

Shaping Our Schools Shaping Our Future

Environmental Education
in Ontario Schools

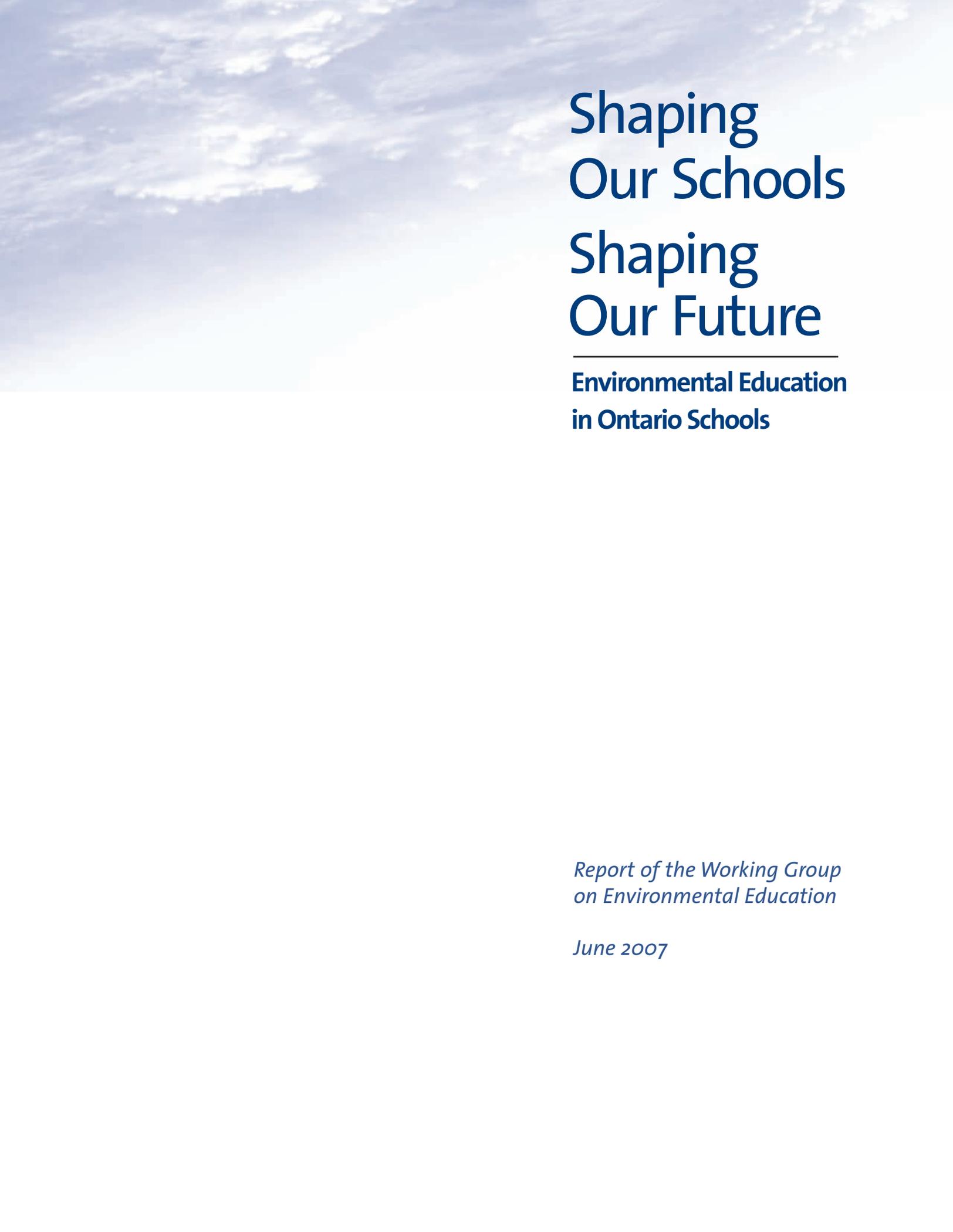


*Report of the Working Group
on Environmental Education*

June 2007

“After observing the planet for eight days from space, I have a deeper interest and respect for the forces that shape our world. Each particle of soil, each plant and animal is special. I also marvel at the creativity and ingenuity of our own species, but at the same time, I wonder why we all cannot see that we create our future each day, and that our local actions affect the global community, today as well as for generations to come.”

Dr. Roberta Bondar



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in Ontario Schools**

*Report of the Working Group
on Environmental Education*

June 2007

*The Working Group on
Environmental Education*

June 1, 2007

Dr. Dennis Thiessen, (Chair)
Curriculum Council
Ministry of Education
Mowat Block, 900 Bay Street, 22nd Floor
Toronto, ON M7A1L2

Dear Dr. Thiessen:

As Chair, I am pleased to present *Shaping Our Schools, Shaping Our Future*, the report of the Working Group on Environmental Education.

It has been my privilege to serve with the six expert members of the Working Group, who have generously shared their insights and considerable expertise over the past nine weeks. I would acknowledge in particular the hundreds of hours, both during and outside of our formal meetings, that these individuals have chosen to devote to this important task, in order to produce a sound and thoroughly considered document on extremely short timelines.

I believe these committed educators - Dr. Eleanor Dudar, Dr. Allan Foster, Dr. Michael Fox, Catherine Mahler, Pamela Schwartzberg, and Marlène Walsh - can take pride in having made a substantial contribution that will benefit our students, our communities, our province, and our global environment.

In developing its recommendations for environmental education in Ontario, the Working Group has examined policies, programs, and practices in Ontario, across Canada, and around the world. It has also undertaken a review of responses to the ministry's call for public comment, posted on the ministry website in April 2007, which are reflected throughout the report. Our recommendations call for the development of an environmental education policy for Ontario schools, and include detailed consideration of the key elements of such a policy across three critical domains:

- Leadership and accountability
- Curriculum
- Teaching and resources

We are confident that these recommendations will support the government's commitment to improving environmental education in Ontario schools, and help ensure that our students are equipped with the skills, knowledge, and perspectives they need to become engaged and environmentally responsible citizens.

Respectfully,

Working Group on Environmental Education

A handwritten signature in blue ink, appearing to read 'R. Bondar', with a long horizontal flourish extending to the right.

Dr. Roberta Bondar (Chair)

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INTRODUCTION

AND BACKGROUND

Over the past decade, changes in the Earth's environment and its natural systems have emerged as a matter of increasingly urgent concern around the world. While the issues are complex and diverse, there is a shared and universal recognition that solutions will arise only through committed action on a global, national, regional, local, and individual scale. Schools have a vital role to play in preparing our young people to take their place as informed, engaged, and empowered citizens who will be pivotal in shaping the future of our communities, our province, our country, and our global environment.

Environmental education in Ontario

For many years, promising elements of environmental education have been reflected in Ontario's curriculum, and supported by innovative programs and partnerships developed by school boards¹ and schools across the province. In the absence of a comprehensive framework for environmental education however, these efforts remain fragmented and inconsistent.

Within the current Ontario curriculum, some opportunities for environmental education are provided in a number of compulsory and optional subject areas and courses, as illustrated by the following examples:

- *Science and Technology, Grades 1-8* (1998) relates knowledge and skills to environmental and sustainability issues through specific expectations for some of the topics and strands, and in a variety of contexts.

Vision

MINISTRY OF EDUCATION

"Ontario students will receive the best possible education in the world, measured by high levels of achievement and engagement for all students. Successful learning outcomes will give all students the skills, knowledge and opportunities to attain their potential, to pursue lifelong learning, and to contribute to a prosperous, cohesive society."

- In *Social Studies, Grades 1-6 and History and Geography, Grades 7 and 8* (2004), an understanding of the environment as the complex relationship between the natural and built elements of the Earth is one of the fundamental concepts.

¹ In this document, the term school boards is used in reference to both district school boards and school authorities.

- In *Science, Grades 9 and 10 (1999)* and *Science, Grades 11 and 12 (2000)*, curriculum expectations are organized across three broad categories, one of which is the relationship between science, technology, society, and the environment; in turn, specific topics are examined within these three broader contexts.
- In *Canadian and World Studies, Grades 9 and 10 (2005)* and *Canadian and World Studies, Grades 11 and 12 (2005)*, the environment continues to be a fundamental concept underlying all courses; all geography courses explicitly address human-environment interactions.
- In Grade 12, two optional courses entitled *The Environment and Resource Management* may be offered at the university/college or workplace destinations within the Canadian and world studies curriculum document.
- In *Technological Education, Grades 9 and 10 (1999)* and *Technological Education, Grades 11 and 12 (2000)*, courses include the societal and environmental impacts of technology.

School boards and schools have initiated programs and partnerships across Ontario:

- There is a rapidly growing movement toward the development of schools that embed environmental education, not only in the classroom, but also in school design and operations.
- Partnerships have been developed between a number of school boards, faculties of education, community-based environmental organizations, and outdoor education centres to develop environmental education opportunities for students.
- Some school boards have developed and implemented guidelines and practices to encourage environmental stewardship at the board, school, and community level, often through environmental committees with broad community representation.

These and many other initiatives demonstrate the

commitment, shared by many educators at every level of the education system, to affirming the importance of environmental education as a vital component of education in Ontario.

A substantial gap remains, however, between these current practices and a comprehensive approach to environmental education in Ontario schools. Evidence of this gap exists at every level of the system:

- The reorganization of curriculum in the late 1990s significantly reduced the opportunities to study the subject of the environment as a result of eliminating optional courses in environmental science. Environmental expectations embedded in some courses or subjects remained.
- Few faculties of education offer environmental education as a teachable subject, or offer specialized programs in environmental studies for teacher candidates.
- Subject associations such as the Council for Outdoor Education in Ontario (COEO) and the Ontario Society for Environmental Education (OSEE) have seen dramatically declining membership.
- It is only recently, with the introduction of a new Program Enhancement Grant, that annualized funding is being provided that may be used to support outdoor education.
- In the absence of specialized teacher training and expertise, there is likely a gap between the environmental education “intended” in Ontario’s curriculum and that which is taught and received in the classroom.

Moving forward: curriculum review and renewal

Over the past four years, the Province of Ontario has been engaged in a process of large-scale education reform. A wide range of initiatives has been introduced to ensure that all Ontario students receive a high-quality education and are prepared for their destination of choice.

One key component of education reform has been the introduction of a cyclical curriculum review process that ensures that Ontario's curriculum adapts to the changing world around us, reflects advances in our knowledge of teaching, learning, and child development, and continues to meet the needs of Ontario students. Each year, a number of subject areas enter this process, which includes extensive research and consultation, and the development of revised curricula by writing teams drawn from school boards across Ontario.

This process has been complemented by the introduction of the Curriculum Council, chaired by Dr. Dennis Thiessen, Chair of the Department of Curriculum, Teaching and Learning at the Ontario Institute for Studies in Education at the University of Toronto. The Curriculum Council is a group of knowledgeable community leaders and education experts who advise the Minister of Education on elementary and secondary school curriculum, through academic research, comparisons to other provinces, and provincial consultations.

The council reviews a wide range of topics at the request of the Minister of Education and is supported by a working group of experts on each selected topic. Environmental education was selected as the first topic for review.

The Working Group on Environmental Education

In March 2007, the government announced the creation of the Working Group on Environmental Education, chaired by Dr. Roberta Bondar, to provide a report to the Minister of Education, through the Curriculum Council, on environmental education in Ontario schools. Members of the Working Group are experts and practitioners in the field of environmental education. The qualifications

and background of Working Group members are included in Appendix A of this document.

The mandate of the Working Group was to analyze needs and research successful approaches to teaching and learning about the environment in elementary and secondary schools. The Working Group met from March through May 2007, to produce its report and recommendations to the Curriculum Council.

Process and recommendations

The Working Group initially defined a vision statement, intended outcomes of environmental education, and a definition of environmental education to inform the balance of its work.

Under the leadership of Dr. Bondar, the Working Group reviewed a broad range of programs and practices in the field of environmental education in Ontario, Canada, and international jurisdictions. In addition, the Working Group sought public comment on the issue of environmental education, through a website provided by the Ministry of Education.

The Working Group identified the need for a comprehensive environmental education policy for Ontario schools, and has detailed the key elements of such a policy in regard to leadership and accountability, curriculum, and teaching and resources..

Purpose of this report

The Working Group on Environmental Education respectfully submits this report to the Curriculum Council. The report identifies key priorities for action that will build on current strengths and serve as the critical underpinning of a coherent approach to environmental education in Ontario schools that will prepare our young people to take their place as environmentally responsible citizens.

VISION

AND INTENDED OUTCOMES

The following vision, intended outcomes, and definition of environmental education were developed and adopted by the Working Group on Environmental Education to focus and inform discussion, and provide a framework for the development of its final recommendations. The vision developed by the Working Group aligns with, and supports, the vision of the Ministry of Education for Ontario students.

VISION FOR ENVIRONMENTAL EDUCATION IN ONTARIO

Ontario's education system will prepare students with the knowledge, skills, perspectives, and practices they need to be environmentally responsible citizens. Students will understand our fundamental connections to each other and to the world around us through our relationship to food, water, energy, air, and land, and our interaction with all living things. The education system will provide opportunities within the classroom and the community for students to engage in actions that deepen this understanding.

Intended outcomes

STUDENTS

Students will acquire the knowledge, skills, perspectives, and practices they need to participate as responsible citizens at the local, national, and global level, caring for each other and all living things. The education system will fulfil its critical role in both delivering effective environmental education, and modelling environmentally responsible practices.

CONTEXT

Environmental education will provide a rich context for learning that engages all students in applying their knowledge and skills to real-world situations through an integrated approach, based on the environmental and sustainability concepts found in all relevant subject areas. Such a context will combine classroom learning with experiential learning, and provide opportunities to interact with, develop caring and concern for, and take action in the places where students live, study, and play. It will provide connections between the curriculum and the world around us, allow students to directly observe impacts and issues, and expose students to the many points of view that must be considered in making choices to preserve the health of the natural environment.

CURRICULUM

Curriculum policy will clearly state what students should know and be able to do, as well as the perspectives they need to consider as responsible citizens in a changing world. While environmental education rests on a foundation of knowledge from both science and social studies/geography, this knowledge will be applied across the curriculum. Environmental education will be reflected in an age-appropriate way throughout the K-12 curriculum through strands, topics, and expectations, and will be recognized as a provincial priority.

TEACHING

All teachers will be equipped with the knowledge and skills to effectively model and teach environmental education, individually and in collaborative practice. Teachers will have access to the professional development required to build their competence and confidence in delivering environmental education.

LEARNING

Environmental education will draw on effective learning strategies - including inquiry, problem solving, critical thinking, and assessing alternatives - that engage students personally in their own learning, connect them to the world they live in, and give them the systems thinking and futures thinking they will need to become discerning, active citizens.

SCHOOLS

In order to facilitate the effective design and delivery of environmental education, schools will adopt innovative policies for school culture, curriculum, facilities, and operations. Environmental education will involve collaboration among students, teachers, parents, administrators, and the community, and foster a habit of mind that sees, and seeks out, the interconnections in life and across subject areas and disciplines.

LEADERSHIP

The Ministry of Education will drive and support the development of environmental leadership at all levels of the education system. School boards and schools will demonstrate their commitment to environmental responsibility through their practices and operations, and engage students to actively apply their learning as environmentally responsible members of the school and broader community.

ACCOUNTABILITY

The effectiveness of environmental education in Ontario schools will be measured both on a system level and against clearly defined student achievement outcomes. The goals and content of and approaches taken to environmental education in Ontario will likewise be subject to cyclical review, to ensure that they remain dynamic and relevant in a changing world.

Defining environmental education

Environmental education seeks to promote an appreciation and understanding of, and concern for, the environment, and to foster informed, engaged, and responsible environmental citizenship. Effective environmental education incorporates problem solving, hands-on learning, action projects, scientific inquiry, higher order thinking, and cooperative learning, and employs relevant subject matter and topics that actively engage students in the educational process.

Environmental literacy is an important outcome of environmental education. An environmentally literate student will have the knowledge and perspectives required to understand public issues and place them

in a meaningful environmental context. Thus, environmental literacy requires a mix of knowledge, vocabulary, key concepts, history, and philosophy.

Environmental education also embraces education for sustainability. Here, there is an explicit focus on ensuring that the ways in which humans use or affect ecosystems do not compromise the natural ability of ecosystems for renewal or regeneration. Effective education for sustainability stresses the need for highly developed systems thinking and futures thinking.

Outdoor education is likewise seen as a distinct and critical component of environmental education, concerned with providing experiential learning in the environment to foster a connection to local places, develop a greater understanding of ecosystems, and provide a unique context for learning.

Accordingly, the Working Group on Environmental Education has developed the following comprehensive definition of environmental education, and recommends that it be adopted as the definition used in Ontario schools:

Environmental education is education about the environment, for the environment, and in the environment that promotes an understanding of, rich and active experience in, and an appreciation for the dynamic interactions of:

- *The Earth's physical and biological systems*
- *The dependency of our social and economic systems on these natural systems*
- *The scientific and human dimensions of environmental issues*
- *The positive and negative consequences, both intended and unintended, of the interactions between human-created and natural systems.*

OVERVIEW

ONTARIO AND OTHER JURISDICTIONS

As a preliminary step toward developing its interim report and recommendations, the Working Group examined the current state of environmental education in Ontario, and the successful practices of other jurisdictions in Canada and around the world. The Working Group also reviewed a summary of responses to the ministry's call for public comment on environmental education. The following is a brief overview of the analysis undertaken by the Working Group.

Ontario

LEADERSHIP AND ACCOUNTABILITY

In the absence of a system-wide framework or strategy, environmental education in Ontario is being implemented unevenly across the province. While a variety of excellent environmental education programs and initiatives have been implemented by school boards and schools, there is no comprehensive policy that would signal the importance of environmental education, guide the investments necessary for further development, and provide concrete accountability measures.

CURRICULUM

While environmental education is reflected in elements of Ontario's elementary and secondary school curriculum, there are few topics directly focused on environmental education, and content tends to be fragmented and inconsistent in the absence of systems thinking. The curriculum does not currently articulate a sequence of environmental expectations, nor does it adequately address the need for environmental education to be reflected across the curriculum.

TEACHING AND RESOURCES

Many teachers currently lack the knowledge, skills, and background in perspectives taking required to teach environmental education effectively. Partly due to the fact that environmental education has relatively low visibility within the curriculum, there is little incentive, or opportunity, for developing the required skills, and there are few resources available to support teachers.

Canada and international jurisdictions

A wide variety of environmental policies and programs has been implemented in recent years, in Canada and around the world. In reviewing the work of these jurisdictions, members of the Working Group noted a number of successful practices and approaches that may be adapted to positively influence the development of environmental education in Ontario.

Alberta: Alberta has developed a unique science curriculum that successfully integrates environmental education in a broad, multidisciplinary way. The curriculum incorporates outdoor ecological investigation

as early as Grade 2, and uses interdisciplinary systems approaches to environmental topics throughout the elementary and secondary curriculum.

British Columbia: British Columbia has produced an interdisciplinary guide for teachers on environmental learning and experience. The guide provides a conceptual framework for introducing cross-curricular environmental learning into all classrooms, general principles of teaching and learning for the environment, and perspectives around which lessons can be created.

Quebec: In its provincial curriculum, Quebec has targeted environmental awareness and consumer rights and responsibilities in one of five broad areas of learning. This area of focus aims at encouraging students to develop an active relationship with their environment while maintaining a critical attitude toward exploitation of the environment, technological development, and consumer goods.

California: Through its Education and the Environment Initiative (EEI), California has legislated that environmental education be a part of the state curriculum, and is currently writing a systems-based curriculum within the framework of a model curriculum plan in consultation with over 100 scientific and technical experts.

Minnesota: In collaborating with 11 other states, Minnesota has articulated a strategy for teaching environmental education that includes a scope and sequence of learning expectations across the grades with a set of benchmarks for student learning. The Toronto and Region Conservation Authority has based its own “system thinking curriculum” on the Minnesota model.

Other U.S. States: The 12-state Education and Environment Roundtable has defined a framework in which the environment serves as an integrating context for learning across all subject areas. This approach includes the integration of subject matter across disciplines and collaborative instruction, with an emphasis on problem solving and learning through real-world projects.

Australia: Australia introduced a national action plan in 2000 that established a national Environmental Education Council, and an Environmental Education Working Group to create policy and improve educational resources. A coherent national standard for environmental education was introduced in 2005.

Finland: Finland has developed sustainability guidelines that explicitly address national, regional, local, and individual opportunities for engagement and partnership. Within this framework, sustainable development will be a key focal point of the Finnish Ministry of Education’s research and education strategy by 2014.

Ireland: Ireland has developed a framework of social, environmental, and science education that is integrated across the history, geography, and science curriculum, and encourages the active engagement of students as an integral component of learning.

Israel: Israel has developed formal environmental education curricula through collaboration between the ministries of education and environment. Interdisciplinary environmental education is offered in elementary school, followed by a secondary “ecotope” program combining classroom study and field-based research conducted by specially trained teachers. In addition, all educational institutions must develop formal and measurable sustainable development plans.

New Zealand: New Zealand has developed key principles and guidelines for environmental education, which include six essential skills and attitudes that span the entire curriculum: creative and innovative thinking, participation and contribution to communities, relating to others, reflecting on learning, developing self-knowledge, and making meaning from information.

Sweden: Sweden has supported a holistic approach to environmental education by stressing the importance of environmental, international, ethical, and historical perspectives. Environmental education,

and education for sustainable development, are identified in 9 subjects out of 18 for compulsory school, with emphasis on action and education outside the classroom.

United Kingdom: The United Kingdom has developed a national sustainable schools framework that incorporates eight interconnected “doorways” for action. Involving the community and using immediate environments as contexts for real-world learning and action are central to this approach.

Executive summaries were prepared for each of the above jurisdictions during the analysis process. These documents may provide valuable insights to guide further development of environmental education policies, curriculum, and resources.

Review of public submissions

With the assistance of the Ministry of Education, the Working Group on Environmental Education invited public submissions on environmental education in Ontario schools through a posting on the ministry website.

Ontarians’ strong interest in environmental education is evidenced by the 150 responses received from organizations and individuals across the province.

With the assistance of an analysis team provided by the ministry, a review of public submissions was undertaken to identify innovative concepts and strategies for further discussion. The Working Group acknowledges with thanks the quality of the submissions received, and has reflected a substantial number of these recommendations and observations in its report.

A summary of public submissions has been prepared by ministry staff and will be made available to the Curriculum Council to support its work. The Working Group strongly advises that the valuable insights and rich examples contained in the submissions themselves be used to support future development of environmental education policy and initiatives.

DISCUSSION

AND RECOMMENDATIONS

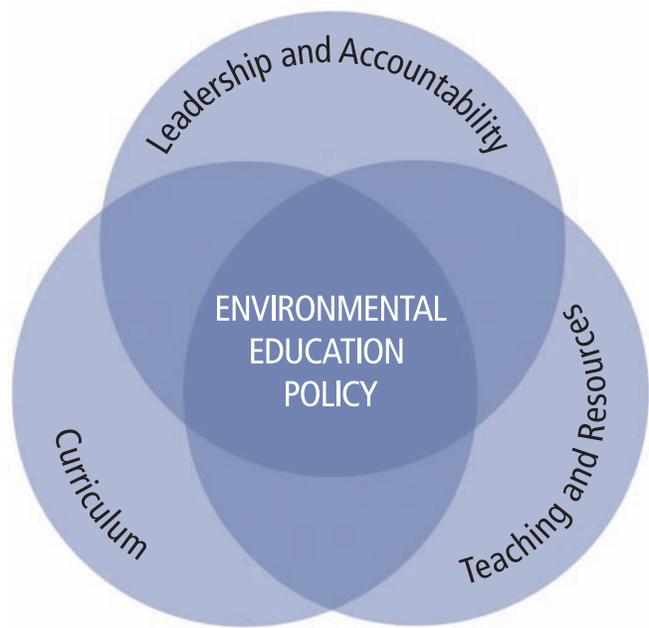
Environmental education is the responsibility of the entire education community. It is a content area and can be taught. It is an approach to critical thinking, citizenship, and personal responsibility, and can be modelled. It is a context that can enrich and enliven education in all subject areas, and offer students the opportunity to develop a deeper connection with themselves, their role in society, and their interdependence on one another and the Earth's natural systems. The recommendations contained in this report are seen as critical - and interdependent - components of an integrated approach to environmental education in Ontario that will afford students the opportunity to take their place as informed and engaged citizens.

1. Environmental education policy

The call for recognition of environmental education as a key mandate of educators and education systems is being heard around the world. The Working Group on Environmental Education believes that, in Ontario, this call represents both an urgent need and a moment of unique opportunity.

Whereas student achievement - and core competencies such as literacy and numeracy - remain fundamental measures of any education system, literacy in today's world also requires the skills, knowledge, and perspectives to engage as an active, committed, and environmentally responsible citizen.

Accordingly, the Working Group recommends that a comprehensive environmental policy be developed for Ontario schools, taking into account the environmentally relevant mandates of all Ontario government ministries, and reflecting the belief that students should:



- Examine the environment, not only in science, social studies, and geography, but also through the study of environmental topics or strands integrated and/or applied in courses across other curriculum areas

- Explore multiple environments including built and natural environments, living and inanimate environments, and local, national, and global environments
- Engage in learning activities that are situated in the outdoor environment and involve actions to improve the environment
- Learn in schools that support environmentally sound practices.

In the interest of guiding the development of such a policy, the Working Group has identified three core components that are seen as essential to the successful implementation of environmental education in Ontario schools:

- Leadership and accountability
- Curriculum
- Teaching and resources

The discussion and recommendations that follow describe the key features of an effective and comprehensive environmental education policy for Ontario.

The Working Group on Environmental Education makes the following recommendation:

1. Develop a provincial policy on environmental education as defined in this report, in collaboration with Ontario government ministries whose mandates are related to environmental issues, to signal the importance of environmental education and guide its implementation in Ontario schools through leadership and accountability measures, curriculum development, teacher training, and resources.

2. Leadership and accountability

Environmental education is a whole-system responsibility, and therefore system leaders will play a critical role in signalling the importance of environmental education and providing a framework in which it is supported, valued, and considered as part of a good educational outcome for every student.

THE PROVINCE

Leadership from the provincial government, including the Ministry of Education and the Ministries of the Environment, Energy, Natural Resources, and Training, Colleges and Universities, is critical in setting an environmental agenda for the province.

THE MINISTRY OF EDUCATION

The success of environmental education in Ontario schools will hinge on ministry policy which identifies environmental education as a priority in education, supported through curriculum, professional development and resources, and its inclusion as a measure of student outcomes and system performance. Effective leadership for environmental education should include:

- A clear policy on environmental education for Ontario schools
- A requirement that schools address environmental education in their school improvement plans
- A strategic sequence for investing in environmental education across the system including:
 - Building a vision for environmental education among system leaders
 - Funding the resources and release time required to build teachers’ capacity
 - Writing and adapting curriculum and teaching resources
- Dedicated staff within the Ministry of Education to guide environmental education

- The development of environmentally responsible procurement, operations, and facilities guidelines for school boards
- Development of guidelines for effective parent engagement and the role of school councils
- A focus on dialogue, consultation, and consensus building
- Development of accountability measures and feedback mechanisms to assess achievement for schools and school boards.
- Provide educational programming within environments local to the school, and to other environments outside the local area where appropriate
- Partner with community organizations to extend engagement in, and responsibility for, environmental education to the broader community.

SCHOOL BOARDS AND SCHOOLS

Leadership at the school board and school levels should focus not only on supporting the development of environmental education programs, but equally on modelling environmental awareness through management of resources, operations, and facilities. School boards should be supported in their ability to:

- Develop a board-wide framework for environmental education reflecting the board's culture and that of its community and partners
- Develop board-wide environmentally responsible school programs that combine sound practices with the flexibility to tailor programs to meet local needs
- Designate staff within the board to coordinate environmental education and help the board and its schools to embed the values of environmental education in their everyday lives.

In turn, schools should be supported in their ability to:

- Provide experiential learning opportunities to students
- Involve all members of the school and broader community in environmental education
- Model environmentally sound practices in their facilities and operations
- Incorporate environmental awareness into the school culture

The Working Group on Environmental Education makes the following recommendations:

2. *Establish a collaborative process involving ministry staff and external environmental education experts (formal education sector, postsecondary stakeholders, and community stakeholders) to develop standards of environmental education, based on the recommendations of this report and further research, that address the environmental knowledge, skills, perspectives, and practices to inform curriculum. This group will apply a draft of these standards to the revised Science and Technology, Grades 1-8, Science, Grades 9 and 10, Science, Grades 11 and 12, Technological Education, Grades 9 and 10, and Technological Education, Grades 11 and 12 curriculum documents and, through an iterative process of reflection and revisions, create a model for incorporating environmental education across the curriculum.*
3. *Undertake research, consultation, and dialogue as part of the policy development process.*
4. *Devise a strategic sequence for investments required at the level of system leadership, teaching and supports, and curriculum development and writing.*

5. *Reflect environmental education in accountability measures for school boards and schools, including the requirement that environmental education be included in school improvement plans.*
6. *Develop and implement transparent assessment mechanisms for monitoring student achievement in environmental education, including report cards and other assessment tools.*
7. *Assign responsibility for the implementation of environmental education programs and supports to dedicated Ministry of Education staff with environmental education expertise.*
8. *Develop and strategically implement guidelines for environmentally sound practices at the ministry, school board, and school levels.*
9. *Develop guidelines to foster positive parent engagement, and clarify the role that school councils can play in furthering environmental education.*
10. *Support school boards in their capacity to both develop board-wide environmental education programs and assign staff with expertise in education and the environment to monitor their development and implementation.*

3. Curriculum

CROSS-CURRICULAR INTEGRATION

An integrated approach to environmental education in Ontario requires that environmental education be highly visible within, and reflected across, the Ontario curriculum. An increased cross-curricular focus will require that, through the ongoing cycle of curriculum review, expectations for, and examples of, environmental education are embedded within the curriculum for all subjects and disciplines.

In order to maintain the integrity of such an approach, it is recommended that the scope and sequence of topics directly related to environmental education be mapped across the curriculum, and reviewed and updated as curriculum revisions occur. Such a map would help teachers to make key connections and build effective environmental education programs. The mapping activity would also help the ministry identify gaps to be addressed through the curriculum revision cycle.

The review of *Science and Technology, Grades 1-8*, *Science, Grades 9 and 10*, *Science, Grades 11 and 12*, *Technological Education, Grades 9 and 10*, and *Technological Education, Grades 11 and 12* currently under way provides an ideal starting point for this process. It is important to ensure that this review makes environmental education more visible than ever before, at each grade, through the inclusion of topics specific to the environment.

To support enhanced visibility, and to help teachers make connections between the curriculum and environmental education, it is recommended that the front matter of all curriculum policy documents include a section on the importance of environmental education in Ontario, along with strategies pertinent to that subject area. In addition, existing interdisciplinary links for environmental education at the secondary level should be identified and expanded wherever possible so that schools can offer packages of courses with an environmental theme.

CURRICULUM CONTENT

Elementary students should have the opportunity to extensively study a topic related to environmental education in each grade, whether the topic at a particular grade level resides in social studies, geography, or science and technology.

For elementary students, revisions to other disciplines in the future should include opportunities to focus on an environmental theme, whether in the context of the arts, health and physical education, French/Anglais/Native languages, language, or mathematics.

Since virtually all secondary students, to meet diploma requirements, take courses in Grade 9 Geography, Grade 9 and 10 Science, and Grade 10 Civics, it is important that expectations related to environmental education be prominent in these courses. Currently, courses in Grade 9 geography and Grade 10 science offer a number of opportunities for environmental education. This focus should be reinforced to complement and extend student knowledge, skills, and perspectives.

As the Civics course was recently revised and is not scheduled for another review for a number of years, it is recommended that expectations within the current course with a potential link to environmental education should be identified so that appropriate connections can be made and appropriate supports can be created.

It is important that in addition to the environmental content in these compulsory courses, students have the opportunity to take at least one additional secondary school course with an environmental focus in their senior high school program. The Working Group recommends that this occur in Grade 11 to build on current opportunities in the curriculum, and ensure the continuity of environmental education in secondary school. In addition, it is suggested that students be encouraged to fulfil, in an environmental endeavour, some of the 40 hours of community involvement required for graduation.

The Working Group on Environmental Education makes the following recommendations:

- 11. Increase the cross-curricular focus of environmental education by embedding environmental expectations and topics across all subjects, disciplines, and grades.*
- 12. Map the scope and sequence of environmental expectations and topics across the curriculum, and incorporate review and revision of this map within the larger curriculum review process.*
- 13. Incorporate in the front matter, and other appropriate sections of curriculum documents, information stressing the urgency of environmental education, defining strategies for implementation in each subject area, and providing examples of excellent environmental activities.*
- 14. Through the curriculum review process, ensure that the elementary and secondary curriculum is written to include an environmental perspective, and that it meets the established standards as described in recommendation 2.*
- 15. Ensure that the curriculum provides an opportunity for elementary students to study explicitly an environmental topic in each grade, and that curriculum expectations, particularly in the elementary grades, specify that students explore and investigate their local environment, and contrasting environments outside their local area, wherever reasonable for the subject matter.*

16. *In recognition that secondary students have reached a critical capacity to engage more deeply in environmental education, ensure that all secondary students are exposed to environmental education through the substantial presence of environmental education expectations in Grade 9 Geography, Grade 9 and 10 Science, and Grade 10 Civics.*
17. *Identify and support opportunities to engage students in environmental action projects within the current Civics course.*
18. *In addition to providing an environmental education focus across compulsory courses, ensure that secondary students have the opportunity to take at least one additional course with an environmental focus during their senior high school program. It is recommended that such a course option be available to students in Grade 11 to maintain continuity.*
19. *Identify interdisciplinary links for environmental education at the secondary level so that schools can offer integrated programs of courses with an environmental theme.*
20. *Develop a Specialist High Skills Major program offering in the environment, energy, or natural resources sectors, in accordance with ministry-approved frameworks, and share effective practices associated with these and other integrated environmentally themed learning opportunities.*
21. *Encourage and support cooperative education teachers and leaders to develop and share a wide variety of environmental placement opportunities that meet ministry policy and guidelines, through partnerships with local business education councils, training boards, and employers.*

4. Teaching and resources

Teachers must have the skills and knowledge required to effectively teach environmental education and model its perspectives and critical thinking skills. Building teachers' confidence and competence in environmental education will require ongoing professional development and appropriate supports.

If environmental education is to succeed in Ontario, it must without question be introduced as a requisite part of teacher training. Equally important, opportunities must be provided for working teachers to introduce their students to outdoor education experiences that help them make connections with local places. Finally, to further teachers' knowledge and skills, an Additional Qualification course is recommended to provide teachers with an opportunity for more in-depth learning.

The Working Group acknowledges the Program Enhancement Grant introduced by the ministry for the 2007-08 school year, which can be used to provide outdoor education programs. Such support is important to ensuring that boards have the resources available to provide effective learning opportunities.

The following are seen as critical components of environmental education in Ontario.

PRE-SERVICE

Faculties of education will make environmental education a teachable subject, providing all student teachers with training in environmental education, including the science behind environmental issues.

IN-SERVICE

Professional learning experiences in environmental education will be provided for teachers and others working in education. These learning opportunities will be coherent, focused, sustainable, informed by evidence, and attentive to adult learning styles. Education partners will be engaged to develop these opportunities collaboratively.

In addition, opportunities will be created for experienced teachers to share exemplary practices through

mentoring, coaching, action research, and other means. Team approaches will also be encouraged to create professional learning opportunities for teachers, administrators, classroom assistants, and other education and school workers.

RESOURCES

The Program Enhancement Grant will continue to support district school boards' ability to provide outdoor education opportunities for students.

Resources for teachers will be developed to include a variety of media such as:

- Sample units of study
- Course profiles
- Teaching guides modelled on current resources such as *Think Literacy* and *Me Read? No Way!*
- Electronic resources such as e-learning modules and webcasts.

In particular, the web will be used as a primary tool to provide broad and cost-effective access to a wide range of resources. As an adjunct to these supports, consultations on environmental education resources will also be held with educational publishers.

The Working Group on Environmental Education makes the following recommendations:

22. Collaborate with Ontario teachers' federations and affiliates, school boards, the Ontario College of Teachers, faculties of education, subject associations, and other stakeholders to develop and implement a strategy for ongoing professional development for teachers.
23. Provide ongoing professional development for teachers with a focus on content/knowledge, teaching in the environment, and using environmental themes to contextualize learning.
24. Use the natural and human-built environments as sites of discovery and active learning, involving projects that invite problem solving, as well as first-hand experiences that put students in touch with nature.
25. Provide provincial/regional training sessions for educators to build capacity and share effective practices, in collaboration with school boards, teachers' federations, faculties of education, subject associations, and other stakeholders.
26. Develop and support workshops and summer institutes on cross-curricular environmental education.
27. Consult with the Ontario College of Teachers about the need for an Additional Qualification course in cross-curricular environmental education.
28. Develop resources for teachers, using a variety of media including sample units of study, course profiles, teaching guides, and electronic resources such as e-learning modules and webcasts.
29. In collaboration with environmental experts, develop and distribute a teaching guide for environmental education modelled on *Me Read? No Way!* and similar ministry resources.
30. Facilitate access to environmental education resources developed by school boards and other stakeholders such as community groups, non-governmental organizations, governments, and teachers.
31. Establish a working group in collaboration with the Ministry of Training, Colleges and Universities, Ontario teachers' federations and affiliates, the Ontario College of Teachers, faculties of education, and other stakeholders to develop and implement a strategy for effective pre-service training in environmental education for all teacher candidates, including environmental education as a teachable subject.
32. Consult with relevant ministries and education partners to ensure the adequate funding of outdoor education in Ontario.

CONCLUSION

AN AGENDA FOR ACTION

The Working Group on Environmental Education respectfully submits its final report for consideration. In doing so, we reflect our collective belief that through visionary leadership, effective curriculum and resources, and system-wide commitment, Ontario's education system will provide students with a standard of environmental education that is among the highest in the world.

The Working Group on Environmental Education is pleased to present its report and recommendations for consideration. This report is intended to accurately reflect the expertise and advice of Working Group members, as well as the perspectives and points of view gathered through public input, and the lessons learned from jurisdictions around the world.

Over the past four years, the education system in Ontario has undergone substantial and positive change. Elementary literacy and numeracy achievement is on the rise. Secondary school graduation rates have increased. Today's students are being prepared for success in a wide variety of meaningful postsecondary, training, and workplace destinations through the introduction of innovative programs and initiatives.

The Working Group believes that environmental education should be adopted as an addition to Ontario's other educational reforms, as a new "basic" of education for the twenty-first century. The findings of a major U.S. study reveal that both students' engagement with school and academic results improve when learning occurs within an environment-based context.² The study confirms what environmental educators have always claimed, that *good environmental education is first and foremost good education*.

We appreciate the opportunity to contribute to the Ministry of Education's renewed commitment to providing Ontario's students with an education for the future - one that that will offer them the knowledge, skills, and attitudes they will need to cope with an increasingly complex world and enable them to find new solutions in building a healthy society.

² Gerald A. Lieberman and Linda L. Hoody, *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning* (San Diego: State Education and Roundtable, 1998).

APPENDIX A

WORKING GROUP ON ENVIRONMENTAL EDUCATION

DR. ROBERTA BONDAR (CHAIR)

Dr. Roberta Bondar graduated with a Bachelor of Science degree in zoology and agriculture from the University of Guelph. Her Master of Science degree from the University of Western Ontario and Doctor of Philosophy degree from the University of Toronto were based on environmental influences on blood pressure regulation and neuro-adaptation.

Graduating as a medical doctor from McMaster University, she is a board certified neurologist, completing subspecialty training in neuro-ophthalmology at Tuft's New England Medical School in Boston. Dr. Bondar formalized her passion for how we see and view the world around us through study in professional nature photography at the Brooks Institute of Photography, Santa Barbara, California.

As the world's first neurologist in space during the First International Microgravity Laboratory on the space shuttle *Discovery*, Dr. Bondar is globally recognized for her pioneering contribution to space medicine and for her landscape photography of Earth. She has been recognized with the Order of Canada, the Order of Ontario, and the NASA Space Medal, and has been inducted into the Canadian Medical Hall of Fame and into the International Women's Forum Hall of Fame for her pioneering research in space medicine. In addition, she has received 24 honorary doctorates from Canadian and U.S. universities. In 2003, *TIME Magazine* named her among North America's best explorers. Currently, Dr. Bondar is in her second term as chancellor of Trent University in Peterborough, Ontario.

DR. ELEANOR DUDAR

Dr. Eleanor Dudar works for the Toronto District School Board as an EcoSchools specialist, overseeing new curriculum resource development and managing internal communications. She has worked as an environmental educator since 1993, when she joined the former Toronto Board of Education to conceive and develop the Greening Schools Program. She was the first project manager of the Ontario EcoSchools project, liaising with York University and representatives from the eight founding boards, and overseeing the development of a suite of 17 curriculum and operational resources. In 2004-05 Dr. Dudar was a member of an Educators' Expert Forum charged with advising Natural Resources Canada about the creation and dissemination of new climate change teaching materials. She holds a Master's degree in Environmental Studies from York University, and a Doctor of Philosophy degree in English Literature from the University of Toronto.

DR. ALLAN FOSTER

Dr. Allan Foster was director of the environmental education program at the Kortright Centre for Conservation for 30 years. He is currently the president of the Ontario Society for Environmental Education (OSEE) and the moderator of the Ask the Naturalist section of the website of Ontario Nature (formerly the Federation of Ontario Naturalists). Dr. Foster is a nature columnist for *Ecolife*, the electronic newsletter of the Toronto and Region Conservation Authority. He is a frequent presenter at professional development teacher workshops on environmental education.

DR. MICHAEL FOX

Dr. Michael Fox is a professor in the Environmental and Resource Studies Program and the Department of Biology at Trent University. He is an ecologist who studies invasive fishes in North America and Europe, teaches courses in fisheries and natural resource management, and has over 55 publications in academic and professional journals. His interest in public education began when he was a junior secondary school teacher in science and mathematics in British Columbia. Five years ago, he initiated a new course for prospective elementary school teachers at Trent University, entitled Environmental Science for Teacher Education. The course focuses on teaching children about environmental issues in ways that support the Ontario elementary school science and technology curriculum. Dr. Fox has a Master's degree in Environmental Design from the University of Calgary and a Doctor of Philosophy degree in Biology from Queen's University.

CATHERINE MAHLER

Catherine Mahler graduated with an Honours Bachelor of Arts degree and a Bachelor of Education degree, both from the University of Toronto. She is the coordinator of the Ontario EcoSchools program, hosted by York University's Faculty of Environmental Studies. She has written curriculum support documents and other resources to engage school boards in environmental education. In addition, Ms. Mahler develops and delivers professional development workshops for teachers, principals, and other board staff.

PAMELA SCHWARTZBERG

Pamela Schwartzberg has over 25 years of experience in strategic planning, policy development, project management, research, and writing in the area of education and sustainable development. She served as Ontario program director for Learning for a Sustainable Future (LSF) from 1995 to 2002, coordinating sustainability education research, policy development, teacher training, and curriculum materials development. Since December 2002, Ms. Schwartzberg has served as national executive director of LSF, coordinating the establishment of the National Education for Sustainable Development (ESD) Expert Council and provincial/territorial ESD working groups in eight Canadian jurisdictions. She has a Master's degree in Environmental Studies from York University.

MARLÈNE WALSH

Marlène Walsh is the French programming coordinator of the Canadian Ecology Centre and an Ontario College of Teachers-certified teacher. In the summer, she teaches ministry-approved high school courses with an environmental focus (Grade 10 Science, Grade 11 Leadership). She has been involved with the Ontario Forestry Association Envirothon program for the past three years, organizing its French provincial competition and the Mattawa-North Bay regional competition. In the past, she has worked at well-known facilities, such as the Leslie M. Frost Natural Resources Centre. She graduated with a Bachelor of Kinesiology degree and a Bachelor of Education degree from the University of New Brunswick.

APPENDIX B

REFERENCES

ALBERTA

Alberta Council for Environmental Education
www.abcee.org/

Alberta Education
www.education.gov.ab.ca/

BRITISH COLUMBIA

Ministry of Education
www.gov.bc.ca/bvprd/bc/channel.do?action=ministry&channelID=-8382&navId=NAV_ID_province

QUEBEC

Ministry of Education, Recreation and Sports
www.mels.gouv.qc.ca/GR-PUB/m_englis.htm

CALIFORNIA

Education and the Environment Initiative
www.environment.gov.au/education/neen/

California Environmental Education Interagency Network (CEEIN)
www.calepa.ca.gov/education/CEEIN/

School Waste Management Education and Assistance
www.ciwmb.ca.gov/schools/

California Regional Environmental Education Community
www.creec.org/

MINNESOTA

Office of Environmental Assistance
www.pca.state.mn.us/oea/about/index.cfm

Capacity Building for EE in Minnesota: An Overview
www.seek.state.mn.us/eemn_f.cfm

SEEK: Minnesota's interactive directory of EE resources
www.seek.state.mn.us/

A GreenPrint for Minnesota
www.seek.state.mn.us/eemn_d.cfm

Environmental Literacy Scope and Sequence
www.seek.state.mn.us/eemn_c.cfm

The Second Minnesota Report Card on Environmental Literacy
www.seek.state.mn.us/eemn_b.cfm

Environmental Education Advisory Board
www.seek.state.mn.us/eemn_i.cfm

OTHER U.S. STATES

State Education and Environment Roundtable The EIC Model - Using the environment as an Integrating Context for improved student learning
www.seer.org/pages/eic.html

AUSTRALIA

Sustainability Education
www.environment.gov.au/education/

Educating for a Sustainable Future
www.environment.gov.au/education/publications/sustainable-future.html

National Environmental Education Network
www.environment.gov.au/education/neen/

FINLAND

Finland's Ministry of Education: A national strategy and guidelines 2006-2014 for education for sustainable development

www.bup.fi/Finnish_Min_of_Educ_strategy_for_sust_dev.pdf

IRELAND

Department of Education and Science

www.education.ie/home/home.jsp?pcategory=27173&ecateg-ry=27173&language=EN

ISRAEL

Ministry of Education

<http://cms.education.gov.il/educationcms/units/owl/english/about/ministry+structure.htm>

NEW ZEALAND

Parliamentary Commission on the Environment

www.pce.govt.nz/

See Change: Learning and education for sustainability

www.pce.govt.nz/reports/allreports/1_877274_56_9.shtml

Environmental Education

www.tki.org.nz/r/environ_ed/

Science in the New Zealand Curriculum

www.minedu.govt.nz/web/downloadable/dl3525_v1/sci-nzc.pdf

Environmental Education in New Zealand Schools

www.minedu.govt.nz/web/downloadable/dl3525_v1/sci-nzc.pdf

SWEDEN

Ministry of Education and Research

www.sweden.gov.se/sb/d/2063

UNITED KINGDOM

Sustainable Schools National Framework

www.teachernet.gov.uk/sustainableschools/framework/framework_detail.cfm

Sustainable Schools

www.teachernet.gov.uk/sustainableschools/

Growing Schools

www.teachernet.gov.uk/growingschools/

Learning Outside the Classroom Manifesto

www.teachernet.gov.uk/teachingandlearning/resourcematerials/outsideclassroom/

Every Child Matters

www.everychildmatters.gov.uk/

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<http://eol.jsc.nasa.gov> (Image ISS006-E-39381)



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