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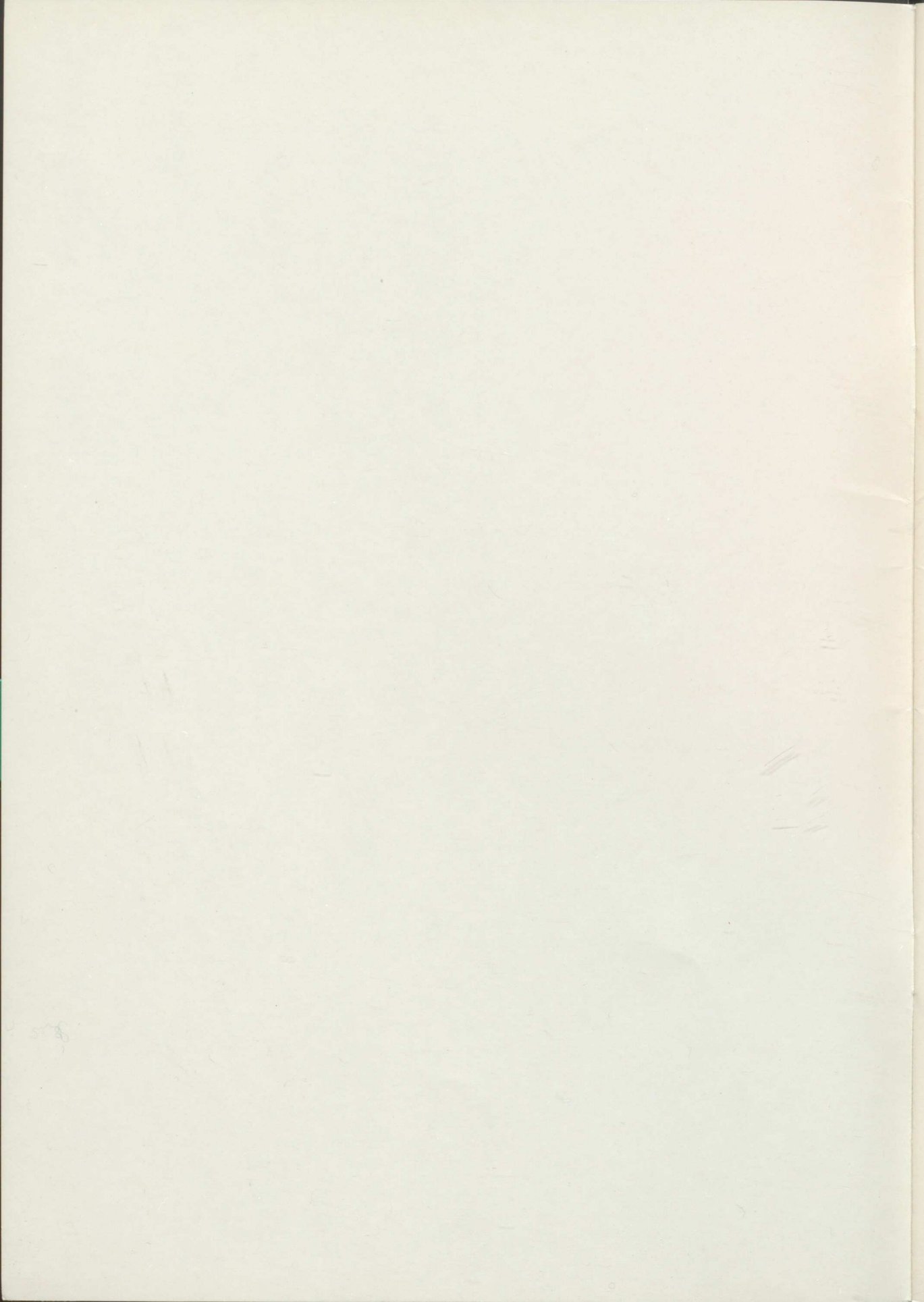
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*FINAL REPORT of the GREAT LAKES
EDUCATORS ADVISORY COUNCIL to the
INTERNATIONAL JOINT COMMISSION*



International Joint Commission
Commission mixte internationale



*FINAL REPORT of the GREAT LAKES
EDUCATORS ADVISORY COUNCIL to the
INTERNATIONAL JOINT COMMISSION*

SEPTEMBER 1993

ISBN 1-895085-63-2



Printed in Canada on recycled paper

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Dew Drops on Web



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"Hello, I'm Severn Suzuki ...

We are a group of four 12 and 13 year-olds from Canada trying to make a difference ... Coming here today I have no hidden agenda. I am fighting for my future ... In my life, I have dreamt of seeing the great herds of wild animals, jungles and rainforests full of birds and butterflies, but now I wonder if they will even exist for my children to see. Did you have to worry about these things when you were my age? ... I'm only a child and I don't have all the solutions, but I want you to realize, neither do you ... If you don't know how to fix it, please stop breaking it.

I'm only a child yet I know we are all part of a family, five billion strong; in fact, 30 million species strong and we all share the same air, water and soil — borders and governments will never change that. I'm only a child yet I know we are all in this together and should act as one single world towards one single goal ... Do not forget why you're attending this conference, who you're doing this for — we are your own children. You are deciding what kind of a world we will grow up in ... I challenge you, please, make your actions reflect your words."

*Severn Suzuki, 12,
founder of the Environmental Children's Organization,
speaking to delegates at the United Nations Conference on
Environment and Development in Rio de Janeiro, Brazil,
1992*

Hello, I'm Steven Seitz

We are a group of four 12 and 13 year olds from Canada trying to make a difference... Coming here today I have no hidden agenda, I am fighting for my future... In my life, I have dreamt of seeing the great world of wild animals, jungles and rainforests full of birds and butterflies but now I wonder if they will even exist for my children to see. Did you have to worry about these things when you were my age?... I'm only a child and I don't have all the solutions, but I want you to realize, remember to you... If you don't know how to fix it, please start looking for it.

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1992

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SUMMARY OF RECOMMENDATIONS AND CONCLUSIONS

The Great Lakes Educators Advisory Council recommends that:

- all Great Lakes states and provinces review current educational guidelines to include mandates, or at least specific goals within existing mandates, for environmental education, and provide the necessary funding to ensure incorporation at all grade levels and in a variety of subject areas; and
- these mandates or goals include specific objectives to incorporate the Great Lakes into a variety of subject areas at various grade levels, including but not limited to science, geography, social studies, history, mathematics and the arts.
- all education departments of Great Lakes - St. Lawrence colleges and universities create necessary courses and programs to ensure that training in environmental literacy and environmental education methodology is accomplished by all graduating students. Great Lakes environmental issues should be infused into a variety of subject areas, including but not limited to science, geography, social studies, history, mathematics and the arts.
- Great Lakes - St. Lawrence colleges and universities develop environmental literacy programs to ensure that graduating students are environmentally literate citizens. Such programs should include incorporation of community-based environmental issues into the learning setting, and provide opportunities for academia to incorporate environmental topics into a variety of subject areas. Great Lakes issues should be a primary topic of inclusion within the environmental literacy program.
- partnerships between educational, business and media organizations be created to expand the quantity and quality of information available on television. Because Canadians' and Americans' primary source of information is through this medium, a "Great Lakes Watch" program similar to the successful Earthwatch segments should be developed and provided to local television media to begin and/or end news segments. Public service announcements and other cost effective methods to inform the general public are also needed.

- curriculum developers, in partnership with Great Lakes specialists and community education leaders, create a "Project Great Lakes" curriculum, similar to the highly successful Project WILD and Project Learning Tree programs. Such a project should include development of action-oriented curricula for various grades and subject areas, and be provided to educators throughout the region through required workshops, as undertaken in the proven programs. Such a project should be initiated once ample and ongoing funding is obtained from a coalition of agencies, organizations and industries, to ensure adequate distribution and use of the resource.

The Council concludes that:

- the week-long institutes created for each Great Lake provide a unique opportunity for agencies and industries in each lake region to reflect their commitment to Great Lakes restoration by sponsoring future institutes for educators and the general public, and the Council encourages them to work with existing sponsors to ensure successful implementation of each institute in future years.

The Council recommends that:

- The Commission hold a roundtable to bring together key organizations, industries, foundations and others to facilitate the creation of partnerships for the development and funding of a Great Lakes - St. Lawrence Environmental Education Clearinghouse, and provide the necessary coordination assistance to ensure its implementation.

The Council subcommittee concludes that:

- the Erie County Environmental Education Institute, Inc., in Buffalo, New York provides the best potential site for the main clearinghouse.

The Council recommends that:

- the Commission strongly urge and support the development of a Clearinghouse for Great Lakes - St. Lawrence Environmental Education, and encourage key federal, state, provincial agencies, as well as funding sources such as foundations and Great Lakes industries and associations, to become involved in and supportive of such a project.

I. INTRODUCTION

As Americans and Canadians, we hear new findings almost daily about environmental problems such as depletion of the ozone layer, destruction of rain forests, extinction of species and pollution of our air, water and soil. Despite our concerns for a healthy environment, solutions may seem incomprehensible or beyond our means because of our limited ability to turn intentions into actions. In spite of our best intentions, and efforts to deal with local issues through recycling or water conservation, many of us feel helpless to contribute solutions to larger regional and global environmental concerns, and thus we continue with life as usual.

The effect of this inaction is obvious. As our lives are increasingly influenced by a global economy in the 1990s and policies that extend far beyond the local community, it becomes more difficult to recognize and understand how personal actions affect the health of the local, regional or even global ecosystem. Yet, this recognition and ability to consider local and global concerns as we act is even **more** essential today than ever before. The interdependence among nations and the growing importance of resolving environmental challenges to ensure human survival demands an educated citizenry that can act according to the needs of the local and global community.

Education is the key to long-term change in the way individuals value and act toward their environment. Environmental education, which has as its theme or slogan to "Think globally, act locally," can encourage personal and societal changes that address the causes of pollution and environmental disruption. It does this by providing opportunities for citizens of all ages to participate in learning that relates to their interests or concerns, by focusing on actions that reflect knowledge and values, and by assisting learners to take responsibility for their actions in the context of interconnectedness and interdependence with the environment in which they live.

Environmental education allows students and citizens to develop an understanding of how humans relate to the natural environment. It provides them with the "tools" to make wise individual and societal decisions about the use of natural resources. An effective environmental education strategy, as outlined by Water Quality 2000,

"begins in grade school, where the goal is to introduce environmental sciences -- nature -- as a topic no less important than reading, writing or arithmetic. In middle and high schools, as curricula are expanded to include civics, geography and history,

more formal instruction should be offered on ecosystems' structure and functions. College curricula should be considered incomplete without core courses on environmental or water resources systems ... Universities should be encouraged to integrate environmental education into every degree program ... environmental education and training programs should be offered to a wide range of professionals, including locally elected and appointed officials, legislators, industrial and utility managers, journalists and other media professionals, and teachers."¹

Throughout the Great Lakes - St. Lawrence region, individuals and organizations are initiating effective environmental education programs that increase awareness of and commitment to resolving issues facing the basin. These programs, for the most part, include integrated and experiential learning approaches to ensure immediate relevancy to learners' lives and to develop creative solutions based on the knowledge and values they acquire. Many take advantage of the vast human resources in their communities by including engineers, economists, lawyers, planners, biologists and others in the teaching and learning process. Such community-based learning increases the likelihood of relevancy and effective decisionmaking for all concerned, because the perspectives and experiences of all segments of the community contribute to solutions.

Unfortunately, environmental education programs and methodologies have not yet been incorporated into formal and nonformal educational training structures in most areas of the region. As a result, many new and experienced educators do not feel confident or knowledgeable enough to incorporate experientially based education about the environment, and the Great Lakes - St. Lawrence ecosystem in particular, into their teaching settings. If we are to expect our children, policymakers and industries to act in ways that will restore and protect the Great Lakes Basin Ecosystem, we must fully incorporate environmental education goals and processes into learning settings for all ages. Training and resources also must be provided for formal and nonformal educators to obtain the skills and confidence needed to implement the goals and objectives of environmental education.

This report includes a review of programs initiated over the past four years by the Commission and its Great Lakes Educators Advisory Council to encourage the use of Great Lakes themes and case studies to promote environmental education in the region. Based on assessments of these programs and additional research, current environmental education initiatives are outlined and recommendations for action by all sectors of the Great Lakes - St. Lawrence community are provided.

¹ Water Quality 2000 is a unique coalition of industries, environmental groups, governments, academics and professional and scientific societies created to advance water quality planning. Water Quality 2000, 1992. *A National Water Agenda for the 21st Century*. Water Environment Federation, Alexandria, Virginia. p. 43.

The level of awareness about issues facing local, regional and global ecosystems has increased significantly over the past two decades. There is reason for optimism, as many citizens are gaining the awareness and knowledge needed to understand their role in the health of the Great Lakes - St. Lawrence ecosystem. Ecosystem management issues will continue to face the region until learning experiences enable all citizens to develop the knowledge, skills and commitment to participate in and support environmental restoration and protection efforts. By doing so, we will provide the keys to ensure that, as inhabitants of the Great Lakes - St. Lawrence region, we can truly act according to our values and concerns for the health of all parts of the ecosystem.

Directory of Great Lakes Education Materials

The Social and Economics Considerations Committee of the Commission's Great Lakes Science Advisory Board invited involvement with the educational community to help identify and evaluate educational materials that would assist in teaching about the Great Lakes. The survey also identified materials that were used most often by teachers in various subject areas and grade levels.

A follow-up questionnaire was distributed by the Science Advisory Board to update responses from the first survey. These results were combined to produce the first edition of the Directory of Great Lakes Education Materials. The Directory was designed to provide a complete listing of all available materials. Rather, its design was helpful in identifying commonly used materials and sources of additional materials on the Great Lakes.

The first two surveys were conducted to determine the type and availability of Great Lakes materials available to the public, while most materials provided in the Directory were for younger audiences and tended to emphasize geography, history and shipping. Those written in the early 1970s were primarily aimed at focused on Great Lakes water quality and pollution. A wide variety of pamphlets and technical reports were also identified. The Directory was developed to provide a comprehensive listing of materials available to develop their own curricula based on the subject and grade level they taught and were most useful to their own school or adult audience. Few materials of any format - books, pamphlets,

WATER

The earth never offered man
Water
As a gift

Water was part of her
It is her blood
Her moving force

And in this, she said
You will see your greed
Your mistakes
Your image
But few will see me.

Michael Robinson

*Mr. Robinson, native artist and poet,
also created the etching "Stone Garden,"
which appears on the front cover*

II. BACKGROUND AND OUTCOMES

The **International Joint Commission (Commission)** has played a significant role in raising the environmental awareness of Great Lakes communities for the past two decades. Public meetings held under the Pollution from Land Use Activities Reference, annual and biennial meetings on Great Lakes water quality, roundtables, live-by-satellite television conferences and published materials have all provided a wealth of information and opportunities to participate in the restoration and protection of the Great Lakes ecosystem. The Commission has enhanced awareness in the educational community through several initiatives over the last decade that recognize the fundamental role education plays in achieving progress under the Great Lakes Water Quality Agreement.

Directory of Great Lakes Education Material

The Social and Economics Considerations Committee of the Commission's Great Lakes Science Advisory Board initiated involvement with the educational community in 1984, when it surveyed several hundred educators and producers of educational programs to determine what materials they found most useful in teaching others about the Great Lakes. The survey also identified what items were used most often by teachers in various subject areas and grade levels.

A followup questionnaire was sent in early 1987 by the Science Advisory Board to update responses from the first survey. These results were combined to produce the first edition of the *Directory of Great Lakes Education Material*. The *Directory* was not meant to provide a complete listing of all available materials. Rather, its listings were helpful in identifying commonly used materials, and sources of additional programs on the Great Lakes.

The first two surveys' results indicated several things about the type and availability of Great Lakes materials available up to the mid-1980s. While most materials produced in the 1970s were for younger audiences and tended to emphasize geography, history and shipping, those written in the early 1980s targeted older audiences and focused on Great Lakes water quality or quantity issues. A wide variety of pamphlets and technical reports published by government agencies and environmental and research organizations were used by educators to develop their own curricula based on the subject focus and grade level they taught and were most useful to those who taught secondary school to adult audiences. Few materials in any format -- books, audio-visuals,

kits -- were listed for elementary or middle school students that addressed the Great Lakes as an ecosystem. Either materials were not being produced on these issues for younger grades, or teachers were not finding out about them.

Educators were also asked in these first surveys what materials were most needed to teach others about the Great Lakes. In almost all instances, they listed classroom-ready materials for all age levels, including preschool, that focus on hands-on or experiential learning. More than 3,000 subsequent surveys sent to produce the third and fourth editions of the *Directory* have shown that producers of educational materials -- including private and public sources -- are responding to this need, although not in the quantity or quality that educators desire. Since 1985, more materials have been produced for younger audiences, and often include information on how humans affect the ecosystem and the lakes, and in turn the potential impact on humans from pollution in the region.

The *Directory* has expanded considerably since its first edition, including development of a separate edition of materials available in the French language. It is encouraging to see the wealth of materials now available. Educators are also seeking out information on the lakes more than ever before, as evidenced by the increasing requests received each year for the *Directory*, totaling more than 40,000 requests. This enthusiasm is also reflected in the number of workshops and education association annual meetings that have focused on the Great Lakes over the past few years. In 1992 alone, the Great Lakes was the primary theme for 23 of 28 annual meetings of various education associations in the region. Clearly, educators are learning about the Great Lakes and how to teach about them through these informal mechanisms.

GREAT LAKES EDUCATORS ADVISORY COUNCIL

Educators' interest in Great Lakes materials exploded in the late 1980s. By 1989, for example, the percentage of the approximately 25,000 information requests received annually from teachers or students at the Commission's Great Lakes Regional Office had grown to approximately 60 percent. Other initiatives to determine the status of Great Lakes education, including a one-year Great Lakes Education Task Force created by the Great Lakes Commission, concluded in March 1989 that teacher workshops and institutes are most effective in expanding educators' knowledge and confidence to teach about Great Lakes issues.²

2 Various researchers, including Council member Rosanne Fortner in the study, *Relative Effectiveness of Four Modes of Dissemination of Curriculum Materials*, 1985, concluded that "simply giving an activity to a teacher is worthless. It won't be used ... For materials disseminators it is apparent that money is better spent on short workshops. They tend to attract those teachers who are more likely to use the materials presented."

Specifically, it recommended that

"... states, education departments, school districts and professional associations ... give a high priority to teacher inservice and preservice training on Great Lakes issues... The Task Force recommends that a group of inservice and preservice training experts from the various jurisdictions be convened to determine strategies for presenting such Great Lakes-specific training and determine the roles and responsibilities of the various interested organizations."³

In late 1989, the International Joint Commission responded by creating the **Great Lakes Educators Advisory Council (Council)**, made up of environmental education experts from each Great Lakes state and province, to advise and assist initially the Great Lakes Science Advisory Board, and later Commission staff, in responding to educators' needs. To encourage educators to develop the knowledge, skills and confidence to incorporate Great Lakes environmental education into their teaching practices, Council members developed one-day workshops and week-long institutes in their respective jurisdictions, and completed research on the status and needs of Great Lakes - St. Lawrence environmental education. A summary of the Council's activities and findings in these areas follows.

Workshops

Council members held or sponsored 33 workshops throughout the Great Lakes region from July 1990 to May 1993. The sessions ranged from four hours to two days, with several general goals. Participants were able to:

- receive an introduction to and materials about the major aspects of the Great Lakes - St. Lawrence ecosystem, the value of the lakes to the region, the environmental issues facing the region, and the impacts of human activities on the ecosystem;
- clarify their personal knowledge, attitudes and values about the Great Lakes - St. Lawrence ecosystem;
- identify opportunities for correlations within their current curricula to include the Great Lakes - St. Lawrence ecosystem, in various subject areas;
- participate in selected hands-on activities to encourage experiential learning opportunities on Great Lakes issues;
- exchange experiences and ideas with other educators from their community, state or province; and
- provide feedback on the effectiveness of the workshop and how they will incorporate ideas into their own teaching setting.

³ Great Lakes Commission, 1989. *Great Lakes Education: Issues and Opportunities for the Region's Classrooms, Final Report of the Task Force on Great Lakes Education to The Great Lakes Commission*. Ann Arbor, Michigan. p. 31.

Council members agreed early in the process, based on their own experiences and on the goals of environmental education in general, that experiential, community-based learning was the most effective method for educators to use in teaching others about the Great Lakes. Thus the workshops were also designed with a "community learning" focus, including exploration of how to incorporate the Great Lakes according to local and state/provincial curriculum objectives, available resources of the host community to provide practical learning experiences, and opportunities for expanded interaction between educators, students and the broader community.

The workshops were also designed to have a multiplier effect. Participants were defined as educators in the broadest sense; while many taught in formal educational settings, others worked with children and adults in nonformal settings such as nature centers or as representatives of public interest groups or civic organizations. Participants were provided with materials and activities to pass on to others, either by word-of-mouth or by holding their own workshops in their respective schools or organizations.

Perhaps the clearest signs of the success of these workshops are that, increasingly, Great Lakes environmental education workshops are being held around the basin through the initiative of past participants in Council workshops, or by education and civic associations interested in supporting the growth of their community's awareness of and concern for the Great Lakes and St. Lawrence ecosystem. Federal, state and provincial agencies are also expanding their education programs in the region. These initiatives will help to ensure greater awareness about the Great Lakes in teachers, students and citizens throughout the region.

Institutes

As the Council implemented its workshops, participants continually expressed frustration in workshop evaluations with the lack of time available to explore Great Lakes topics and issues in depth. Many felt that, in order to enhance their knowledge and confidence levels to the degree they would feel comfortable incorporating such topics into their teaching settings on an ongoing basis, they required additional instruction and support. As a result, the Council explored options to serve as a catalyst for week-long sessions or institutes, to be held in cooperation with community or regionally based organizations that could sponsor the institutes in future years.

The first such institute was held on Isle Royale in July 1991 as a pilot project with the Lake Superior Center. The same goals used to design the workshop sessions were incorporated into the institute's design, and expanded to include:

- first-hand opportunities to obtain the latest Great Lakes research from scientists located in the institute's lake region, to connect participants with a variety of agencies, groups and organizations that can provide information and assistance;
- sharing of teaching activities and curricula already developed by participants; and
- development of sample lessons or outlines of study for individual and/or group use, using techniques that accommodate various thinking skills and learning and teaching styles.

Based on successful completion of the pilot institute, additional research was completed to identify organizations, agencies or universities that could implement Great Lakes - St. Lawrence Environmental Education Institutes in other lake regions. A lake-based focus was developed by the Council according to results of the pilot institute, where participants tended to come from surrounding states and provinces and were most interested in learning about Lake Superior as a microcosm to represent the larger region. This approach has also been used successfully for several years in the Lake Erie basin, where Ohio State University provides a week-long course on Great Lakes education at its Stone Laboratory on South Bass Island.

In 1992, the Council assisted in producing a Lake Ontario institute in cooperation with Brock University, while the Lake Superior Institute was sponsored and held in its entirety by the Audubon Center for the North Woods. These entities will continue their successful programs in future years, and two additional institutes are being cosponsored for Lakes Michigan and Huron with the University of Wisconsin-Green Bay and Michigan Science Teachers Association, respectively. With the completion of these last two pilot institutes, a Great Lakes Environmental Education Institute has been created for each lake basin. Further investigation is needed to develop an institute focusing on the St. Lawrence River ecosystem.

Clearinghouse

As the Commission and Council have provided these opportunities to enhance awareness of the Great Lakes - St. Lawrence in the educational community, the increased demand for materials and information has been overwhelming. While this points to the success of the Commission's and others' efforts, it also places additional demands on the resources of various Great Lakes organizations to respond effectively to these requests, often within severe funding and staffing constraints.

Citizens and educators are looking for a common source of information that provides easy access to a variety of Great Lakes - St. Lawrence materials. For most, the Commission has become that source,

III. FINDINGS AND RECOMMENDATIONS

STATUS OF ENVIRONMENTAL EDUCATION IN GREAT LAKES STATES AND PROVINCES

Environmental Education Mandates

Canada and the United States share similarities and differences when it comes to formal education mandates. Canada's Constitution Act of 1867 allows each province to legislate education according to its own culture and history. Provinces set curriculum objectives and standards, and each local school board designs specific curricula and programs to meet these requirements as well as local needs. School boards are fairly autonomous, and can add other requirements or priorities as needed to suit their community.

Like Canada, education standards in the United States are a constitutional right reserved for each state. States are free to develop their own objectives, which federally legislated and funded educational programs strive to complement. For example, the National Environmental Education Act of 1990 established partnerships among the U.S. Environmental Protection Agency and other federal agencies, local education institutions, state agencies and nongovernment organizations to increase public understanding of the natural environment and to advance and develop environmental education and training. Grants are provided under the act to enhance state and regional efforts, and to create a National Consortium for Environmental Education and Training, established in 1992 at the University of Michigan. Like provincial school boards, state school boards have a great deal of freedom and autonomy to design programs that meet state requirements as well as any other provisions the boards feel are important for their community.

The Ontario Ministry of Education's 1980 goals of education include general statements of support for the inclusion of environmental education. Because nothing specific was mandated in these goals, however, the amount of education included about the environment has ultimately depended on the individual teacher's interest and motivation, and the direction she/he receives from the local board of education. The province is in the process of reorganizing the mandated learning process for grades one through nine so that, by the end of grade nine, students are expected to have developed an understanding and commitment to "peace, social justice, and the protection of the environment, and apply a

global perspective in both their attitudes and behaviour."⁴

Wisconsin leads the United States as the first state to mandate environmental education, in 1935. The law as updated in 1983 requires all teacher certification candidates in early childhood, elementary, agriculture, science and social studies education to be competent in four areas of environmental content and three areas of environmental education methodology. Teacher preparation programs are reviewed and approved every five years.

Several other programs make up the Wisconsin Environmental Education Initiative, an unofficial coalition of agencies and organizations that coordinate and implement a variety of programs. For example, the state's Department of Public Instruction, Board of Vocational, Technical and Adult Education and the Wisconsin Association of Environmental Education work with school districts to ensure they meet state requirements to develop and implement curriculum plans for all subject areas into which environmental education has been incorporated. The Wisconsin Environmental Education Board was created in 1990 to provide additional direction and to administer an annual \$200,000 grants program. Twenty-seven projects were funded in 1992-93. The Center for Environmental Education also was established at the University of Wisconsin-Stevens Point in 1990, and a quarterly newsletter updates teachers and others interested in environmental education.

In 1993, Pennsylvania adopted new curriculum regulations that require all students to meet learning outcomes in nine academic areas, including environment and ecology. Instruction for this area begins in kindergarten and continues through 12th grade. The Michigan Natural Resources Commission and State Board of Education adopted an Environmental Education Plan in 1992 to develop materials, curriculum objectives and provide support staff to expand the use of environmental education throughout the state. Minnesota's Environmental Education Act of 1990 was revised in 1993 by the "GreenPrint for Minnesota," which includes development of proposed graduation outcomes for environmental education. Previously, the environment was included in various grade levels but was not a required area of knowledge for graduation.

Like Ontario, the other Great Lakes states thus far have only general guidelines for public schools to include instruction and study in the "conservation of natural resources" (Illinois), "the ecological consequences of choices in the use of the environment and natural resources" (New York), and "energy and resource conservation education" (Ohio). In Indiana, environmental issues are integrated into the proficiencies framework for the kindergarten through grade 12 science curriculum.

⁴ Ontario Ministry of Education, 1993. *The Common Curriculum*. Toronto, Ontario. p. 11.

The restructuring occurring in Pennsylvania, Michigan, Minnesota and Ontario to include -- among other topics -- environmental education, is encouraging. However, because nothing specific has been mandated in most Great Lakes state and provincial guidelines, and because most educators have not had training to incorporate environmental studies into their teaching, the amount of environmental education a teacher has or will include in the formal learning setting depends on their interest level, and guidelines and support provided by the local board of education or other organizations.

Based on informal tallies of education association meetings and preservice sessions requested and held on environmental issues and education methodology, it is clear that environmental education is very much a grassroots movement that is producing some positive results for the region's overall level of environmental awareness. This grassroots movement is also helping to spur state agencies into revising their curriculum guidelines and standards for graduation, as highlighted in many of the descriptions above.

Even with the progress obtained as a result of these informal initiatives, the goals, objectives and programs of environmental education will not be considered legitimate and necessary elements of every child's education until greater commitment and funding from state, provincial and local governments is provided. Because so many topics already compete for space on the curriculum agenda in almost every subject area, even the most environmentally committed teachers have trouble finding space to weave environmental considerations into their classroom instruction. Formal commitment brings with it the recognition, funding and training support to ensure that teachers have the knowledge and confidence to infuse environmental education into subject areas at all age levels.

Just as important, the Council is aware of a limited number of school boards in the region -- the Niagara South Board in St. Catharine's, Ontario, the Sandusky, Ohio public school system and Windsor, Ontario public schools -- that include specific guidelines for instruction about the Great Lakes at various age levels. The lakes will continue to be taken for granted until children learn at an early age about the lakes, their value to the region economically and aesthetically, and the impacts humans have on the ecosystem. If the Great Lakes states and provinces are truly committed to developing educational guidelines that reflect the history and culture of the region, the lakes themselves must become an integral part of all levels of instruction.

Therefore, the Great Lakes Educators Advisory Council recommends that:

- all Great Lakes states and provinces review current educational guidelines to include mandates, or at least specific goals within existing***

mandates, for environmental education, and provide the necessary funding to ensure incorporation at all grade levels and in a variety of subject areas; and

- *these mandates or goals include specific objectives to incorporate the Great Lakes into a variety of subject areas at various grade levels, including but not limited to science, geography, social studies, history, mathematics and the arts.*

The Council of State Governments has developed model state environmental education legislation which the Great Lakes states and provinces could use as a starting point for individual efforts.⁵

Teacher Training

Even if every Great Lakes state and province mandated the incorporation of Great Lakes environmental education tomorrow, few educators would have the training, knowledge and confidence to incorporate it into their teaching setting. While some have obtained inservice instruction in specific areas, few have received the extensive training required to infuse environmental education subjects and methodology into every subject they teach.

In a 1992 survey of Canada's 46 deans of schools of education, 81 percent said that environmental issues were included in basic teacher training. Seventy-four percent of these include the environment as a topic in a specific course, such as biology or aquatic science, while 58 percent incorporate environmental issues into the broader curriculum. Sixty-eight percent have at least one designated faculty member for environmental education, and 10 percent use outside specialists or associates to provide environmental education instruction. These are encouraging figures, although the quality of programs and extent of environmental education methodology used (i.e. experiential learning techniques that address knowledge, skills, values and action) was not identified.

In a separate Council study, 22 Ontario and Quebec universities were surveyed. Three schools of education responded that they had fully incorporated environmental education into their teacher education programs, while four had remotely done so and eight did not provide a specific program, but included the environment in a broader context in geography or science courses. Five reported that the Great Lakes was a minor topic or was not included in their program, and four listed the lakes as a subject taught in other areas, such as biology or aquatic sciences. None listed Great Lakes studies as a strong element of their program.

⁵ For further information, contact Karen Marshal, Council of State Governments, 3560 Iron Works Pike, Lexington, Kentucky 40578-1910.

Environmental studies is not considered an area of concentration for initial teacher certification in Ontario, and thus students with an interest in this area must complete an additional qualification process. The Ontario Ministry of Education's reorganization process is expected to include requirements for a teacher training program in environmental education for practicing and new teachers. At present, however, the Great Lakes is not included as a priority topic within these new requirements.

In the United States, environmental studies programs are available in almost 200 colleges and universities across the country. Few, however, have direct ties to education department programs. In the Great Lakes region, 26 out of 40 who responded to a Council survey offer some form of environmental education or Great Lakes studies in their teacher education programs, particularly in science courses. In those universities where strong programs do exist, they are directly linked to state mandates and standards, such as in Wisconsin and, most recently, Pennsylvania.

Because colleges, universities and other professional schools educate most of the people who will teach Canadian and American children, they must be responsible to provide the training necessary to ensure that educators can pass on the knowledge, skills and commitment to environmental sustainability of the Great Lakes - St. Lawrence region, and the world. ***Thus, the Council recommends that:***

- ***all education departments of Great Lakes - St. Lawrence colleges and universities create necessary courses and programs to ensure that training in environmental literacy and environmental education methodology is accomplished by all graduating students. Great Lakes environmental issues should be infused into a variety of subject areas, including but not limited to science, geography, social studies, history, mathematics and the arts.***

These same colleges and universities are responsible for preparing the people who will manage society's public and private institutions. As environmental issues increasingly impact all sectors of society in both countries, the level of awareness among our policymakers, engineers, economists, attorneys and health professionals becomes crucial to successful resolution of these issues. The Management Institute of Environment and Business estimates, for example, that approximately 25 of 700 business schools in the United States have a course on business and the environment; none require the course for graduation.

Some universities, such as Tufts University in Boston, Massachusetts, are implementing environmental literacy programs for faculty and students. In the first year, the Tufts Environmental Literacy Institute assisted 25 faculty members in incorporating environmental issues into courses such as mechanical engineering, economics, history, interna-

tional diplomacy, drama, sociology and chemistry.⁶ The program takes advantage of community experts to enhance university professors' and students' involvement in real environmental issues, and in turn the program is expanding environmental awareness throughout the Boston community. While not in the Great Lakes basin, the Tufts program is exemplary and worth duplicating at colleges and universities throughout the region.

Environmental literacy programs are in the early stages in some Great Lakes colleges and universities. They hold great promise, because these schools could serve as centers for creative partnerships to solve environmental challenges between and among academia and the local, regional and international community. The broader communities can take advantage of academia's expertise, thus reducing the isolation of academia from the very societies that support them, and add relevancy to their work.⁷ **Thus the Council recommends that:**

- **Great Lakes - St. Lawrence colleges and universities develop environmental literacy programs to incorporate community-based environmental issues into the learning setting in all subject areas. Great Lakes issues should be a primary topic of inclusion within the environmental literacy program.**

ENHANCING GREAT LAKES ENVIRONMENTAL EDUCATION PARTNERSHIPS

The Council believes it is vital that Great Lakes environmental education be recognized and institutionalized into existing educational structures, and recognizes that continued growth will most often occur through bottom-up approaches. Environmental education is and will remain a grassroots effort by virtue of its goals and design.

The success of efforts to expand awareness about the Great Lakes - St. Lawrence ecosystem has resulted primarily from these approaches. Nature centers, for example, are the focal point for many community programs on the environment. Directors are seeing positive changes in how teachers use these centers; rather than just asking for information, educators are looking for programs that actively involve children in environmental concerns.

This is a positive step toward more action-oriented educational methodologies such as those advanced in environmental education.

⁶ Cortese, Anthony D., 1992. "Education for an Environmentally Sustainable Future," *Environmental Science & Technology*, 26:6. p. 1113.

⁷ Francis, George, 1992. "Environmental Education in Academia: Escaping the Institutional Impass," *Environmental Professional*, Vol. 14. p. 282.

Programs and Materials

In the Great Lakes - St. Lawrence region, existing and new organizations are increasingly becoming involved in awareness programs about the lakes. The Center for Great Lakes and Aquatic Sciences in Ann Arbor, Michigan is developing a traveling exhibit for display at visitor and community centers, marinas, hospitals, airports and shopping malls and, where possible, at open houses on regional research vessels from a variety of institutions. The Center for Environmental Study, also in Michigan, is completing a pilot study for a series of weekly, one-minute radio spots highlighting Great Lakes issues and problems. The spots will air during peak listening times on commercial stations throughout the region. McMaster University in Ontario is producing a 40-part radio series on environmental topics in Canada, which includes discussion of Great Lakes issues.

These and other similar programs are essential ingredients in the Great Lakes environmental education scenario, because they provide opportunities for the general public to learn about and become involved in issues facing the region's ecosystem. ***The Council recommends that:***

- ***partnerships between educational, business and media organizations be created to expand the quantity and quality of information available on television. Because Canadians' and Americans' primary source of information is through this medium, a "Great Lakes Watch" program similar to the successful Earthwatch segments should be developed and provided to local television media to begin and/or end news segments. Public service announcements and other cost effective methods to inform the general public are also needed.***

Other innovative programs are focusing on assisting educators, such as the Teacher Action Plan Workshops on the Great Lakes to be held in Canada's 17 Areas of Concern. The workshops will emphasize individual empowerment and community outreach on Great Lakes issues. Several federal and provincial agencies, including the Department of Fisheries and Oceans, Health and Welfare Canada and the Department of the Environment, are developing the program in cooperation with the Ontario Science Centre and others as part of the federal Great Lakes Action Plan.

The United States Environmental Protection Agency has also increased its efforts recently in Great Lakes environmental education, including classroom tours of its research vessel "Lake Guardian," distribution of its curriculum resource *Great Minds, Great Lakes*, teacher workshops and distribution of grant funds through the National Environmental Education Act. The Great Lakes Protection Fund funds new ventures in Great Lakes environmental education, such as the recently developed project by the Michigan Geographic Alliance, a organization

funded by the National Geographic Society Education Foundation, the Michigan Departments of Education and Natural Resources, and the W.K. Kellogg Foundation. These programs expand on already successful programs in the basin, such as the Grand Traverse Inland Seas Education Association and Ontario NIMBI schoolship programs, the Global Rivers Environmental Education Network, and community outreach programs in most Areas of Concern.

As shown by the *Directory of Great Lakes Education Material*, a wealth of programs and background materials already exists. However, few curriculum materials have been developed that provide the hands-on, classroom ready instruction that educators most desire. Those that do exist often do not have the funding for mass distribution or effective teacher training, and thus become useful to only a small percentage of the Great Lakes educational community. ***The Council recommends that:***

curriculum developers, in partnership with Great Lakes specialists and community education leaders, create a "Project Great Lakes" curriculum, similar to the highly successful Project WILD and Project Learning Tree programs. Such a project should include development of action-oriented curricula for various grades and subject areas, and be provided to educators throughout the region through required workshops, as undertaken in the proven programs. Such a project should be initiated once ample and ongoing funding is obtained from a coalition of agencies, organizations and industries, to ensure adequate distribution and use of the resource.

Workshops and Institutes

For educators in particular, the Council has learned that workshops and institutes are essential to provide the followup necessary for participants to feel comfortable using Great Lakes materials in the teaching setting. The sessions' real success can be measured not only in terms of the value of the experience for the educators, but also in how the experiences motivate participants to action. A personal commitment to integrate the Great Lakes - St. Lawrence ecosystem into their teaching programs on an ongoing basis is most often obtained through the workshop and institute process. ***The Council concludes that the week-long institutes created for each Great Lake provide a unique opportunity for agencies and industries in each lake region to reflect their commitment to Great Lakes restoration by sponsoring future institutes for educators and the general public, and the Council encourages them to work with existing sponsors to ensure successful implementation of each institute in future years.***

Great Lakes - St. Lawrence Clearinghouse

The International Joint Commission has played a pivotal role in the development and growth of Great Lakes environmental education. Its creation of the *Directory of Great Lakes Education Material* and the Great Lakes Educators Advisory Council, its support of workshops and institutes, and development of a variety of informational and educational materials have vastly expanded the level of awareness of Great Lakes issues throughout the region. In the process, the Commission has become a primary source for materials and networking information for educators in the basin.

Citizens and educators are both looking for a common source that provides easy access to a variety of Great Lakes - St. Lawrence materials, one that can provide the networking and training necessary to help them understand and become committed to resolving issues facing the Great Lakes - St. Lawrence ecosystem. The Commission will be expected to continue its networking and coordinating role in educational and community awareness until another resource can be identified or created.

Such a resource center or clearinghouse, in the Council's view, should play a variety of roles. First and foremost, it should serve as a warehouse or distribution center of materials, curricula and programs about the Great Lakes - St. Lawrence ecosystem. As such, it would offer coordination among agencies, organizations and others creating such materials in order to identify duplicative efforts, thus avoiding the expenditure of scarce resources in areas that are not most needed or effective. It should have dual U.S. and Canadian addresses for easy access from both countries, and should have the ability to communicate via standard and electronic means.

The clearinghouse can also play a primary role in developing and coordinating a "Project Great Lakes" curriculum, as recommended above, as well as teacher and community-based workshops and institutes. It should be connected to education departments in leading environmental education colleges and universities in the region, including the Universities of Wisconsin and Michigan in the United States and Waterloo and Brock Universities in Canada. Finally, it must have the ability to seek and obtain ongoing funding from a variety of sources, including foundations, agencies, organizations and industries. By developing such a framework, the clearinghouse will provide the best example of communities working in partnership to ensure greater awareness and commitment to Great Lakes - St. Lawrence issues.

The Council recommends that:

The Commission hold a roundtable to bring together key organizations, industries, foundations and others to facilitate the creation of partner-

ships for the development and funding of a Great Lakes - St. Lawrence Environmental Education Clearinghouse, and provide the necessary coordination assistance to ensure its implementation.

In the course of its investigations into possible sites and sponsoring organizations, the Council has determined that one main site, with appropriate subcenters for outreach and community-based support, would provide the most effective clearinghouse resource for the region. The response to the Council's informal initial investigations has been extremely positive, with more than 20 agencies, universities or organizations expressing interest in becoming a key part of such a project.

Based on information obtained thus far, **the Council subcommittee concludes that the Erie County Environmental Education Institute, Inc., in Buffalo, New York provides the best potential site for the main clearinghouse.** As a border city, Buffalo can provide a U.S. and Canadian mailing address and the institute is structured as an independent, non-profit corporation, which assures that its programs are not dependent on continued support from other organizations or the political process. Its board of directors would be expanded to include key leaders from around the basin, in addition to the broad community interests already included. It has strong ties to educational programs in several Areas of Concern, and can benefit from the numerous colleges and universities in the Niagara region. These include Brock University and the State University of New York at Buffalo, which houses the Great Lakes Research Consortium and Great Lakes United.

The Council subcommittee believes Eastern Michigan University in Ypsilanti, Michigan also has potential as a main clearinghouse site, although it would have difficulty providing easy U.S.-Canadian access and has not been as active in Great Lakes environmental management. Potential subcenters that have expressed interest include, but are not limited to:

- Lake Superior Center, Duluth, Minnesota
- Milwaukee Lake Schooner, Ltd., Milwaukee, Wisconsin
- Chicago Academy of Sciences, Chicago, Illinois
- University of Michigan via the National Consortium for Environmental Education and Training, Ann Arbor, Michigan
- Northern Michigan University, Marquette, Michigan
- Michigan Technical University, Houghton, Michigan
- Consortium for International Earth Science Information Network, Saginaw, Michigan
- Great Lakes Commission, Ann Arbor, Michigan
- Ohio State University in Columbus, Ohio
- Great Lakes Pollution Prevention Centre, Sarnia, Ontario
- Ontario Science Centre in Toronto, Ontario
- Brock University in St. Catharine's, Ontario
- University of Windsor, Windsor, Ontario

- Maritime Discovery Center, Rochester, New York
- The American Forum for Global Education, New York, New York
- Montreal Biodome, Montreal, Quebec

Other sites and cooperative programs should be explored for their potential applicability to this regional clearinghouse effort. The Alliance for Environmental Education, for example, is creating a network of interactive environmental education and training centers throughout the United States in partnership with the Tennessee Valley Authority and the U.S. Environmental Protection Agency. Each center is expected to develop expertise pertinent to their geographic regions, and to create information and training programs that can be shared with other regions.

The Council believes the development of a Clearinghouse for Great Lakes - St. Lawrence Environmental Education, with at least one subcenter in each Great Lakes state and province, can provide the coordination, networking, information and training resource that is essential to enhanced individual and community awareness about the ecosystem.

Thus the Council recommends that:

- ***the Commission strongly urge and support the development of a Clearinghouse for Great Lakes - St. Lawrence Environmental Education, and encourage key federal, state, provincial agencies, as well as funding sources such as foundations and Great Lakes industries and associations, to become involved in and supportive of such a project.***

The Commission's Great Lakes educational initiative has, in the words of Dr. Brad Smith, Director of the U.S. Environmental Protection Agency's Office of Environmental Education, become a "regional model for environmental education, and will help in creating similar initiatives throughout the continent." The Commission is to be commended for its efforts, and for the leadership provided thus far to enhance awareness in the educational community. Its support and facilitation of the creation of a clearinghouse will ensure that its successful initiatives, as well as many others, will continue to grow and expand throughout the region.

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- Chicago, Illinois
- University of Michigan
- Northern Michigan University
- Michigan Technological University
- Council for International Earth Science Information Network
- Great Lakes Commission
- Ohio State University
- Great Lakes Pollution Prevention Centre
- Ontario Science Centre
- Brock University
- University of Windsor

IV. SUMMARY

If humans continue on their present path of fragmented attempts to resolve and eliminate those actions that severely stress our regional and global ecosystem, the environment will continue to deteriorate to the extent that human survival will eventually be threatened. While we celebrate the increasing popularity of Earth Day, which indeed shows a growing public awareness -- if not action -- for the environmental problems facing our planet, we might consider renaming the celebration "Human Day." For it is not the Earth we are trying to save, but our ability to survive on it as a result of our own actions. As Native American legend provides, the Earth will survive and recover from our ecological mistakes long after the last human has left the planet.

In 1987, the Science Advisory Board stated that "it is unrealistic to assume that we can effectively manage systems as complex as the Great Lakes or the Great Lakes Basin Ecosystem; what we can do is influence human uses and abuses of the natural resources on which we depend." Through environmental education, we can teach ourselves and others to appreciate the impact of human activities on the ecosystem and to strive towards restoring and protecting its quality.

While adults sometimes feel overwhelmed with the problems facing the world, children generally are not afraid to act. They seem to understand that even though each one of us is a small part of the solution, our combined efforts can have a dramatic impact. As children learn through their educational experiences how to respect and care for the environment, they can influence their parents' values and actions to create a societal change in behaviors. Without this change, the present system of controlling pollution and attempting to preserve the environment through regulation will continue to fail.

Prevention is the key to success in environmental protection, ecologically and economically. Federal, state, provincial and local agencies responsible for environmental protection will spend their money wisely, under their new pollution prevention mandates, if they enhance their level of support for environmental education initiatives that increase understanding of the value of such a perspective. All sectors of society have a stake in restoring and protecting the Great Lakes - St. Lawrence ecosystem, and can play valuable roles through individual and collective initiatives. Reaching the goals of the Great Lakes Water Quality Agreement depends on the efforts of all sectors of the basin's society, and thus all citizens must have the knowledge, skills and commitment to contribute positively in this undertaking. Education is the key to help

each of us to understand that the economic, political and social choices we make have environmental consequences.

Our children are pointing us in the right direction, by their concern for the environment and their desire to live in a healthy ecosystem for all species. While it will be difficult to measure the benefits in the short term, the return on investing in ourselves and our children in the long term will be substantial. It is an investment we must make.

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