installed capacity of nearly 8 million kilowatts, of which almost 5 million are in Canada, and over 3 million in the United States. The principal hydroelectric power producers are the publicly-owned utilities.

Table 1. Great Lakes Data.

PHYSICAL						
Lake	Drainage area (square miles)			Storage capacity CFS months per foot	Length of shoreline including islands (miles)	
	Water surface	Land area	Total		U.S.A.	Canada
Superior	31,700	49,300	81,000	337,000	1,245	1,481
Michigan	22,300	45,600	67,900	481,000	1,638	0
Huron	23,000	51,800	74,800		955	3,119
St. Clair	400	6,100	6,500	5,000	171	149
Erie	9,900	23,600	33,500	105,000	543	460
Ontario	7,600	27,200	34,800	80,000	713	758
TOTALS	94,900	203,600	298,500	1,008,000	5,265	5,967

NOTE: Water areas do not include the connecting channels. Land areas and shoreline lengths include the area up to the outlet of the upstream lake. For Lake Ontario the land area and shoreline length also include the St. Lawrence River downstream to the Saunderson-Moses Dam.

HYDROLOGIC											
Lake	Monthly mean elevations IGLD (1955)				Annual fluctuation (feet)			Outlet river	Monthly outflows CFS		
	Maximum	Mean	Minimum	Range	Maximum	Mean	Minimum		Maximum	Mean	Minimum
Superior	602.1	600.4	598.2	3.9	1.9	1.1	0.4	St. Mary	127,000	75,000	41,000
Michigan-Huron	581.9	578.7	575.4	6.5	2.2	1.1	0.1	St. Clair	245,000	188,000	99,000
St. Clair	576.2	573.1	569.9	6.3	3.3	1.8	0.9	Detroit	246,000	189,000	100,000
Erie	573.5	570.4	567.5	6.0	2.7	1.5	0.5	Niagara	265,000	202,000	116,000
Ontario	248.1	244.8	241.4	6.7	3.5	1.9	0.7	St. Lawrence	350,000	240,000	154,000

NOTE: Mean outflow from Lake Michigan through Mackinac Strait is estimated to be 52,000 CFS.

RAINFALL AND RUNOFF				
Lake	Annual precipitation (inches)			Runoff (annual mean in inches)
	Maximum	Minimum	Mean	
Superior	38.0	24.0	29.7	12.4
Michigan	37.8	22.2	31.2	11.1
Huron	39.0	25.8	31.3	11.1
Erie	42.6	24.5	33.8	10.2
Ontario	43.7	27.6	34.3	10.5

plants affected by regulation of the Great Lakes have a total installed capacity of nearly eight million kilowatts, of which over three million are in the United States and almost five million in Canada.

The institutional setting¹⁴ is defined primarily by the two federal systems of the United States and Canada in which responsibility for governance is shared by the federal, state (provincial), and local governments within each system. Basin governance is diffused among two federal governments, eight states and the province of Ontario¹⁵, as well as numerous regional, local, and special-purpose districts of government. In addition, international institutions have been developed to aid in cooperative approaches to Great Lakes Basin resource protection and management.

Table 2 describes the basic international institutional framework for governing the Great Lakes.

14. For an excellent discussion of the institutional setting, see generally GREAT LAKES TOMORROW, *supra* note 8, at § III, *Governing the Basin Ecosystem*.

15. The states are New York, Pennsylvania, Ohio, Indiana, Illinois, Michigan, Wisconsin, and Minnesota. While the Great Lakes are bounded in Canada by the province of Ontario only, the St. Lawrence drainage and the results of Great Lakes management have substantial effects in the province of Québec.

USES OF THE WATERS AND RELATED LAND RESOURCES

Reacting to the high water levels in the Great Lakes in 1976, in 1977 the two nations authorized a study by the IJC of diversions and consumptive uses of Great Lakes waters. Table 3 provides information on the amount of water withdrawn for various uses and the amounts of water lost to the atmosphere and, thus, not returned to the Lakes.

Table 2. Canada-United States Cooperation on the Great Lakes

1. Treaty between the United States and Great Britain Relating to Boundary Waters and Questions Arising Between the United States and Canada (Boundary Waters Treaty), 1909.
International Joint Commission, 1912
Great Lakes Water Quality Agreement, 1972
Great Lakes Water Quality Agreement, 1978
2. Treaty of Niagara Falls, 1950
3. Convention on Great Lakes Fisheries, 1955
Great Lakes Fisheries Commission, 1956
Joint Strategic Plan for the Management of Great Lakes Fisheries, 1981.

Francis, *How Governments Behave*. GREAT LAKES TOMORROW. DECISIONS FOR THE GREAT LAKES 103 (1982).

Table 3. Water Withdrawals and Water Consumed for the Entire Great Lakes: United States and Canada

Water Uses	Withdrawals* 1978 (cfs)	Consumed** 1975 (cfs)
Manufacturing	26,030	2,500
Municipal	7,060	830
Power	40,070	480
Irrigation	480	360
Rural-	560	330
Domestic	1,210	250
Mining	210	210
Livestock	76,000	4,900
<i>Rounded totals</i>	66,600	4,300
<i>Country:</i> United States	9,400	600
Canada		

*Withdrawals are waters taken from the Great Lakes for use.

**Consumed waters are that portion of withdrawals not returned to the Great Lakes.

INTERNATIONAL JOINT COMMISSION. GREAT LAKES DIVERSIONS AND CONSUMPTIVE USES (report to the two governments made under the Reference of February 21, 1977), at 28 (Jan. 1985).

Table 4 provides information on a wider array of water and related land uses for the year 1970, and focuses on the effects of change that may take place by the year 2020 for each of the various resource categories.

Recirculation practices could reduce the amount of municipal and industrial wastewater needing treatment, while at the same time implementing the goals of the Federal Water Pollution Control Act Amendments of 1972.¹⁶ It is hoped that by the year 2020 implementation of progressive federal and state legislation, coupled with pollution control management systems, will be effective so that the Great Lakes Basin environment will be minimally affected by discharges from municipal and industrial wastewater treatment facilities. The Great Lakes are presumed able to provide all of the water required for cooling condensers in the production of energy, the withdrawals judged not to have a significant effect upon the quantity or quality of the lakes' waters. However, the location of power plants along or near the shorelands implies a significant increase in the amount of shoreland allocated to power plant construction, with elimination of valuable waterfowl and fish habitat.¹⁷ The large increase in electrical power demands expected in the Great Lakes Basin will require

Table 4. Significant Environmental Changes Due to Growth and Proposed Framework Programs: Great Lakes Basin.

Resource Use Categories	Units	Base Year (1970) Condition	Projected (2020) Condition	Future Change- Ratio of 2020 to 1970 Condition
Water supply ¹	MGD	15,427.9	31,351.7	2.0
Irrigation	MGD—consumption	682.1	2,763.5	4.1
Mining	1000 acres disturbed	65.4	571.8	8.7
Thermal power cooling	MGD—cooling consumption	165	2,220	13.4
	1000 acres of plants ¹	4.6	68.9	15
Municipal wastewater discharge	MGD—effluent requiring treatment	3,063.7	9,787.0	3.2
Sport fishing	1000 angler days	80,700.0	153,500.0	1.9
Recreational boating	1000 boat days	29,010.0	39,850.0	1.4
Commercial navigation	Million tons/year accommodated	343.0	754.3	2.2
Agricultural land—treatment	1000 acres	20,453.0 ²	15,500.0	.76
Agricultural land—cropland drainage	1000 acres	6,213.0 ²	2,610.0	.42
Forest land—treatment	1000 acres	27,930.0 ²	21,800.0	.78
Shoreland erosion	Miles protected by structures	317.7	521.8	1.6
Streambank erosion	Miles protected	346.5	3,277.0	9.5
Flood damage prevention	Thousand \$ AAD (average annual damages)	60,609.0	222,548.0	3.7
Wildlife management	1000 acres	74,818.0 ²	79,739.0	1.1
Outdoor recreation	1000 recreation days	637,167.0	1,863,787.0	2.9

¹Assumes maximum land required for plants at .17 acres per megawatt of installed capacity.

²For municipal, self-supplied industrial, and rural domestic water supplies.

³1960 data.

⁴Land requiring treatment—ratio of 2020 to 1970 indicates portion of these needs met.

GREAT LAKES BASIN COMMISSION, ENVIRONMENTAL IMPACT STATEMENT OF THE GREAT LAKES BASIN FRAMEWORK STUDY PROGRAM 26 (1976).

16. Federal Water Pollution Control Act Amendments of 1972, Pub. L. No. 92-500, 86 Stat. 816.

17. The dissipation of heated water discharge from thermal power plants could have serious localized effects upon wildlife and fishery habitat by increasing the water temperature to unacceptable limits. By 2020, a major portion of the total energy produced in the Great Lakes Basin may be from nuclear power plants. The potential threat of nuclear accident and radiological contamination requires stringent public health and environmental safeguards.

adequate land for power plant sites and transmission line rights-of-way.¹⁸ Problems of aesthetics and land loss and disruption result from distribution and transmission lines. However, many manufacturers and utilities have developed new designs and materials which can improve the appearance of these power facilities.

With the exception of petroleum, natural gas, and a few other resources, mineral reserves within the Great Lakes Basin are adequate to meet projected demands. Mineral-bearing land requirements are expected to grow about 900 percent by the year 2020. In addition, certain mineral producers need large acreages for processing plant sites, ore storage areas, overburden and waste rock dumps, and tailings ponds. State policy for each individual state controls drilling for oil or gas in the beds of the Great Lakes. Offshore drilling presents a possibility for environmental damage; an appraisal of the value, location, and extent of mineral deposits in beds of the Great Lakes is needed and then decisions can be made on the feasibility of lakebed mining.

Projected flood damages in the Great Lakes Basin, excluding flooding on the lakes, can be alleviated through a two-pronged approach to flood plain management which includes nonstructural and structural measures. By 2020, approximately 54 percent of the urban flood damage that could occur and 39 percent of the rural flood damage that could occur in the basin will have been alleviated through structural measures.¹⁹ Non-structural measures such as flood plain management and zoning regulations are also projected.

The environmental effects of channel maintenance and selected segmented deepening would be felt in: (1) the extent of polluted or unpolluted dredged material removed; (2) the negative short-term effect of dredging on water quality and benthic population; (3) the land required for disposal of dredged material (often including valuable fish and wildlife habitat); (4) the land required for harbor area development stimulated by channel and harbor deepening.

The effects of dredging on aquatic flora and fauna are variable, and a site-by-site analysis of impacts would be required to judge their severity. Waterfowl and waterfowl habitat need to be protected from on-land disposal practices. Adverse effects could lead to disturbance of valuable fish-

18. The land requirement for thermal plants varies from about 0.09 acres/MW to 0.17 acres/MW, depending on the size and type of plant. For the steam generating capacity projected to be installed in the Basin by 2020, and using the 0.17 acres/MW figure, the amount of land required for thermal plants would be about 69,000 acres. Assuming 150 to 200 plant sites would be required, all situated on the lakeshore, a maximum of about 200 miles of shoreline would be needed.

19. These measures include reservoir storage, channel modification, levees, and flood walls which will significantly disrupt fish and wildlife habitat both in the areas of construction and in other areas that depend on periodic flooding to maintain their productivity.

spawning areas, increased temperatures in side channels and wetland areas, extended periods of turbulence, and increased gouging of shoreland. Although recreational diversity and opportunity is a desirable goal for the Great Lakes Basin, more intensive use of existing lakes and streams will burden some already over-used resources. The problem now and in the future for basin wildlife is the influx of people. An accelerated rate of attrition of habitat is occurring with wetlands, the highest-value habitat, the most affected. Destruction of shore wetlands is proceeding at an alarming rate. In nearly all of the Great Lakes land areas, the demands for consumptive and nonconsumptive wildlife uses are projected at least to double. Considering the fact that total basin wildlife area demand exceeds supply, and that the supply in terms of acres of wildlife habitat may be steadily diminished in the future, accommodation of any major increase in the current demand is not at all likely.

ISSUES, CURRENT STATUS, AND FUTURE OUTLOOK

*Water Quality*²⁰

Following the 1909 Treaty, from 1912 until the present day, Canada

20. Prior to the establishment of the IJC in 1909, under the Boundary Waters Treaty, Jan. 11, 1909, United States-United Kingdom, 36 Stat. 2448, 2451, T.S. No. 548, the United States had established two commissions, in 1906 and 1908, to investigate water pollution in Lake Erie and Lake Michigan. In both of these early commissions and the subsequent studies under the IJC, the part played by the sanitary engineers of the United States Public Health Service was significant. The 1912 Reference for the IJC to study pollution in the Great Lakes coincided with the establishment of the "Cincinnati Group" of sanitary engineers, chemists, bacteriologists, and biologists at the newly authorized Water and Sanitation Investigations Station of the Public Health Service at East Third and Kilgore Streets, under the federal laws of 1912.

It was this group that included among its members sanitary engineer officers of the Public Health Service. One young engineer, John K. Hoskins, saw his dream fulfilled 36 years later when, as Assistant Surgeon General, he provided the leadership in Washington under Surgeon General Thomas Parran that saw the enactment of the first comprehensive Federal Water Pollution Control Act, Pub. L. No. 845, 62 Stat. 1155 (1948).

Building further on this background, the Public Health Service under the Water Pollution Control Act of 1948 initiated and brought to completion by 1953 the beginning phases of comprehensive water quality programs for the major river and lake basins of the nation, including the Great Lakes. Further work produced FEDERAL WATER POLLUTION CONTROL ADMIN., U.S. DEP'T OF THE INTERIOR, A PLAN FOR WATER POLLUTION CONTROL: LAKE ERIE REPORTS (1968). It was this work that was in progress that played a leading role in the development of the reports made to the IJC and by the IJC to the governments in 1970 which led to the 1972 Great Lakes Water Quality Agreement. In the interim years Hoskins, along with engineers Ralph Tarbett, Harold Streeter (of Streeter-Phelps equation fame), Leslie Frank, and "potomologist" Professor Earl Phelps, as he once called himself, and others completed studies of the Great Lakes for the IJC; formulated many of the scientific principles underlying pollution survey and control theory; and restudied the boundary waters under the 1946 reference. It was fortunate, too, that the Public Health Service had, between 1938 and 1943, completed the monumental study of pollution of the Ohio River, U.S. PUBLIC HEALTH SERVICE & U.S. ARMY CORPS OF ENGINEERS, THE OHIO RIVER REPORT, House Doc. 299, 78th Cong., 1st Sess. (1943). The guidance of this report, specifically that part dealing with water quality objectives and planning processes, played a major role in the successful studies, if not the implementation, of the 1946 Reference and the 1950 report to the IJC.

and the United States have authorized investigations and struggled with the development of procedures to control the pollution of the boundary waters of the Great Lakes, excluding Lake Michigan. A synopsis of these activities follows:

- 1912 The two governments refer the matter of pollution of the Great Lakes to the IJC.
- 1918 IJC reports to the governments that "... situation along the frontier is generally chaotic, everywhere perilous and in some cases disgraceful."²¹
- 1920 Canada proposes a treaty to control pollution to the United States; agreement was not reached.
- 1946 Reference sent to IJC similar to 1912 reference pertaining to the St. Clair River, Lake St. Clair, and the Detroit River.²²
- 1946 Reference extended to include St. Mary's River.²³
- 1948 Reference extended to include Niagara River.²⁴
- 1954 In Report on Reference, IJC found injury being caused to health and property from municipal and industrial wastes and shipping sources, and recommended the governments adopt specific water quality objectives and extend authority of IJC to maintain surveillance of water quality to insure achievement of quality objectives. The governments approved both recommendations and further authorized establishment of Advisory Boards on each of the connecting channels to report semiannually to the IJC.²⁵
- 1964 Reference resulting from deteriorating conditions in Lakes Erie and Ontario was given to IJC by the two governments.²⁶
- 1970 Final report submitted by IJC to the two governments relative to the 1964 Reference.²⁷ Between 1964-70, the IJC's International Advisory Boards submitted ten semi-annual reports, three major interim reports, and a special report on oil drilling.²⁸ In addition, six public hearings were held by the Boards, and further public hearings were held by the IJC.
- 1969- Various activities, including the formation of the Canadian De-

21. INTERNATIONAL JOINT COMMISSION, FINAL REPORT ON THE POLLUTION OF BOUNDARY WATERS REFERENCE (1918).

22. 1946 IJC Docket No. 54.

23. *Id.*

24. 1948 IJC Docket No. 55.

25. INTERNATIONAL JOINT COMMISSION, POLLUTION OF BOUNDARY WATERS (1951); INTERNATIONAL JOINT COMMISSION, SAFEGUARDING BOUNDARY WATER QUALITY (1961) (a cooperative effort between the United States and Canada under International Treaty).

26. 1964 IJC Docket No. 83.

27. INTERNATIONAL JOINT COMMISSION, POLLUTION OF LAKE ERIE, LAKE ONTARIO, AND THE INTERNATIONAL SECTION OF THE ST. LAWRENCE RIVER (1970).

28. INTERNATIONAL LAKE ERIE WATER POLLUTION BOARD, POTENTIAL OIL POLLUTION INCIDENTS FROM OIL AND GAS WELL ACTIVITIES IN LAKE ERIE-THEIR PREVENTION AND CONTROL (Sept. 1969).

- 1972 partment of the Environment and the U.S. Environmental Protection Agency.²⁹
- 1972 On April 15, 1972, the Great Lakes Water Quality Agreement was signed in Ottawa by President Richard Nixon and Secretary of State William Rogers for the United States, and by Prime Minister Trudeau and Secretary of State for External Affairs Mitchell Sharp for Canada.³⁰
- 1972 The Water Quality Agreement of 1972 attached two additional references as tasks to be undertaken by the IJC.³¹
- 1978 Following the first five-year review, the Great Lakes Water Quality Agreement of 1978 was signed at Ottawa on November 22, 1978.³²
- 1979 The IJC in May 1979 provided the two governments with a report on water quality of the upper Great Lakes.³³
- 1980 The IJC in March 1980 provided the two governments with a report on pollution in the Great Lakes Basin from land use activities.³⁴
- 1981 The IJC in January 1981 provided the two governments with a special report on pollution in the Niagara River.³⁵

The Water Quality Agreements: 1972 and 1978

The texts of the Agreements in English and in French run over seventy pages (1972) and fifty pages (1978). A side-by-side comparison of the

29. Canada-U.S. consultation in anticipation of IJC's final report (1969); Ministerial meeting in Ottawa to set phosphorus limits on detergents (1970); U.S. Environmental Protection Agency formed (1970); First Great Lakes Environmental Conference of Governors (1970); Canada Dept. of the Environment formed (1971); Second Ministerial meeting (1971); Canada Federal Government and Province of Ontario Agreement on Lower Great Lakes (1971); and draft texts of agreements (1971-72).

30. Canadian Department of the Environment, *A History and Analysis of the Agreement Between Canada and the United States on Great Lakes Water Quality* (Sept. 18-22, 1972) (prepared for the NATO/CCMS Workshop Symposium at Presque Isle).

31. Great Lakes Water Quality Agreement, April 15, 1972, United States-Canada, 23 U.S.T. 301, 24 U.S.T. 2268, T.I.A.S. Nos. 7312, 7747 (with Appendix I dated November 21, 1973). The first reference was to study pollution in the Great Lakes System from agricultural, forestry, and other land use activities. The second was to study pollution problems of Lake Huron and Lake Superior.

32. Great Lakes Water Quality Agreement, November 22, 1978, United States-Canada, 30 U.S.T. 1384, T.I.A.S. No. 9257.

33. INTERNATIONAL JOINT COMMISSION, *WATER QUALITY IN THE UPPER GREAT LAKES* (May, 1979).

34. INTERNATIONAL JOINT COMMISSION, *POLLUTION IN THE GREAT LAKES BASIN FROM LAND USE ACTIVITIES* (March 1980).

35. INTERNATIONAL JOINT COMMISSION, *SPECIAL REPORT ON POLLUTION IN THE NIAGARA RIVER* (January 1981). Annual or biennial reports of the IJC, the Water Quality Board, the Science Advisory Board, or of special committees established by those entities have not been included in the summary. Copies of most publications of the Great Lakes Water Quality Agreement agencies can be received by writing the International Joint Commission, Great Lakes Regional Office, 100 Ouellette Avenue, Windsor, Ontario N9A 6T3, or the Canada or United States Sections IJC in Ottawa, Ontario, or Washington, D.C., respectively.

Tables of Contents of the two agreements, excluding Annexes, is provided here, together with brief notes to indicate the topics and changes in the substance of the agreements as stated in the IJC's Second Biennial Report.³⁶

Agreements 1972

Article I—Definitions³⁷

No Comparable Article

Article II—General Water Quality Objectives

Article III—Specific Water Objectives

Article IV—Standards and Other Regulatory Requirements

Article V—Programs and Other Measures

Article VI—Powers, Responsibilities and Functions of IJC

Article VII—Joint Institutions

Article IX—Consultation and

Agreements 1978

Article I—Definitions³⁸

Article II—Purpose

Article III—General Objectives

Article IV—Specific Objectives

This includes a non-degradation clause: a policy that flow augmentation is not a substitute for adequate treatment; exclusion of in-shore areas where natural phenomena prevent achievement of objectives; designation of limited use zones.

Article V—Reiterates Prohibition against flow augmentation as a substitute for adequate treatment.

Article VI—Programs and Other Measures. Changes compliance date from 12/31/75 to 12/31/82.

Requires pretreatment for industrial waste; establishment of effective enforcement programs; adds new sections on Industrial Sources, Inventories, Eutrophication, Pollution from Land Uses, Persistent Toxics, and Airborne Pollutants.

Article VII—Powers, Responsibilities and Functions of IJC.

Changes "Great Lakes Water Quality" to "Great Lakes Basin Ecosystem" with regard to research and investigation authority. Changes reporting schedules.

Article VIII—Joint Institutions and Regional Office. Changes the function of the Regional Office from "... to assist it [the ICJ] in the discharge of its functions" to "... provide ... support and ... assistance to the two Boards. . . ."

Article X—Consultation and Review

36. INTERNATIONAL JOINT COMMISSION: SECOND BIENNIAL REPORT UNDER THE GREAT LAKES WATER QUALITY AGREEMENT OF 1978 TO THE GOVERNMENTS OF THE UNITED STATES AND CANADA AND THE STATES AND PROVINCES OF THE GREAT LAKES BASIN (December 1984) [hereinafter cited as SECOND BIENNIAL REPORT].

37. These pertain, in part, to Boundary Waters, Boundary Waters Treaty, Great Lakes System, Harmful Quantity, Hazardous Polluting Substance, Phosphorus, and Specific Water Quality Objectives.

38. *Id.* The 1978 Definitions also include Great Lakes Basin Ecosystem, Monitoring, Research, Surveillance, and Toxic Substances.

Review	In lieu of prior five-year review, review following third biennial report.
Article X—Implementation	Article XI—Implementation
Article XI—Existing Rights and Obligations	Article XII—Existing Rights and Obligations
Article XII—Amendment	Article XIII—Amendment
Article XIII—Entry into Force and Termination	Article XIV—Entry into Force and Termination
	Article XV—Supersession changes reference to "Great Lakes Water Quality Agreement of 1978."

The short phrases selected for the topics discussed in this section inadequately reflect the Commission's voice, tone, and balanced concerns. It is important to recognize their concerns for: the integrity and validity of the agreement; a presentation that tells of gains and unattained objectives; a proper reading of the responsibilities of the two governments, their federal partners of state, provincial, and local levels; and the responsibilities of the two societies, the citizens of the two democracies who have the ultimate responsibility. Finally, the Commission speaks to its own role with a sense of historic perspective. It relates explicitly to its traditional place in Canada-United States relations; it does not want to be saddled with performance tasks, and budgets and administration, that are the proper work of others; and it wants certainly to be free to carry out its essential role of advising governments.³⁹

The Commission opened its Second Biennial Report noting that:

In the twelve years since Canada and the United States signed the 1972 Great Lakes Water Quality Agreement, the Commission's advisory boards have reported annually on progress in meeting the Agreement goals. In 1972, the Great Lakes Basin community faced serious problems that threatened the ecology of the lakes and the uses of this large natural resource. The substantial efforts and funds directed by Governments have not eliminated the problems, but important milestones have been reached.⁴⁰

The Commission closed this opening note by saying:

There are limits to what technical and scientific programs can accomplish when fundamental elements are not only technological but also societal and attitudinal. As technological and scientific limitations on progress become more apparent, the challenge becomes increasingly one of engaging public support for the new approaches and programs that are needed.⁴¹

39. On a personal note, as an observer of the IJC for four decades and as a friend or working colleague of many of the Commissioners and staffs on both sides, the author's admiration must be expressed for the fairness, objectivity, and willingness to serve in the best public-service tradition that pervades this agency.

40. SECOND BIENNIAL REPORT, *supra* note 36, at 1.

41. *Id.*

The Commission report addressed four major areas: (1) Progress Under the Agreement; (2) Problems of the Management of Science Under the Agreement; (3) Ecosystem Approaches and Their Implications; and (4) Roles Under the Agreement.

Under the first area, the report states that controlling eutrophication through the management of phosphorus was a main focus of the 1972 Agreement. The goal was to reduce phosphorus concentrations to 1.0 milligram per litre in municipal wastewater treatment plants discharging more than one million gallons per day, and to limit phosphorus in household detergents. Regarding these point sources of pollution, the report stated that Canada and the United States had spent more than \$7.6 billion to construct and upgrade municipal plants in the basin.⁴² The report also explains that unless non-point sources of phosphorus pollution from land use, agriculture, forestry, mining, and similar activities, are controlled, the full extent of the phosphorus problem will not be addressed.⁴³

Continuing under the Progress area, the report notes that:

Unlike the efforts to control phosphorus, there had been limited success in coming to grips with the overall problem of toxics in the Great Lakes basin. . . . [I]t is becoming increasingly apparent that their individual, combined, and long-term effects do present serious environmental problems. . . . The Commission has previously recommended that a comprehensive toxic substances control strategy be implemented by Governments.⁴⁴

42. Though significant progress has been made . . . 39 of the 390 major (municipal treatment) facilities in the basin missed the December 31, 1982 construction deadline and difficulties have been encountered in operating some plants to their design capabilities. In November, 1983 . . . nine major municipal . . . plants in the lower lakes were still discharging effluents with phosphorus concentrations exceeding the 1 mg/litre limit. These . . . control programs have improved water quality. Nutrient goals for Lake Superior have been met; Lakes Erie and Ontario continue to show declines in phosphorus concentrations; Saginaw Bay on Lake Huron . . . is also improving. The Commission reminds the Parties, however, of their commitment in the 1978 Agreement to achieve the effluent discharge requirement of 1 mg/litre at all major municipal waste treatment facilities and where necessary to reduce the effluent discharge to 0.5 mg/litre in order to meet target goals.

Id. at 3.

43. The Commission again recommends a comprehensive strategy be developed for dealing with non-point pollution, including phosphorus. . . . While there have been some successful demonstration programs . . . a wide-spread, coordinated, and systematic approach has not been implemented.

Id. at 4.

The Commission then reminds the Governments that in signing Annex 3 of the Agreement they confirmed their commitment to specific phosphorus reductions, and concludes by noting:

The Commission reiterates its support for the kind of broadly-based efforts such as those outlined by the Commission's Task Forces on Non-Point Source Control (1983) and Phosphorus Management Strategies (1980) as well as the Commission's 1981 Supplemental Report on Phosphorus Management Strategies.

Id.

44. *Id.* at 4. The Commission called also for more research in the area of toxics, specifically for new and broader technologies to treat toxic chemicals, for pre-treatment technologies for certain industrial wastes, and for the disposal on land or through incinerator of toxic materials.

Although, as the IJC noted, the Agreement does not explicitly address groundwater problems, it recommended that the Parties give serious attention to developing toxic monitoring strategies for groundwater resources in the Great Lakes region.⁴⁵ The Commission reported its support for the application of an "ecosystem approach" to research and monitoring of the transport and behavior of toxic materials concerning water and air bases throughout the Great Lakes Basin.⁴⁶ The Commission also raised its concern about the adequacy of present risk assessment methods and the confidence placed in them.

Areas of concern that do not conform to the requirements of the Agreement occur throughout the system and, despite considerable attention from governments and the public, eighteen "Class A" areas of concern remain the same as in 1981.⁴⁷ The ecosystem of the Niagara River and Lake Ontario was pointed out as one example which "will continue to be degraded by pollutants for the foreseeable future."⁴⁸ Twenty-one "Class B" areas also remained of concern but, because of low priority, they may be "neglected until their problems escalate."⁴⁹

Water quality goals include reference to thirty-eight specific objectives for chemical substances. The IJC has recommended new or revised objectives for eleven of these. While the limitations of using single water quality parameters for assessing progress are recognized, they are a basic part of the current Agreement.

The concept of "limited use zones" is included in Article IV of the agreement but, after formal adoption by the United States, the U.S. Environmental Protection Agency informed the Commission that such zones are inconsistent with U.S. domestic law. The Commission "believes that the Parties should consult at the earliest opportunity to resolve this issue and provide clarification to the Commission."⁵⁰

Finally, in addressing the subject of Progress Under the Agreement, the IJC stated that it "is not satisfied that the information it now receives enables it to assess adequately programs and progress required under the Agreement." The Water Quality Board has formed a committee to review the Commission's information needs and to recommend appropriate data requirements.⁵¹

45. *Id.* at 5.

46. See INTERNATIONAL JOINT COMMISSION, REPORT OF WORKSHOP ON A TRANSBOUNDARY MONITORING AND SURVEILLANCE NETWORK (Oct. 1984) (Philadelphia Academy of Natural Sciences).

47. SECOND BIENNIAL REPORT, *supra* note 36, at 7.

48. *Id.*

49. *Id.*

50. *Id.* at 8. In connection with this concept, reference should be made to Agreement Article IV which states that "flow augmentation is not a substitute for adequate treatment." Where "limited use zones" are intended to provide an area of a lake for dilution purposes, such action would appear inconsistent with Article IV as well as with U.S. domestic law.

51. SECOND BIENNIAL REPORT, *supra* note 36, at 9.

Under the second major area, Problems of Management, the Commission combines a number of previous concerns into an entirely new and vital dimension of its supervisory responsibilities. The problem is the design of a Science Policy for the Great Lakes Basin. The background summary statement is an excellent description of current problems in planning, funding, administration, and management of science under the Agreement. The Commission expresses concern for scheduling and allocation of funds, availability of expertise, uncertain levels of support, timing of awards and receipt of funds, and effects on personnel and coordination. Similar concerns are expressed regarding planning of scientific research, priorities, and laboratory operations. The Commission encourages the Parties to take steps to address these concerns.⁵²

The third major area, Ecosystem Approaches, reflects a restatement of the IJC's commitment to an ecological approach to resource management in which land, water, air, and biota interact and are mutually influenced. "A seemingly unrecognized dimension [is] the extent to which institutional arrangements limit the ability of scientists and scientific institutions to focus on relevant research leading to the technical resolution of environmental problems."⁵³

The first recommendation of the Commission's first biennial report stated:

[T]he Commission recommends therefore that: 1. Parties, Jurisdictions and others foster and encourage policies, programs and institutions that (a) help develop and maintain a long-term ecosystem perspective with respect to their other legitimate goals and to be more anticipatory in their actions.⁵⁴

In the final major area, Roles Under the Agreement, the Commission, after indicating that the agreement is between the two governments, made

52. *Id.* at 11-12. A series of Canada-U.S. University Seminars addressed, from 1971-1977, the problem of improving the management of the international Great Lakes. The second seminar recommended that the two governments formulate a science policy for the Great Lakes as an indication of their commitment to restore, rehabilitate and improve the management of the Lakes and to support the development of new knowledge needed by decisionmakers. Subsequently, the two co-chairmen of the seminars, Professor George Francis of the University of Waterloo in Ontario, and Professor Leonard Dworsky of Cornell University in Ithaca, New York, were appointed members of the Societal Aspects Expert Committee (SAEC) of the IJC's Research (later Science) Advisory Board. The draft minutes of the 26th Research Advisory Board meeting, May 23, 1978, note that Dworsky as chairman of the SAEC proposed an SAEC agenda of six items, one of which was "A Science Policy for the Great Lakes." The draft minutes of the 27th meeting note that Professor Francis led further discussion to clarify the idea. While the idea was accepted as a vital question which should be given further attention, implementation of further action was not accomplished due to lack of resources.

53. SECOND BIENNIAL REPORT, *supra* note 36, at 13.

54. INTERNATIONAL JOINT COMMISSION: FIRST BIENNIAL REPORT UNDER THE GREAT LAKES WATER QUALITY AGREEMENT OF 1978 TO THE GOVERNMENTS OF THE UNITED STATES AND CANADA AND THE STATES AND PROVINCES OF THE GREAT LAKES BASIN I (June 24, 1982) [hereinafter cited as FIRST BIENNIAL REPORT].

it clear that the role of the IJC is one of assisting the two governments. In clarifying its specific role, the Commission says that "... it must insure that its own integrity as an independent commentator on governmental programs be maintained."⁵⁵

In an unambiguous statement, the Commission wrote:

[I]t is the task of federal, state and provincial governments to integrate and coordinate governmental activities, supply scientific personnel and provide technical and financial resources. They can foster public consultation and promote discussions which focus public consideration of Agreement principles and issues and provide the public with a credible base of information.⁵⁶

ADDITIONAL ISSUES

*Lake Levels and Flows*⁵⁷

The very large size of the Great Lakes creates, to a high degree, a self-regulatory mechanism. Variations of two to three feet from the long-term average affect shore property, navigation, and power interests. Shore property owners seek a stable water level regime; navigation is best served by high water levels; and hydropower generation prefers maintenance of minimum flows as large as feasible. The issue of lake levels and flows has been the search for a balancing of benefits and detriments among

55. SECOND BIENNIAL REPORT, *supra* note 36, at 15.

56. The Commission wrote:

Specifically it is the prerogative and responsibility of governments to undertake, among other things, the following:

- (a) adoption of new water quality objectives;
- (b) provision of reliable information for adequate program assessment;
- (c) development of demonstration programs for non-point source reduction of phosphorus and other pollutants;
- (d) consideration of a comprehensive toxic substance strategy; and
- (e) implementation of clean-up programs in areas of concern.

Id. at 15. This summary of the main areas considered by the IJC in its second biennial report provides some idea of the tasks involved in carrying out the Great Lakes Water Quality Agreements of 1972 and 1978.

57. INTERNATIONAL JOINT COMMISSION, FURTHER REGULATION OF THE GREAT LAKES (1976). See also EIC&ASCE, PROCEEDINGS, *supra* note 4; INTERNATIONAL JOINT COMMISSION, GREAT LAKES DIVERSIONS AND CONSUMPTIVE USES (Sept. 1981); INTERNATIONAL JOINT COMMISSION, LAKE ERIE WATER LEVEL STUDY (July 1981); INTERNATIONAL JOINT COMMISSION, GREAT LAKES BASIN FRAMEWORK STUDY, Appendix 11 (1975); *Great Lakes Water Level Problems, Hearings Before the Senate Comm. on Foreign Relations*, 94th Cong., 2d Sess. 33-34 (1976); *The Great Lakes: Hearings Before the Subcomm. on InterAmerican Affairs of the House Comm. on Foreign Affairs*, 93rd Cong., 1st Sess. 634-713 (1973) [hereinafter cited as *The Great Lakes Hearings*]; and Dworsky, *Setting Great Lakes Water Levels: Institutional Aspects of the IJC* (1974) (Great Lakes Mgmt. Ser. Working Doc. No. 3).

these interests.⁵⁸ In 1985 the consensus was that further regulation of the Great Lakes, except for modest adjustments in outflow rates for Lakes Superior and Ontario using available regulatory devices, is not justified. Instead, heavy reliance must be placed on man's adjustment to and respect for the natural self-regulation of the lakes.

Waterway Transportation

A 1980 Workshop on Anticipatory Planning listed sixteen major problems of concern in the planning, developing, and monitoring of a Great Lakes regional transportation system.⁵⁹ While there is a Great Lakes Waterway System, it should not be inferred that there is unified system management. In fact, there is a Canadian system, and an American system; the workings, however, are primarily cooperative. Changes in the Welland Canal are the responsibility of that ownership. Winter navigation studies were primarily a responsibility of the Corps of Engineers. The study of the potential for an All-American Canal some years ago was a unilateral study on the American side. Perhaps the future is more clouded than ever before by the new policies on deregulation. It will bear watching to see if a free marketplace and more open competition will operate to rationalize who will be carriers of what at what prices, and what the Great Lakes Water Transportation System will look like when the dust settles.

Fisheries

The Great Lakes Fisheries Commission (GLFC), established in 1955, initiated the long needed task of changing the direction of exploitation of Great Lakes fisheries towards one of protection, if not yet one of

58. In 1964 the two governments requested the IJC to determine whether further regulation of Great Lakes levels would be in the public interest. Existing regulation was provided at the St. Mary's River for Lake Superior and at the St. Lawrence power facilities for Lake Ontario; the other lakes were unregulated directly, but may be affected by Lake Superior controls. When, nine years later, such studies had not ever been concluded by the agencies responsible for reporting to the IJC, the U.S. Congress authorized a study to see what effect diversions up to 10,000 cfs at Chicago would have on lake levels. *The Great Lakes Hearings*, *supra* note 57. In addition, a study of the general problem of diversions and consumptive uses of Great Lakes water was authorized in February 1977. INTERNATIONAL JOINT COMMISSION, GREAT LAKES DIVERSIONS AND CONSUMPTIVE USES, a report to the governments of Canada and the United States made under the Reference of February 21, 1977.

59. Four of these involved the management of available economic and environmental data to facilitate planning; three were environmental in nature and concerned dredging, transportation-related environmental problems, and recreation; five concerned either technical or economic equations including length of navigation season, intermodality and intersystem considerations, locks and channels, port planning, and the relation of the Great Lakes system to the nation's water needs; the other four involved energy transport and consumption, future outlook, Corps of Engineers studies in relation to IJC activities, and a general catch-all of other factors.

restoration or rehabilitation. Professor Henry Regier has noted that by 1960:

[a]ll the major traditional commercial fisheries on the Great Lakes were in a shambles of collapse. . . . The most important proximate causes in the twenty year period prior to 1960 were: eruptions of exotic sea lamprey, alewife and smelt; improper fishing, especially by some commercial interests; eutrophication and its ramifications; and nearshore pollution by obnoxious and toxic materials.⁶⁰

The GLFC had limited responsibilities. The Great Lakes Water Quality Agreement had a strong agenda to restore and control water quality, which is of vital concern to fisheries. For roughly five years, between 1972-77, little if any communication occurred between the IJC and the GLFC but beginning in 1977 joint meetings were initiated.⁶¹ In 1980, the Great Lakes Basin Commission hosted a conference to consider a strategic plan to guide the GLFC in the management and rehabilitation of the fishery resources of the entire Great Lakes.⁶²

There is renewed, but guarded, optimism about the rehabilitation of the Great Lakes fishery from a biological, species, point of view. Yet, there is much concern about the problem of toxic substances and the processes of bio-accumulation of toxics in fish life. Public health agencies maintain their warnings against human consumption. Carcinogenic effects in fish and the transferability of disease to man are under continued scrutiny. The remainder of the rehabilitation task is proving to be much more difficult than were the catch-up efforts of the initial phases to meet long-standing, known needs for municipal sewage and industrial works.⁶³

Energy

Electrical generating capacity in those portions of the eight Great Lakes states in the Basin is calculated to be 52,151.2 megawatts. This represents a mix which relies on coal (48%), oil (24%), uranium (18%), and hydropower (10%). Ontario has a capacity of 24,489 megawatts generated by coal (38%), oil (9%), uranium (21%), and hydropower (26%).⁶⁴

The Science Advisory Board of the IJC published two reports, both dealing with broad-ranging energy questions. The first brought forward eight so-called "factors of importance" which led to matters termed "IJC

60. Regier, *The Rehabilitation of Great Lakes Fishes and Fisheries*, J. GREAT LAKES RESEARCH (forthcoming 1986).

61. Great Lakes Fisheries Comm'n., Report of Meeting (Oct. 20, 1977) (Ann Arbor, MI).

62. The Effects of Environmental Issues and Programs on Great Lakes Fisheries: Directions for the Future (Ann Arbor, Michigan, January 10-11, 1980).

63. See J. LEGAULT & T. KUCHENBERG., *supra* note 6.

64. U.S. Dept. of Energy, study on Great Lakes Basin States electric power capacity (1980). See also, 4 Royal Commission, Report on Electric Power Planning (1980).

active or monitoring roles."⁶⁵ The second report⁶⁶ had a more detailed technologic base, but concentrated its recommendations on four IJC "shoulds," suggesting that the IJC should: (1) request integrated information from the Parties regarding their programs for making more effective use of energy; (2) encourage the Parties to undertake studies to identify energy alternatives best suited to achievement of overall environmental quality and to promote the use and development of those alternatives; (3) encourage the Parties to coordinate in planning and use of energy alternatives; and (4) encourage research into hazardous substances associated with alternative energy use and production, monitoring those substances that may produce significant environmental or health hazards.⁶⁷

Acid Rain

The Energy work group of the Anticipatory Planning Workshop began its Report on Sulfur Emissions and Acidic Precipitation by noting "Acidic precipitation is perhaps the most serious environmental problem faced in the Great Lakes Basin."⁶⁸ United States contributions of sulfur dioxide (SO₂) emissions from states in the basin amounted to 10,586,000 tons per year; Ontario accounted for 1,500,000 tons.⁶⁹ While the Great Lakes are not highly susceptible to acidification because of their buffering capacity and volume, "a large number of highly susceptible streams and small lakes . . . will undergo acidification within ten to twenty years."⁷⁰ The Library of Congress Congressional Research Service has prepared an information pack on acid rain⁷¹ which provides summaries of the major elements of the problem. In the political arena, President Reagan and

65. 2 INTERNATIONAL JOINT COMMISSION SCIENCE ADVISORY BOARD, ANTICIPATORY PLANNING FOR THE GREAT LAKES 59-113 (Feb. 1980).

The eight "factors" were: the long lead time to bring new energy facilities into service in sufficient quantities to have Great Lakes Basin-wide effects; an adequate total energy and electrical energy supply in the near-term, based on lower expected growth rates in energy demand; a shortage of oil and natural gas predicted for the Great Lakes Basin beginning in the late 1980s-1990s; the Great Lakes region's extreme dependence on imported energy, with about 80 percent of its gas and oil coming from outside the basin; a growing U.S. interest in the natural gas potential in Lake Erie; the apparent need for increased reliance on coal and uranium in order to meet the Great Lakes' future energy requirements; more work on the extent of environmental difficulties associated with coal; and accelerated exploration of alternative energy supply technologies.

66. INTERNATIONAL JOINT COMMISSION SCIENCE ADVISORY BOARD, ENVIRONMENTAL IMPLICATIONS OF ALTERNATIVE ENERGY FUTURES FOR THE GREAT LAKES BASIN (March 1982).

67. *Id.*

68. II INTERNATIONAL JOINT COMMISSION, ANTICIPATORY PLANNING FOR THE GREAT LAKES (Feb. 1980) [hereinafter cited as ANTICIPATORY PLANNING].

69. *Id.* at 130.

70. *Id.* at 132.

71. Congressional Reference Service, U.S. Library of Congress, Background Material on Acid Rain (1984) (Washington, D.C.).

Prime Minister Mulroney, in 1985, appointed country representatives to a panel which was to recommend courses of action during that year.⁷² The panel's report, made early in 1986, indicated that the problem resulted from sulphur emissions of power plants and other industrial sources; specific solutions remained to be determined.⁷³

Land Use

The development of institutions and procedures to correlate land and water management in the Great Lakes Basin has proceeded slowly, in spite of the concept that land use is the driving force that determines water use and water quality. During the past thirty years, major studies and reports by the IJC and others have laid an adequate basis for needed action.⁷⁴ However, the IJC's 1985 biennial report to the two governments made clear its concern for lack of appropriate action in the land management area.⁷⁵

Perhaps the strongest voice providing specific direction to institution-building for land resources management was that of Professor Zigurd L. Zile:⁷⁶

Those who have contemplated and urged 'alternative institutional arrangements' for resource management . . . appear to assume that the International Joint Commission lacks the requisite powers to work toward their envisioned goals, including land resource management. I believe that this assumption is unwarranted and that certainly none of the Commission's constituent jurisdictional documents needs revision as a condition to pragmatic progress toward improved binational land management practices.

The reference mechanism first conceived in Article IX of the Boundary Waters Treaty and expanded in Article VI of the Agreement on Great Lakes Water Quality seems adequate for both surveillance

72. *Reagan, in Quebec, Agrees to a Study of Acid Rain Issue*, N.Y. Times, Mar. 18, 1985, § A, at 1, col. 6.

73. *Joint U.S.-Canada Report on Acid Rain is Delivered*, N.Y. Times, Jan. 9, 1986, § B, at 6, col. 1.

74. See INTERNATIONAL JOINT COMMISSION, POLLUTION IN THE GREAT LAKES BASIN FROM LAND USE ACTIVITIES (March 1980); GREAT LAKES BASIN COMMISSION, GREAT LAKES BASIN REGION SUMMARY REPORT FOR THE NATIONAL ASSESSMENT OF WATER AND RELATED LAND RESOURCES (April 1977) (prepared for the U.S. Water Resources Council); INTERNATIONAL JOINT COMMISSION, FURTHER REGULATION OF THE GREAT LAKES, *supra* note 57 at chs. 1, 2, 4; ONTARIO DEPT. OF TREASURY & ECON. & ONTARIO DEPT. OF MUNICIPAL AFFAIRS, A STRATEGY FOR SOUTHWESTERN ONTARIO DEVELOPMENT (March 1970); PROVINCE OF ONTARIO, DESIGN FOR DEVELOPMENT REPORTS (1970-77); A READER ON MANAGEMENT IMPROVEMENT STRATEGIES: THE GREAT LAKES OF THE UNITED STATES AND CANADA (L.B. Dworsky & C.F. Swezey eds. 1974).

75. SECOND BIENNIAL REPORT, *supra* note 36.

76. Zigurd L. Zile, Binational Land Resource Management for the Great Lakes Area: Powers of the International Joint Commission (Study Doc. No. 1, Canada-U.S. University Seminar, Great Lakes 1974).

and mediation functions with respect to planning or programming, designation, enforcement, and dispute settlement. The dormant article, Article X of the Boundary Waters Treaty, possibly provides a mechanism for the making of binding decisions in a pinch. The perceived inadequacies of the Commission are traceable to the unwillingness of the parties to utilize what they already have rather than to a lack of linguistic embellishment on the sparsely-worded treaty framework.

I am convinced that the parties can draft a reference to authorize the International Joint Commission to engage in as much binational land resource management as could be realistically accommodated at this time even with substantially augmented resources of the Commission. The reference might direct the Commission to look into the condition of the land resources, to talk to the national, state (provincial) and local authorities about the practices and needs of land resource management in the area, and to prepare a responsive management plan or program for an indicated future. In addition, if the affected interests were ready for it, the reference might propose specific land use designations subject to approval under the applicable domestic law of the two countries. The mandate would simultaneously give the Commission an initiatory role regarding any action within the scope of the reference. Adequate staffing and an operating budget could be given to enable the Commission to perform the assigned tasks.

The parties should take procedural care in formulating the reference. In particular, they should secure the cooperation of all relevant government units through their principal resource management agencies.⁷⁷

INSTITUTIONS

Joint institutions established under the premier agent of the two governments, the IJC, include three control boards and two technical boards pertaining to management or investigation of Great Lakes levels and flows, one study board on diversions and consumptive uses, and several special committees and groups.⁷⁸ The Niagara Falls Treaty of 1950 provided an assured flow of water over Niagara Falls in competition with hydropower interests.⁷⁹ The Great Lakes Fisheries Treaty of 1955 brought

77. *Id.* at 61-62.

78. The boards are: International Lake Superior Board of Control, International Niagara Board of Control, International St. Lawrence River Board of Control, International Great Lakes Levels Board, American Falls International Board, International Niagara Committee, Coordinating Committee on Great Lakes Basic Hydraulic and Hydrologic Data, and the Winter Navigation Board. GREAT LAKES BASIN COMMISSION, GREAT LAKES BASIN FRAMEWORK STUDY 173-79 app. II (1976). See also INTERNATIONAL GREAT LAKES DIVERSIONS AND CONSUMPTIVE USE STUDY BOARD, INTERNATIONAL JOINT COMMISSION, EXECUTIVE SUMMARY (1981).

79. INTERNATIONAL JOINT COMMISSION, FURTHER REGULATION OF THE GREAT LAKES 90 (1950).

to a conclusion matters which had been discussed by no less than twenty-seven commissions and conferences since 1875.⁸⁰ Agreements, lacking the force of treaties but binding nonetheless, were utilized in 1954 and 1972⁸¹ for the arrangements then thought necessary to control pollution in the Great Lakes.

The activities of the two countries in the arena of Great Lakes Basin water, land, and environmental resources during the past three-quarters of a century, but primarily during the last thirty years, include boundary agreements; institution building; agreements on levels and flows, diversions, and fisheries; agreements on scenic resources; allocation for hydropower; air quality in the Windsor-Detroit area; and water pollution control. In light of comparable arrangements in similar international arenas, their record is impressive. Of equal importance in the longer term is the inevitable direction of the two countries toward the bilateral multipurpose management of the basin. It is this direction toward comprehensive, integrated, multipurpose water, land, and environmental management to which both countries have subscribed not only in concept but by action, that allows an optimistic outlook for the future management of the basin.

An impressive start toward the development of a modern and effective management plan was outlined by J.W. MacClaren, one of Canada's foremost consulting engineers, and R.F. Clevinger, a former chairman of the Great Lakes Basin Commission, nearly twenty years ago.⁸² Their plan laid out the basic reasoning to justify a comprehensive, integrated approach by showing the relationship among seven water use categories.⁸³ The organizational framework was to be, like the IJC, a coordinating agency. Each country would provide its own planning agents, envisioned as the Great Lakes Basin Commission, then in existence, and a counterpart agency, a Great Lakes Resources Commission, on the Canadian side, to be built upon an agreement of the governments of Canada and the Province of Ontario.

80. Convention on Great Lakes Fisheries, Sept. 10, 1954, United States-Canada, 6 U.S.T. 2836, T.I.A.S. No. 3326 (entered into force Oct. 11, 1955).

81. The first (1954) resulted from studies under 1946-1948 IJC Docket Nos. 54 & 55 of the Connecting Channels of Lakes Superior, Huron, and Erie, and of Lakes Erie and Ontario. The second (1972) resulted from 1964 IJC Docket No. 83 and is the Great Lakes Water Quality Agreement of 1972, later extended with amendments to 1978. Within this Agreement fall the Water Quality Board and the Science Advisory Board.

82. MacLaren & Clevinger, *New Requirements in Water Resources Planning on the Great Lakes*, in PROCEEDINGS OF GREAT LAKES WATER RESOURCES CONFERENCE 361-89 (1968) (conference held June 24-26, 1968, at Toronto, Canada, Paper No. 7).

83. *Id.* The seven water use categories discussed are: domestic water supply, waste water disposal, navigation, power development, agricultural irrigation, fisheries, and recreation. The paper notes that unless a comprehensive plan for the staged development of Great Lakes water and related land uses is effectuated all problems will become increasingly complex and difficult, and presents an outline of an early work plan.

Planning Philosophies

The approach taken by MacLaren and Clevinger towards an integrated arrangement for the Great Lakes was in keeping with the evolution of complex resource management systems in both countries as well as with philosophical realities in the relations between Canada and the United States. Comprehensive, integrated, multipurpose water resource planning and development by river basins is an idea that has been extant for about a hundred years. Professor Norman Wengert of Colorado State University has traced the concept through three eras.⁸⁴

The first is the preparatory period from the 19th century to the New Deal, during which a set of related ideas were being expressed and tested in the marketplace of public discussion. Toward the end of this period a variety of ideas were being woven together as a basis for public action, data being accumulated on rivers as systems, and multipurpose projects rather than single purpose projects were being proposed. The second period extends from 1933-1965 when, to ideas about multipurpose, integrated planning were added goals for socio-economic development within regions traversed by major rivers. Finally, the present period from 1965 is that when river basin planning, and programs rationalized in river basin terms, began to be crowded from their previous dominant position with respect to water policy, as new concerns, new goals and objectives, and new concepts with respect to water, to the environment, to development, and to the government role, were articulated and received political support.⁸⁵

Institution-building to make real the sought-after concept of river basin development evolved in periods approximating the three identified by Wengert.⁸⁶

The first period was one in which separate agencies were or had been assigned separate tasks: the Army Corps of Engineers was responsible initially for navigation and flood control, and towards the end of the period for selected multipurpose development planning; the Bureau of Reclamation was responsible for western irrigated agriculture, and water power and related matters. These assignments continued into the second period with new tasks for water pollution control being given to the Public Health Service; small watershed protection to the Department of Agriculture; and fish and wildlife protection to the Department of the Interior.

The second period, ending in 1965, saw two reasonably successful efforts at joining together the federal and state agencies. The first, during

84. Wengert, *A Critical Review of the River Basin as a Focus for Resource Planning, Development, and Management*, in UNIFIED RIVER BASIN MANAGEMENT SYMPOSIUM PROCEEDINGS 9-28 (1980).

85. *Id.* at 10-11.

86. *Id.* See also Dworsky & Allee, *Unified/Integrated River Basin Management: Evolution of Organizational Arrangements* in UNIFIED RIVER BASIN MANAGEMENT SYMPOSIUM PROCEEDINGS 28-45 (1980).

the 1930s and early 1940s was the establishment of the National Resources Planning Board (NRPB). The Board's reports on the several regions of the country were landmarks in intergovernmental cooperation. The second effort, following the demise of NRPB, was the voluntary formation in 1943 of the Federal Interagency River Basin Committee.⁸⁷ Over the next decade field committees, including state participation, were established in the Columbia, Missouri, and Arkansas-White-Red basins, the Pacific Southwest region, and New England, including New York.⁸⁸

During both of these periods, beginning with President Theodore Roosevelt just after the turn of the century, the concept of comprehensive, integrated multipurpose development of the river basins of the nation was supported by several attempts to institutionalize the concept. Finally, as an outgrowth of a 1960 Senate report on the nation's waters,⁸⁹ the Congress enacted the Water Resources Planning Act of 1965.⁹⁰ This act established the United States Water Resources Council, and authorized the establishment of river basin commissions with federal and state members having equal voting power. From 1965 until 1981, the commissions were established in the Columbia, Missouri, Upper Mississippi, Ohio, Great Lakes, and New England drainage basins.

The principal task of the commissions was to develop comprehensive, coordinated, joint plans for basin development. Planning authority was limited, as was authority for plan implementation; nevertheless, the commissions were of value. Their major benefit was to bring together state and federal water authorities on a regular basis to consider the development and management of water quality and quantity and related matters. In 1981 the current administration chose not to continue the commissions and other arrangements made by the Water Resources Planning Act of 1965. Whether, over the long term, this signals a retreat from the seventy year effort to evolve a federal-state cooperative arrangement to manage the nation's waters is not clear.

87. The Federal Power Commission, and Departments of the Army, Agriculture, and Interior, jointly formed the Federal Interagency River Basin Committee in 1943. The Federal Interagency River Basin Committee and the subsequent field committees in various basins of the United States are described in Schad, *Water Resources Planning—Historical Development*, 105 J. WATER RES. PLAN. & MGMT. DIV. AM. SOC. CIV. ENG. 9 (1979).

88. This practical approach was used by the U.S. federal government and the states in the interstate basins of the United States from 1943 until 1965 when the Water Resources Planning Act of 1965 was enacted. See case studies of the Missouri and Columbia Basin Interagency Committees in Dworsky, A STUDY OF POTENTIAL INSTITUTIONAL ARRANGEMENTS FOR WATER QUALITY AND WATER RESOURCES PLANNING AND MANAGEMENT 79-148 (Mar. 1974) (Cornell Univ. Water Resources & Marine Sciences Center, Tech. Rep. No. 83); see also Roy Schuefle, History of the Columbia Basin Interagency Committee (1967) (report prepared for U.S. Army Corps of Engineers North Pacific Division, Portland, Oregon).

89. STAFF OF SENATE SELECT COMM. ON NATIONAL WATER RESOURCES, 86TH CONG., 2D SESS., REPORT ON U.S. WATER RESOURCES (1960).

90. Water Resources Planning Act of 1965, 79 Stat. 244-54 (1965).

A SAMPLING OF MANAGEMENT PROPOSALS

At a conference held to celebrate the 70th anniversary of the IJC, Professor Don Munton said:

At the ripe old age of three score years and ten, when many institutions have passed the point of redundancy, the need for the International Joint Commission is increasing. Indeed, the IJC is still being recognized internationally as one of the most ambitious examples of a joint boundary water authority. But its future does remain something of an enigma. Almost no one, it seems, wants just to leave it alone. Over the years a host of observers have found it in need of restructuring, reforming, expanding, strengthening, even narrowing and weakening. What accounts for all this attention? Its success is one factor. . . . Paradoxically perhaps, its limitations also attract attention.⁹¹

The most complete and authoritative study of the entire range of Canadian-United States relations that has appeared in recent years was a 1965 report entitled "Canada and the United States—Principles for Partnership," by former Ambassadors Livingston T. Merchant of the United States and A.D.P. Heeney of Canada.⁹² While the emphasis of the report is on the economic issues between the two countries, Ambassadors Merchant and Heeney address themselves to nearly every significant aspect of the bilateral relationship. In a section entitled "Machinery for Consultation," the authors describe the International Joint Commission as "one which has been of continuing importance to both countries since its establishment . . . a unique institution" with a "solid foundation of law and precedent." Its "long and successful record in the disposition of problems along the boundary" which "justify consideration of some extension of the Commission's functions" suggests that the two governments "examine jointly the wisdom and feasibility of such a development."⁹³

Views from the U.S. Congress, 1965

Ten Republican members of the House of Representatives, meanwhile, detailed their own reaction to the Merchant-Heeney study in a statement inserted in the Congressional Record.⁹⁴ Their overall view was laudatory, although they expressed some differences in their own and the authors' perspectives. They then listed suggestions for a broader IJC function: (1) include Lake Michigan in the definition of boundary waters; (2) empower

91. Munton, *Paradoxes and Prospects*, in INTERNATIONAL JOINT COMMISSION SEVENTY YEARS ON 60 (R. Spencer, J. Kirton & K.R. Nossal ed. 1981)

92. Merchant & Heeney, *Canada and the United States—Principles for Partnership*, DEPT. STATE BULL. 193-207 (Aug. 2, 1965).

93. *Id.* at 199.

94. 111 CONG. REC. 25,394 (1965).

the IJC to make recommendations relating to continental development of water and energy resources; (3) establish a permanent institutional location at the IJC offices for international discussion of technical foreign policy questions; (4) grant priority emphasis in both countries to IJC studies on water levels and pollution of the Great Lakes; and (5) give the Commission a leading role in fulfilling the "obvious need for comprehensive advance planning in the development of water resources."⁹⁵

International Pollution Control, 1969

Professor Frederick Jordan of McGill University noted shortcomings of the IJC,⁹⁶ pointing out that it has no specific jurisdiction over boundary pollution matters and consequently no control over the timing, extent, or nature of the investigations which it undertakes. Jordan suggested that the most fundamental difficulty is the lack of power to put into effect the standards and measures of control recommended by the IJC following completion of its study and in the exercise of its surveillance function. Even though both governments may adopt the recommendations of the IJC, in the absence of legislative enactments to carry out the recommendations, their implementation and enforcement remain academic. Within the context of a perception that neither Canada nor the United States would be prepared to vest broad powers over international pollution control in an international agency, he suggested changes he felt would strengthen the commission. They included: (1) amending the Boundary Waters Treaty to place air pollution concern on the same level as that of water; (2) doing away with the reference procedure in cases involving transboundary air and water pollution; and (3) giving the IJC certain supervisory powers over implementation of its recommendations.

13th Conference on Great Lakes Research, 1970

Existing institutional arrangements define the essential terms and conditions for establishing the political feasibility of any program of action relating to the water resources of the Great Lakes Basin. Therefore, the characteristics of the different political regimes bearing upon the basin need to be well understood before an effective analysis of its water resource problems can take place. Conferees noted that most studies of institutional arrangements focus on one or, at best, a limited number of governmental instrumentalities in relation to a complex system and that little is known about the patterns of interaction between and among public

95. *Id.*

96. Jordan, *Recent Developments in International Environmental Pollution Control*, 15 MCGILL L. REV. 277 (1969).

and private enterprise in the Great Lakes Basin system.⁹⁷ The Great Lakes represent a classic example of a common-pool resource in which a user draws from said resource until his marginal costs equal his marginal benefits without taking into account the external costs imposed on other users. This will continue unchecked unless institutional arrangements require all users to take external factors into account.

Institutional Analysis, A Report from the Great Lakes Basin Commission, 1972

Dr. Lyle E. Craine, consultant to the Great Lakes Basin Commission, prepared the report.⁹⁸ Because the commission was a U.S. entity, the report was limited to the consideration of alternative institutional arrangements for the Great Lakes within the United States. Dr. Craine's purpose was to lend structure to the complex problem of institutional arrangements and to offer some general guidelines on how to proceed with any reform. His main point was that more geographic integration is needed. This means more formal links between and coordinated management among the various governments and agencies and departments of those governments operating within a particular geographic region which is ecologically related, such as the Great Lakes.

In this context, Dr. Craine assessed four institutional alternatives: interstate compacts, Title II river basin commissions, federal-interstate compacts, and basin interagency committees. He concluded that no single one of the four forms appeared to fill completely the need for geographic integration. According to Craine, a systems approach to geographic integration would be concerned:

[f]irst about the degree of policy, planning, and management powers which should be delegated to a geographic agency as compared to those exercised by agencies of general purpose government; second, about the constitution of the governing body of a geographic agency, with due attention to the requirements for representation and to the decision rules; and third, about the operational links among geographic agencies and functional agencies in general purpose governments.⁹⁹

Binational Environmental Cooperation, 1972

Only a few months before the Stockholm signing of the United Nations

97. Ostrom, Ostrom & Whitman, *Problems for Institutional Analysis of the Great Lakes Basin*, in 13TH CONFERENCE ON GREAT LAKES RESEARCH PROCEEDINGS 156-67 (1970).

98. Lyle E. Craine, *Final Report on Institutional Arrangements for the Great Lakes* (1972) (unpublished report prepared for the Great Lakes Basin Commission).

99. *Id.* at 2-3.

Conference on the Human Environment. *Controlling Great Lakes Pollution: A Study in U.S. and Canadian Environmental Cooperation* by Richard Bilder was published.¹⁰⁰ Recognizing that the cooperative arrangements resulting from the U.N. Conference would have little in the way of precedent and law to guide them, Bilder attempted to fill some of that void with a detailed case study of U.S.-Canada cooperation on boundary matters. He began by reviewing major factors relevant to the pollution problems of the international Great Lakes. He pointed out the limitations in the ability of the federal governments to intrude, particularly in Canada, and the "complex hodgepodge of proliferating and occasionally inconsistent laws, regulations, and ordinances" governing Great Lakes pollution.¹⁰¹

Bilder commended the IJC for having dealt successfully with a wide range of problems over the years. But he injected a word of caution about making predictions for the future based on that experience, suggesting that the IJC had been left relatively free from political pressures by the two governments. With the growing political importance of the problems with which the IJC deals, "the two governments may in the future prove less inclined to respect its [IJC's] traditional independence. There may be at least some pressures toward its politicization."¹⁰² He suggested, however, that a more politicized IJC might actually have enhanced usefulness. A politically responsive Commission, he reasoned, might even be trusted with regulatory or enforcement powers.

Bilder also reviewed the 1972 coordinating agencies in both countries with responsibilities for resource management in the Great Lakes and proposed alternatives for such coordination: (1) an advisory board operating under the IJC which would include responsible officials from all concerned planning, research, and operating agencies, and (2) some type of "internationalized" Great Lakes Basin Commission combined with the establishment of a new high level joint U.S.-Canadian interagency committee on Great Lakes pollution.¹⁰³ In addition, he discussed potential alternatives that would go beyond the scope of the present Great Lakes Water Quality Agreement. One is to expand the IJC's authority under the existing treaty framework. Another alternative, a supranational Great Lakes Authority would, in his view, permit 'problem-shed' management; eliminate the recurrent problems of jurisdictional conflict, duplication, and lack of coordination; and encourage effective decisionmaking in a

100. Bilder. *Controlling Great Lakes Pollution: A Study of United States-Canadian Environmental Cooperation*. 70 MICH. L. REV. 469 (1972).

101. *Id.* at 478.

102. *Id.* at 521.

103. *Id.* at 537.

sufficiently broad context to permit a more complete analysis and balancing of policy alternatives.¹⁰⁴

Improving Management, 1973

During the period from December 1971 to June 1972, a Canada-U.S. University Seminar explored ways in which the institutional structures for management of water and land resources in the Great Lakes Basin might be strengthened to the mutual advantage of both countries.¹⁰⁵ The undertaking of this seminar in a sense reaffirmed the growing cooperation between Canada and the United States on Great Lakes problems. Participants recognized the progress and positive contributions being made in biophysical research on the lakes, as exemplified by the International Field Year on the Great Lakes which began in the spring of 1972. They also were aware of the negotiations then taking place between the two nations to strengthen the hand of the IJC in controlling transboundary water pollution. While acknowledging these accomplishments, the seminar also felt it was necessary to ask what else had to be done. The scope of attention would have to go beyond cooperation on controlling transboundary water pollution and joint efforts on water research, but how far, and in what way?

Two major substantive results came from the seminar. There was general agreement on the necessity for additional institutional change and the need to develop some framework as a prerequisite for more detailed plans, studies, and consultations required in the institutional remodeling process. In addition, two distinct alternative options were identified. The first would seek organizational improvements within the framework of a significantly strengthened IJC. Its key feature was that the IJC would be freed from the present treaty constraint of acting only when a matter is referred to it by both countries, so that it could assume an active role in the public decisionmaking processes. This process is already underway in part as a result of the Great Lakes Water Quality Agreement of 1972. That Agreement provides significantly more freedom for IJC action than any other previous arrangement by the two countries. The first alternative seeks to have this type of greater IJC freedom extended to other water and land problems in the Great Lakes.

The second alternative would call for a specifically created international

104. *Id.* at 547-48.

105. Faculty members from some twenty universities and colleges in both countries, with Professors George Francis and Leonard Dworsky acting as co-chairmen, joined in dialogue and published a report entitled *A Proposal for Improving the Management of the Great Lakes of the United States and Canada* which was reported in *The Great Lakes, Hearings Before the Subcomm. on InterAmerican Affairs of the House Comm. on Foreign Affairs*, 93d Cong., 1st Sess. 634-713 (1973).

body to supplant the IJC in the Great Lakes Basin. The IJC would be relieved of its treaty responsibilities within the basin and the function of the existing permanent and temporary Great Lakes Boards absorbed by the new treaty-established body. The responsibility of the IJC for that portion of the international border lying outside the Great Lakes Basin would remain unaffected. This alternative would require the negotiation of a new treaty by Canada and the United States as well as modifications to the 1909 Treaty. The Columbia River Treaty would provide some precedent for this arrangement.

Either alternative requires developing relationships among existing federal, provincial, state, and regional agencies. The arrangements considered in these two alternatives do not constitute a management body in the sense of a control and operating organization such as state, provincial, or federal agencies with legislative mandates. Neither would they change the equality status between the two countries nor create a supranational bureaucracy with authority over the existing three levels of government. Instead, they would give rise to a joint, Canada-U.S. body intended to serve as the locus of recommendatory policy guidance and coordination for those public programs and private activities which affect the water and related land and air environments of the Great Lakes Basin.

The organization would be assigned two basic management functions, those of surveillance and mediation. Surveillance, defined in this instance as information gathering, data interpretation, and dissemination, is a function concerned with problem identification and definition. Mediation is viewed as a management function which goes beyond surveillance in requiring broader authority and responsibility, an active role in which joint activities are agreed upon and conflicts resolved through discussion and consultation. The joint Canada-U.S. body would be actively involved in a coordinative and mediative capacity with the operating agencies in developing joint programs to attack common problems within the basin. This role could include, among other things, promulgation, after appropriate coordination among the agencies concerned, of regulations, standards, and compliance schedules. While the joint body under the definition and recommendations of this report would have no enforcement authority, such promulgations would provide clear evidence of acceptance of common goals and agreement on joint programs. The public notice of these actions would be a large step forward in securing public credibility, improving government accountability, and providing public reports for public assessment of progress. The report recommended that:

A. The governments of the United States and Canada should initiate, on a joint basis, a comprehensive examination of the problems associated with multiple purpose management of the Great Lakes in order to con-

serve, develop, and use that unique resource for the mutual benefit of the people of both countries.

B. The alternative proposals formulated by the Canada-United States University Seminar should be used by the two governments as a basis for initiating discussion and debate on the modernization of the management of the Great Lakes.

C. In the United States, a study bill should be introduced early in the 93rd Congress for the purpose of opening the doors to serious public debate on the question of the joint management of the Great Lakes Basin by local, state, regional, and federal officials, and by private persons and non-governmental organizations concerned with the public interest.

D. In Canada, the findings of the seminar should be discussed with officials in the federal government, Ontario provincial government, and selected regional and local governments in Ontario. The purpose would be to encourage informal consultations on the new steps and responsibilities needed for the Great Lakes Basin, with the view to developing more detailed proposals for consideration at the Cabinet level of the two senior governments and providing material for bilateral consultations.

A Canadian Parliament Report, 1975

This report by the Standing Senate Committee on Foreign Affairs of the Canadian Parliament is Volume I of a continuing study of Canada-United States relations.¹⁰⁶ While praising the IJC, the committee also listed suggestions for its improvement. Present environmental concerns which could not have been foreseen by the treaty-makers of 1909, they noted, may force certain modifications in the IJC procedures. The committee urged the Canadian government to examine two recommendations with a view to their implementation jointly with the United States.

The committee recommended that the IJC should be given the authority to make, on its own initiative, preliminary examinations or assessments of potential pollution problems along the boundary, to point out potential sources of trouble and dispute, and to suggest to the two governments that a reference should be made. At present, the IJC must await a reference from the governments before inquiring into or investigating such problems.¹⁰⁷ The committee also recommended that the IJC should have ex-

106. 1 STANDING SENATE COMM. ON FOREIGN AFFAIRS, CANADA-UNITED STATES RELATIONS: THE INSTITUTIONAL FRAMEWORK FOR THE RELATIONSHIP (1975).

107. *Id.* As an example, the Committee is of the opinion that the current Garrison Diversion problem might have been headed off had the IJC had this "watch dog" capacity. The Committee hoped that an extension of authority could be granted without opening up the Treaty, because the two governments had already given the IJC a similar watching brief in regard to air pollution and presumably the same technique could be used to provide an extension into other pollution problems. If not, perhaps a standing reference could be given.

tended power to publicize all its recommendations. While it now has power to publicize its views under the Great Lakes Water Quality Agreement, such authority is not automatically given in respect to other areas of IJC competence under the Boundary Waters Act.

*Improving Management-Second Session, 1978*¹⁰⁸

Recommended long-term objectives of a critique and draft proposals, approved in general terms by the second session of the Canada-United States University Seminar, are the rehabilitation and restoration of the Great Lakes. To achieve this, participants suggested an integrated problem analysis of the lakes so that proposed solutions may better fit existing and future conditions. Integrated problem analysis is sought through strengthening the role of the IJC within the context of the Boundary Waters Treaty. Rehabilitation and restoration of the Great Lakes, implicit in the 1972 and 1978 Water Quality Agreements, requires the two countries to make a strong, irreversible and concerted commitment to this goal in the new Agreement.

Recommendations

The seminar participants specifically recommended that:

(1) The IJC be authorized to establish a board to interface with the planning activities in both countries, and that such board report not less than annually to the IJC on current and potential problems which may require action;

(2) The two countries recognize explicitly the authority of the IJC to recommend references to them, and encourage the IJC to proceed on its own initiative to recommend references on current or potential management problems of the Great Lakes;

(3) The governments of Canada and the United States submit a reference to the IJC asking it to create a group, or board, on Great Lakes Rehabilitation and Restoration;

(4) The IJC professional and support staff be increased;

(5) The term of office of IJC commissioners, board members appointed by them, the Great Lakes Fisheries Commission, and other boards whose decisions bear substantially on Great Lakes management be defined for specific periods of time;

(6) The Canadian Parliament and the Congress of the United States hold annual legislative oversight hearings on the management of the Great Lakes; and

108. Dworsky, *The International Joint Commission—A Critique*, in PROCEEDINGS OF THE CANADA-UNITED STATES NATURAL RESOURCES AND ENVIRONMENTAL SYMPOSIUM (J. Cartoll & D. Cartoll eds. 1978) (the Report of the Canada-United States University Seminar, Second Session).

(7) The two governments formulate a science policy for the Great Lakes as an indication of their commitment to restore, rehabilitate, and improve the management of the lakes and to support the development of new knowledge needed to achieve those ends.

Anticipatory Planning, 1979¹⁰⁹

The IJC's Science Advisory Board brought together nearly one hundred persons to define major actions which might be taken to improve the management of the Great Lakes. Main themes were identified by the group, and key questions posed: How are we to develop a "Great Lakes Perspective"—a view of the international Great Lakes as a whole? What is the role of information and analysis in creating a "Great Lakes Perspective"? What is the role of the IJC in arranging for the development of a "Great Lakes Perspective" and how should it use the results of such a process?

To move toward a strengthened collaborative arrangement allowing the two governments, acting through the IJC, better access to an improved information and analysis procedure, the following were proposed:

(1) The IJC should establish a standing board on Information Acquisition and Analysis, including a core staff qualified to integrate, synthesize, and interpret such information, to improve the capability of the IJC to advise governments on needed programs and policies for the Great Lakes Basin.

(2) The Canadian federal government and the Province of Ontario should develop an agreement that the preparation of reports for the Canadian portion of the Great Lakes will allow necessary coordination with reports by U.S. institutions for the U.S. portion of the Great Lakes.

(3) Under its mandate in the Great Lakes Water Quality Agreement of 1978, the IJC should monitor the evolution of human settlements in the Great Lakes region from a comprehensive, holistic stance, reorienting its operations to include a view toward the future as well as considering the past.

Integrated Ecosystem Management

What new tasks are imposed on the governments of Canada and the United States and the IJC as greater recognition emerges of the interrelationships of water, land, the atmosphere, plant and animal life, and the effect of human behavior? The IJC and the two nations need new ways to speed their responses so that problems which impact upon each other can be dealt with sooner and more holistically. Because integrated man-

109. ANTICIPATORY PLANNING. *supra* note 68.

agement of the Great Lakes Basin is a very large task, priorities will have to be established. Development of an effective management process would extend over several years. To begin this process, Canada and the United States, with the assistance of the IJC, should undertake studies to consider program linkages and priorities, expand the roles and capabilities of the standing boards, and strengthen the role and staff capabilities of the regional office.

Regional and Economic Perspectives

The Great Lakes represent a geographic region shared by Canada and the United States. What is the significance of regional and economic factors in developing a management strategy for the lakes? What impact does the Great Lakes region have on other North American regions, and what is the impact of the other regions on the Great Lakes? How can the nature of these complex issues be more clearly identified so that effective regulatory programs can be implemented and monitored?

How should the Boundary Waters Treaty and/or the Water Quality Agreement be modified, if necessary, in order to allow the two nations to solve regulatory problems arising as a result of energy development, human settlements, water transportation, lake levels regulation, increasing pressures for diversions into and out of the Great Lakes Basin, increasing consumptive use of water in the basin, and atmospheric pollution of land, lakes, rivers, and human settlements? How can the IJC address the emerging problem of scarce economic resources for support of water quality regulatory and control programs?

Institutional Arrangements and Capabilities

What changes may be needed in the institutional arrangements which have been established within and between the United States and Canada for dealing with Great Lakes issues in an anticipatory and forward looking manner? What changes do these in turn imply for the IJC as the major binational bridging agency for the Great Lakes? The development and strengthening of an anticipatory capability for the Great Lakes Basin ecosystem can be done within the basic policy framework for governance as outlined above. The IJC has a crucial role to play as major facilitator for consultations on goals, issues, and problems requiring the attention of both countries. Existing intergovernmental arrangements within each nation should be modified and strengthened where necessary to provide the intelligence function in support of binational cooperation. Steps need to be taken to strengthen the involvement of municipal governments in working out implementable programs for resolving problems pertaining to the Great Lakes ecosystem, and elected officials at all levels of gov-

ernment should be brought much more into the consultation process. Public awareness and involvement also must be widened. It is desirable that the two countries issue a strong statement confirming their expectations that the IJC will take the initiative to advise them on current or emerging problems in order that they may respond in a timely manner, and on what specifically has to be done to create a strengthened anticipatory capability to respond to emerging problems in the Great Lakes Basin ecosystem. The IJC should create a special panel or advisory board to develop the strategies needed to implement such a directive, in part by reviewing the nature and extent of ongoing planning and development activities which bear significantly on Great Lakes issues and in part through consultation with other Great Lakes commissions on the programs they are facilitating or coordinating. Such a panel or board could then initiate consultations with various individuals or groups of professionals and impacted publics along the lines proposed for creating the communication networks necessary to develop a futures orientation toward planning and management of the Great Lakes ecosystem.

Communication for Implementation

Strategies to improve the ecosystem quality of the Great Lakes Basin cannot succeed without widespread public understanding and acceptance of whatever goals the strategies are meant to achieve. They also require mobilization of strong political support. How can effective communication networks be brought together with one another to facilitate information sharing and a great degree of public involvement in matters affecting ecosystem quality in a large region such as the Great Lakes Basin? What is the crucial role of the IJC in helping to bring this about? How can the IJC develop effective two-way information sharing and communication processes with local groups, elected officials, and citizens in both countries; even though it must also formally work through official channels of communication to governments?

What approaches are being taken to anticipate and assess technological innovations, changing cultural values, and social futures? In what ways can the IJC maintain communication with these activities so that it can be better prepared to deal with the future?

Dealing with the Future

Professor Munton¹¹⁰ provides a deeper and more critical analysis of management proposals. He notes: "in 1973 a bilateral group of professors, mainly of resource planning and engineering, under the banner of the

110. Munton, *supra* note 91.

Canada-United States University Seminar produced the most thoroughly developed set of proposals to date."¹¹¹

In the final report of that Seminar to the Secretary of the Department of the Interior,¹¹² the principal investigator summarized the value of the 1971-72 and 1976-77 seminars, saying both had contributed substantially to the establishment of concepts, and the formation of attitudes and implementation processes, all of which were in part used by various publics, the governments, and the IJC during the past decade. He noted there was no record of any similar binational discussion group which concentrated its efforts on the Great Lakes and their management for the long future.

Although the Boundary Waters Treaty of 1909 and the formation of the International Joint Commission were first and major steps toward managing through a unitary body many of the issues arising out of new developments (but not treating the issues themselves in a unitary manner), the largest step toward the evolution of a management process that recognized substantially interrelationships, integration, ecology or, stated another way, "the totality of the whole," occurred with the approval of the binational Water Quality Agreement of 1972, extended in 1978. It was the felt need to look into management processes concerned with the totality of the whole that led to the initiation of the Canada-United States University Seminar.

The findings of the two seminars heightened the debate in Canada and the United States on management matters and several significant occurrences took place. In 1973 the U.S. Congress held, for the first time, a hearing on Great Lakes Institutional Arrangements;¹¹³ the IJC undertook, for the first time, a self-review in 1974;¹¹⁴ and the Standing Senate Committee on Foreign Affairs of the Canadian Parliament did the same in 1975.¹¹⁵ Additional growth of the idea of "managing the whole" took place during the first five-year program of the Great Lakes Water Quality Agreement. As a result of impressive special presentations, the IJC agreed to initiate a management process guided by the idea of ecosystem management¹¹⁶ which was further enlarged in an IJC-funded workshop in 1979, under the sponsorship of its Science Advisory Board-Societal Aspects Committee. The workshop report, *Anticipatory Planning for the*

111. *Id.* at 70.

112. Leonard B. Dworsky, Report on Office of Water Research & Technology Project No. C-5305, Funding Agreement No. 14-31-0001-4238 (1974).

113. *Great Lakes Hearings*, *supra* note 57.

114. International Joint Commission, Self Review (1974) (unpublished mimeo prepared at two-day conference held at Montreal, Quebec).

115. 1 STANDING SENATE COMM. ON FOREIGN AFFAIRS, *supra* note 107.

116. Great Lakes Water Quality Agreement of 1978, *supra* note 32.

Great Lakes, had as one of its main themes the idea of "Integrated (Ecosystem) Water Resources Management."¹¹⁷

In furtherance of the integrated management idea, the Great Lakes Governors and Provincial Ministers in 1982 resolved that the time had come to examine institutional arrangements as a means of looking forward to the improved management of the Great Lakes. And in June 1982, the IJC made it clear that institutional roles and opportunities represented a major concern in preparing for future developments.¹¹⁸

Institutional Summary

The impressive record of the two countries when compared to other nations facing similar international boundary water problems has been noted. Of equal importance in the longer term is the inevitable direction of the two countries toward the bilateral multipurpose management of the Great Lakes Basin. It is the direction taken by Canada and the United States toward comprehensive, integrated, multipurpose water and related land and environmental management that allows an optimistic outlook for the future management of the Great Lakes Basin.

One of the reasons that ecological planning has not moved forward as well as it might have been the lack of activity to identify the elements and their specific interdependencies which would better define the ecosystem to be managed.¹¹⁹ A first order of concern in attempting to design institutional characteristics is the need to determine the objectives sought and the problems to be confronted. An interdependence matrix for the Great Lakes Basin is presented in Table 5.

A report on Lake Erie Water Levels,¹²⁰ authorized by a Reference in 1977 and published in 1981, considered: geographic location; physiography; climate; hydrology and hydraulics; population; environmental conditions, water quality, wildlife-wetlands, and fish; coastal zone, economic areas, areas of concern, and land use-shorelines; power development. St. Lawrence, Niagara, and St. Mary's; Great Lakes-St. Lawrence Navigation System; public beaches; and recreational boating.

A report authorized by Reference in 1977 and published in 1981 on

117. ANTICIPATORY PLANNING, *supra* note 68.

118. INTERNATIONAL JOINT COMMISSION. INSTITUTIONAL ROLES & OPPORTUNITIES (June 1982) (annual report, under Great Lakes Water Quality Agreement of 1978, *supra* note 32).

119. Jack Vallentyne. The Ecosystem Approach (1978) (report prepared for Great Lakes Advisory Board, IJC). Vallentyne states explicitly that integration is the essential feature of the ecosystem approach. Although his comment was addressed to management, it applies equally to integration among the tasks to be managed.

120. INTERNATIONAL LAKE ERIE REGULATION STUDY BOARD. INTERNATIONAL JOINT COMMISSION. LAKE ERIE WATER LEVEL STUDY: MAIN REPORT (July 1981).

Great Lakes Diversions and Consumptive Uses¹²¹ considered: hydraulic methodology—forty three possible scenarios of diversion flow changes; economic evaluation—navigation, power generation, beaches and boating, and coastal zone-shore property; environmental evaluation—fisheries, near shore habitat, wetlands, and water temperature; wildlife; water quality—oxygen, phytoplankton, embayment water quality, phosphorus and turbidity; consumptive uses—municipal, rural-domestic, manufacturing, mining, rural-stock, irrigation; thermal power; consumption quantities by basins, nations, sectors of the economy, lake and non-lake categories; and general assumptions/parameters such as population growth, migration trends, employment, GNP, per-capita consumption, energy use, economic growth, and government policies.

Table 5. Interdependence Matrix for the Great Lakes Basin.

Affects	Water quality	Land use	Lake level control	Recreation	Flood control	Municipal/industrial water supply	Fish and wildlife protection	Agricultural water supply	Solid waste	Air quality	Navigation	Hydropower
Water quality	—	2	5	3	3	0	0	0	1	3	3	5
Land use	2	—	1	2	1	2	1	2	5	1	4	2
Lake level control	0	4	—	0	1	1	0	3	2	0	0	1
Recreation	1	1	3	—	3	0	2	0	4	1	5	5
Flood control	0	3	1	0	—	2	0	0	3	0	0	5
Municipal/industrial water supply	1	0	3	4	5	—	0	4	3	4	5	0
Fish and wildlife protection	1	1	2	2	2	0	—	0	2	4	3	2
Agricultural water supply	1	5	3	5	5	3	0	—	3	5	5	0
Solid waste	1	1	3	0	3	0	0	0	—	0	1	5
Air quality	4	1	0	0	0	0	0	0	4	—	5	0
Navigation	0	2	1	5	4	0	0	0	1	0	—	0
Hydropower	0	0	1	0	4	0	0	0	4	0	0	—

Ranking of priority on a scale 1-5; 1 = highest; 0 if no significant interdependence is thought to exist.

Canada-U.S. University Seminars, A Proposal for Improving the Management of the Great Lakes of the United States and Canada 17 (1971).

121. INTERNATIONAL JOINT COMMISSION, GREAT LAKES DIVERSIONS AND CONSUMPTIVE USES: EXECUTIVE SUMMARY (1981); INTERNATIONAL JOINT COMMISSION, GREAT LAKES DIVERSIONS AND CONSUMPTIVE USES: FINAL REPORT (1985).

In a 1984 report on Great Lakes Hydrometeorologic and Hydraulic Data Needs,¹²² the findings and conclusions of which were transmitted with substantial approval by the IJC to the two governments on January 31, 1985, the need for improved coordinating mechanisms for Great Lakes technical information was outlined. The report concluded that institutional arrangements among the boards of the IJC, data gathering agencies, and other users lack cohesion and the authority needed to make optimum use of technological advances.

It recommended continuing review and coordination of the ever-changing needs of the IJC boards; formal coordination with data collection agencies to ensure meeting present and future technical information needs of the Great Lakes boards and agencies in both countries using internationally coordinated data; promotion of the development of climate forecasts; and promotion of the development of predictive large basin water supply models. To accomplish these goals, the Board proposed that the IJC establish a permanent International Great Lakes Technical Information Network Board to provide a mechanism for institutional coordination in making studies and gathering and providing data on the Great Lakes system. This Board should also function as a coordinating committee on hydraulic and hydrologic data.

Without citing additional reports, it is apparent from those detailed above that the data requirements of the IJC boards, study committees, and the like are broad and growing. Integrated ecosystem planning data require technical information of a specific kind, but also needed are socio-economic data, water use and consumptive use statistics, resource and environmental evaluations, and land, atmospheric, climate, and quality data.

At the end of 1985 the two countries appeared close both to acting to achieve integrated ecosystem planning and management for the Great Lakes and articulating, through carefully defined policy and institutional capacity, means to implement such a program. Alerted to changing legal policies affecting diversions of water¹²³ and concerned about such diversions affecting the Great Lakes, the riparian states and the provinces of Ontario and Quebec joined forces in February 1985 to sign a Great Lakes Charter. The Charter calls for each signatory state to use similar formats to collect and maintain data on major water uses, diversions and consumptive uses, uses for navigation, recreation, hydroelectric power, and water allocation.

122. INTERNATIONAL GREAT LAKES TECHNICAL INFORMATION NETWORK BOARD. GREAT LAKES HYDROMETEOROLOGIC AND HYDRAULIC DATA NEEDS (1984) (report to the IJC).

123. *Sporhase v. Nebraska*, 458 U.S. 941 (1982). *Colorado v. New Mexico*, 459 U.S. 176, 183 (1982).

The workshop on Anticipatory Planning¹²⁴ laid out the basic lines of action which, if implemented by the two countries, can bring about an effective start to the long-term and unending task of binational management of the Great Lakes.

An Ending. Perhaps a New Beginning

The Great Lakes Basin Commission, organized under the Water Resources Planning Act of 1965, provided an important (but incomplete by itself) institution to forward the idea of Great Lakes Basin integrated/ecosystem management. Representing the eight basin states and the relevant federal agencies, the Commission moved forward the idea of comprehensive, coordinated, joint planning for the basin through publication of its twenty-seven volume Great Lakes Basin Framework Study.¹²⁵

In September 1981, all Basin Commissions under the Planning Act of 1965 were terminated by the federal government,¹²⁶ leaving a vacuum in federal-state-local relations and institutions in basin-wide water and related land resources planning.

Alerted to the changing legal policies affecting diversions of water and concerned about such diversions affecting the Great Lakes, the lake states, joined by the provinces of Ontario and Quebec, joined forces in February 1985 to sign a Great Lakes Charter.¹²⁷ The Charter calls for each state and province to use similar formats to collect and maintain data on major water uses and diversions and addresses uses for navigation, recreation, hydroelectric power, and water allocation. Governor Blanchard of Michigan emphasized, in signing the Charter, that it was "a first step not only in preventing diversions but also in addressing many of the other common issues this region faces."¹²⁸ The signatories to the Charter agreed that "without careful and prudent management, the future development of diversions and consumptive uses of the water resources of the Great Lakes Basin may have significant adverse impacts on the environment, economy, and welfare of the Great Lakes region."¹²⁹

Institutionally the Charter Working Committee, entitled the Water Resources Management Committee, "will be charged with responsibility to

124. ANTICIPATORY PLANNING, *supra* note 68.

125. GREAT LAKES BASIN COMMISSION, *supra* note 57.

126. Exec. Order No. 12319, 3 C.F.R. 175-76 (1981).

127. On February 11, 1985, in Milwaukee, Wisconsin the governors of Michigan, New York, Ohio, Illinois, Wisconsin, and Minnesota signed the anti-diversion Great Lakes Charter at a ceremony attended also by representatives of the governors of Indiana and Pennsylvania and of the Premiers of Ontario and Quebec who were to sign the Charter at a later date.

128. Hon. James J. Blanchard, Governor of Michigan, Statement on the Signing of the Great Lakes Charter 3 (Feb. 11, 1985).

129. Great Lakes Charter, *supra* note 127, at 1, *Findings*.

identify specific common water data needs: to develop and design a system for the collection and exchange of comparable water resources management data. . . ."¹³⁰ The Charter action by the signatory parties should be watched with a great deal of interest by the two national governments and by the IJC. There are a number of cautionary signals that need to be considered in determining the role of the Charter in the management of the Great Lakes, which the Great Lakes Framework Report¹³¹ had earlier commented upon:

(1) Any mechanism fashioned to deal with basin-wide resource issues must be capable of dealing with the problems of multiple use resources;

(2) Failure to coordinate information generation and planning constitutes a grave handicap of the ability to identify problems and formulate policy goals; and

(3) An institution created to deal with the total Great Lakes picture must have authority to establish priorities. Otherwise, there is a probability that any agreement on policy goals and objectives would be a hollow gesture.¹³²

Professor George Francis, in *Institutional Arrangements and Capabilities*,¹³³ responded to two questions: What changes may be needed in the institutional arrangements which have been established within and between the United States and Canada for dealing with Great Lakes issues in an anticipatory and forward looking manner, and what changes do these in turn imply for the IJC as the major binational "bridging agency" for the Great Lakes? He expounded:

The basic policy framework for governance over the Great Lakes Basin is set primarily by the international boundary between Canada and the United States, the constitutional division of powers among levels of government within both countries, and the major statutes bearing on planning, management, and use of the Great Lakes Basin ecosystem within each of the major jurisdictions. The secondary, but nonetheless crucial, components of this framework are the various intergovernmental coordinating devices which have been created to help facilitate the handling of specific kinds of problems arising from the many uncoordinated uses of Great Lakes resources.

The binational commissions, the IJC and the Great Lakes Fishery Commission, are the only bodies whose mandates permit them to view the lakes' ecosystem as a totality. Within the United States there

130. *Id.* at 42.

131. GREAT LAKES BASIN COMM'N. GREAT LAKES BASIN FRAMEWORK STUDY: FINAL ENVIRONMENTAL IMPACT STATEMENT 22, 25-28 (1976) (Leonard Crook, Staff Director).

132. *Id.* at 106.

133. Francis, *Institutional Arrangements and Capabilities*, in ANTICIPATORY PLANNING, *supra* note 68, at 37, 39, 40.

is an additional complementary role for water and land use planning provided by the Great Lakes Basin Commission, and some coordination of user group interests by the Great Lakes Commission. In Canada, several federal-provincial agreements, especially the Canada-Ontario Environmental Accord, also serve to facilitate joint inter-jurisdictional cooperation on matters concerning the Great Lakes.¹³⁴

In order to strengthen these capabilities, Professor Francis suggests creation of a Great Lakes Basin-wide "intelligence" operation to monitor ecosystem quality changes and exercise surveillance over ongoing activities and new initiatives which appeared to impact most heavily on the basin ecosystem. In addition, he sees a need for a wider measure of informal binational and interorganizational consultation on policy issues and common goals to be sought for the Great Lakes by each country working through its own system.

It is important to recognize the significance of the action of the leaders of the Great Lakes Basin states and the two Canadian provinces in furthering the idea of comprehensive, multipurpose, integrated water and related land and environmental planning and management, and ecosystem planning and management. They have moved the idea to a new plateau, and it is to be hoped that by their action they will have created a new atmosphere within which the two governments can once again more comfortably undertake those consultations and studies that will lead in time to an improved and effective management arrangement for the Great Lakes.

The advisory provided for the two governments by the IJC in part two of its January 1985 report on *Diversions and Consumptive Uses*,¹³⁵ excerpts from which were included in the introduction to this article, stands as a strong complement to the Great Lakes Governors' and provincial Ministers' Charter. In concluding its advisory, the IJC asks, and answers, a provocative question: Are we prepared for a non-linear future? A portion of that response follows:

Major changes in the economic and social conditions of our two nations have occurred in the past, and substantial policy shifts have taken place in reaction to them. One has only to think first of the Great Lakes in the early 1800s, not greatly different from what they were before the arrival of Europeans, and then of the Great Lakes a century later, at the center of a rapidly industrializing and urbanizing North America. The Great Lakes made this change possible with their seemingly unlimited supply of water for domestic and industrial use, for navigation, for power generation, for recreation; but they

134. *Id.* at 39.

135. INTERNATIONAL JOINT COMMISSION, *supra* note 2.

also paid the price in terms of pollution and eutrophication. In little more than a century, an apparently inexhaustible supply of pure water had become fully committed—if not over-committed—to supporting a variety of beneficial uses, leading inevitably to a variety of control measures to balance the needs of competing forces.

If this rapid change could occur in little more than a century, discontinuities must also be expected in the future. Though some trends leading to major change may be discernible now, their nature and scope are to a large extent unpredictable, for the Great Lakes and elsewhere. For example, a change in attitudes or in economic imperatives could make water a widely accepted article of commerce. While the commission does not believe that there is now a critical situation, at least one that would be felt in the Great Lakes region with respect to the quantity of water, it questions whether the institutions of government are in a position to make thoughtful and forward-looking decisions about the use of water, should the need arise. We know with little precision the present and future uses and values of Great Lakes water. Policies should therefore provide adaptive mechanisms for dealing with change and the unexpected.¹³⁶

If the two governments find it within their agendas, under this new climate, to initiate conversations looking toward the strengthening of institutional arrangements for the shared international Great Lakes, action will be needed to bring together representatives of urban and rural constituencies, and federal, provincial, and state government representatives, in a setting that will provide for communication among the several parties.

Several proposals have suggested an international committee format.¹³⁷ In keeping with these views, and based upon the author's own research and experience, an initial step to support the IJC's advice to governments that they would "be well advised at this stage to engage in broad but systematic discussion of their use of Great Lakes waters before they are faced with any sense of crises, actual or imminent . . ." ¹³⁸ would be the creation of an Ecosystem Study Board under usual Reference procedures to the IJC and under IJC oversight. Such an arrangement would involve minimal formality, and could be established for a specified period of time, for specific tasks, or for any number of directed actions. It could be discharged at the will of the governments. It would be experimental, enlightening, and would provide a guide, positive or negative, to the future.

The primary purpose of such a Reference would be to provide an

136. *Id.* at 44.

137. *I.e.*, Bilder, *supra* note 100; Craine, *supra* note 98.

138. DWORSKY, THE GREAT LAKES OF THE UNITED STATES AND CANADA: AN ECOSYSTEM PERSPECTIVE (Dec. 1985) (report prepared by a Cornell Univ. seminar, Leonard B. Dworsky, leader).

authorization by the governments of the United States and Canada to allow the IJC to initiate a comprehensive examination of the problems associated with the ecosystem management of the Great Lakes in order to conserve, develop, and use that unique resource for the mutual benefit of the people of both nations. Such a report would be of great value in providing the basis for the broad but systematic discussions recommended by the IJC.

Professor Munton¹³⁹ implied the difficulty the two governments may have in assessing the need for, the value of, and the usefulness of the IJC. Particularly, their concern is rooted in assuring that they do not overkill a good thing and that they maintain control over their responsibilities. But Munton's conclusion appears to be that the times, the problems, and the experience to date do require some change. In responding to the suggestion for an Ecosystem Study Board, the two governments could initiate a process that would lead to a variety of opportunities to allow responsible actors at all levels to evolve, ultimately, a procedure which will be practicable and workable in the real world.

139. Munton, *supra* note 91.