

Environmental Literacy Plan for Ohio

PLANNING FOR OHIO'S
ENVIRONMENTAL
FUTURE



DRAFT
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INTRODUCTION

Current research has demonstrated significant benefits from environmental education (EE), including positive impacts on student test scores in science, mathematics, reading and social studies. Additionally, studies have shown that environmental education can reduce discipline problems, while increasing engagement, motivation and enthusiasm for learning. However, today's youth are more likely to be inside watching some kind of electronic screen than spending time out-of-doors. Emerging research has shown that this trend contributes to issues such as childhood obesity, attention deficit disorder and depression. Key research findings are referenced in Appendix E.

Momentum is gaining across the country for a greater focus on increasing the environmental literacy and connection to the outdoors of today's youth. Federal legislation has been introduced which would strengthen environmental education in America's classrooms and reconnect children with the outdoors. Many states, including Ohio, are positioning themselves to be responsive to this legislation and any funding that might be included.

The Environmental Education Council of Ohio (EECO) provided leadership for the development of an Environmental Literacy Plan for Ohio by convening an Advisory Group to begin drafting the Plan. The group includes representatives from Ohio Department of Education (ODE), Ohio Department of Natural Resources (ODNR), Ohio Environmental Protection Agency (OEPA), Ohio Leave No Child Inside Collaboratives, and the Ohio Parks and Recreation Association. The Ohio Leave No Child Inside Collaboratives' *Report on Ohio's Initiative to Reconnect Children with Nature*, national environmental education guidelines (NAAEE, 2004) and *Ohio's Best Environmental Education Practices* are among the resources used to develop this Environmental Literacy Plan.

THE GOALS OF OHIO'S ENVIRONMENTAL LITERACY PLAN ARE:

- I. Prepare those studying to be educators to incorporate EE into their teaching throughout their career
- II. Help classroom teachers and educators in other settings enhance and expand their use of environmental education
- III. Provide a variety of experiences that increase student environmental literacy and contribute to healthy lifestyles
- IV. Encourage youth and adults to participate in outdoor environmental activities and gain an understanding of conservation, recreation, and preservation
- V. Gather evidence that documents increases in environmental literacy and environmentally friendly behavior

This plan lays out a framework for environmental literacy in the state of Ohio. The plan will be implemented through the voluntary collaboration of many individuals, organizations and agencies. We welcome your involvement.

WHAT IS ENVIRONMENTAL LITERACY?

Environmental education has many definitions. In Ohio, one of the leading EE groups, the Ohio Environmental Education Fund (OEEF) has defined environmental education as follows:

“Environmental education is the learning process whereby people acquire an awareness and scientific understanding of the natural and built environment; attitudes that value the environment; and skills for identifying and addressing environmental issues. When effective, it leads to participation in environmental decision making and actions that result in a sustainable environment, healthier people and livable communities.” (Ohio Environmental Education Fund grant guidelines, www.epa.ohio.gov/oeef)

Environmentally literate citizens are aware of the consequences of their actions. They make informed choices that will protect their health and the environment. Objective environmental education is the key to ensuring this literacy.

Ohio’s Environmental Literacy Plan Advisory Group has examined many definitions of environmental education and environmental literacy and has decided that, for the purpose of this Plan, the definition of Environmental Literacy will build upon the OEEF definition and incorporate three basic components.

Environmentally literate citizens will have:

- the ability to understand environmental concepts;
- the ability to analyze or evaluate environmental issues;
- the ability to act or participate in decisions or behaviors that address environmental issues, based on multiple sources of information.



LOURDES COLLEGE

Four-Season Natural Science Exploration:
Ohio Bio-region.

Project provided training for 22 northwest Ohio teachers on integrating hands-on natural science field and classroom activities, by observing seasonal changes.

▲ *This and other Outstanding OEEF Projects are featured through this plan as examples of how ELP strategies can be implemented.*

Environmental literacy includes a sense of place and an understanding of natural rhythms; the timing of the spring bud burst and the first frost; which creatures are stirring or migrating through; which species of plants and animals are native to that place.

Environmentally literate citizens carefully consider how they use natural resources and their impacts on their surroundings. This includes knowing the source of their water and energy, how wastes are treated or disposed, how and where their food is produced, how toxins enter and biomagnify in food webs. They understand how their actions as consumers and stewards affect natural systems locally and globally. They take steps such as properly maintaining septic systems, compost piles, or tire pressure, properly using fertilizers and chemicals, conserving energy, providing and conserving wildlife habitat, removing invasive species from their gardens, and using alternative means of transportation.

Environmental education does not advocate a particular course of action. When well done, environmental education provides scientific data and a variety of perspectives to help students and adults make informed decisions.

“The problem, then, is how to bring about a striving for harmony with land, among a people, many of whom have forgotten there is any such thing as land, among whom education and culture have become almost synonymous with landlessness. This is the problem of conservation education.”

Aldo Leopold, 1948

PURPOSE OF THE PLAN

The Ohio Environmental Literacy Plan is needed to position Ohio to take swift advantage of funding opportunities in new proposed federal legislation. This legislation, called “No Child Left Inside” (NCLI) has strong grassroots support and over 60 co-sponsors in both houses of Congress including bipartisan support in the Senate. The legislation has been endorsed by over 1900 member organizations of the No Child Left Inside Coalition, including health, education, environment, parks and recreation, and other interests, representing over 50 million Americans who share the concern that America’s children spend too little time outdoors in nature.

An important part of the NCLI Legislation is a commitment of \$100 million over 5 years to state education departments to support teacher training. The bill would establish three new grant programs. The first would authorize the funding of state-level environmental literacy plans. The second would fund professional development activities for teachers and educators. The third grant would fund innovative programs to build capacity and make environmental education an integral part of the educational curriculum. These funds, awarded through competitive grants, will be used to improve teachers’ skills and subject matter knowledge about the environment. To be eligible for these funds, a state must have an approved Environmental Literacy Plan (ELP) in place within one year of the passage of the legislation. As of August 2011, Maryland, Oregon and Nebraska have an ELP in place. Ohio is one of many states currently working on a plan.

RATIONALE

Several recent reports document the importance of outdoor and environmental education. *Back to School: Back Outside! Create High Performing Students* (National Wildlife Federation, Coyle, K.J., 2010) examines the impact of outdoor and environmental education, outdoor time and nature study on student motivation, effectiveness at learning, classroom behavior, focus and standardized test scores. The report shows how outdoor time is connected with wide-ranging academic benefits including;

- improved classroom behavior,
- increased student motivation and enthusiasm to learn,
- better performance in math, science, reading and social studies,
- reduced Attention Deficit Hyperactivity Disorder (ADHD),
- higher scores on standardized tests (including college entrance exams),
- helping under-resourced, low-income students perform measurably better in school.

Another report, *Children’s Nature Deficit: What We Know—and Don’t Know* (Children and Nature Network, Charles, C. & Louv, R., 2009), concludes that a growing body of evidence suggests that significant changes in childhood have occurred in the past several decades relating to children’s experiences in nature. While there are always exceptions, there are strong indicators of an absence of direct experience with the natural world in many children’s everyday lives.

The average American boy or girl spends more than 7 hours each day in front of an electronic screen; childhood obesity rates have more than doubled the last 20 years; the United States has become the largest consumer of ADHD medications in the world; and pediatric prescriptions for anti-depressants have risen precipitously. Establishing a stronger connection to the natural world is one strategy to address these issues. (National Wildlife Federation, Back to School: Back Outside! Create High Performing Students and National EE Foundation, Fact Sheet—Children’s Health and Nature). There is a large body of medical research addressing the links between lack of time outdoors and specific health concerns. Some of this research is cited in the research reviews included in Appendix E.

Findings included in the House of Representatives No Child left Inside (NCLI) bill state that studies documenting the value of environmental literacy experiences show that “time spent out of the classroom for learning during the school day is critical to the intellectual, emotional, and physical health of children and that providing students with quality opportunities to directly experience the natural world can improve students’ overall readiness to learn and academic performance, as well as self-esteem, personal responsibility, community involvement, personal health (including child obesity issues), and understanding of nature.”

Environmental literacy is included in President Obama’s proposed education budget. Environmental education is documented in the recently released U.S. Department of Education publication titled *A Blueprint for Reform*, which outlines the Obama administration’s priorities for the reauthorization of the Elementary and Secondary Education Act.

According to the *Report on Ohio’s Initiative to Reconnect Children with Nature*, “Developing strategic alliances between nature facilities and programs, schools and health care providers can help to assure the sustainability of natural resources and outdoor experiences. Such alliances would leverage limited dollars to do “triple duty” – getting children active in a healthy, outdoor environment, educating them through nature experiences, and at the same time supporting our parks, camps, recreation facilities and other natural spaces.”

Ohio’s environmental community sees the Environmental Literacy Plan and its resulting strategies as a strong vehicle to reinforce ongoing efforts, and as a mechanism through which many of the current initiatives can be accomplished. Instead of being “one more program”, the plan and its strategies can be used by ODE and other agencies to accomplish existing initiatives in a way educators in the field can see as congruent, efficient, and reaching toward the same overall goals.

MIAMI UNIVERSITY, DEPARTMENT OF ZOOLOGY

The GREEN Teachers Institute, multiple southwest Ohio Counties
Contact: Don Kaufman, kaufmadg@muohio.edu

Program provides ten-day advanced, field-oriented workshops on southwest Ohio ecology, natural history and environmental issues for 40-60 K-8 teachers each summer, with follow-up Saturday seminars during the school year to reinforce concepts. Participants develop outdoor inquiry-learning episodes for their students, integrated with Web-based resources and state science standards. Eighty-four inquiry activities are posted at www.cas.muohio.edu/scienceforohio



The following are selected current initiatives and examples of how the plan and its actions can complement existing initiatives:

Rigorous Curriculum and Instruction • Environmental literacy is embedded within the Academic Content Standards and Model Curriculum Document. The Ohio Department of Education is using a special icon to identify sections within these documents that support the goals of environmental literacy. The environmental community, including the organizations and agencies that are part of the ELP Advisory Group, served as strong partners as the Model Curriculum was developed. The commitment to inquiry and active, engaged learning in the ELP and in Ohio's publication, *Best Practices for Environmental Education: Guidelines for Success*, will be included in the Instructional Strategies and Resources section. The ELP Advisory Group's organizations and agencies assisted in developing, reviewing and evaluating the Instructional Strategies and Resources section of the document. Other components of the Plan, including interdisciplinary, field-based and research-based learning as well as the use of school-yard habitats/outdoor classrooms, and innovative technology in the classroom are also showcased in the document. (Further connections between this ELP and ODE's Academic Content Standards and Model Curriculum are shown in Appendix B.)

High Quality Professional Development • Once the federal legislation passes, states like Ohio that have an ELP in place could anticipate receiving up to \$2 million in funding for educator professional development. This effort is to be sustained over at least a five-year period, with a focus on inquiry and increasing educators' knowledge of content matter and how to provide engaging, content-centered instruction both inside the classroom and in outdoor settings.

College and Career Readiness, Service Learning and Universal Skills • Environmental literacy is essential for students to develop the skills needed for success in the global economy. The Plan includes a strong emphasis on the growing career opportunities in environmental science and engineering including related technology careers, and showcases service learning and internships as important vehicles to interest students in future careers and the education required to obtain those careers.

Ohio is a local control state • This means that local school districts develop and maintain their own curriculum. Most school districts use Ohio's Academic Content Standards and Model Curriculum as a framework for their local curriculum because state assessments are aligned to the state standards, but the standards are not mandated.

OHIO'S ENVIRONMENTAL LITERACY PLAN

GOALS & STRATEGIES

The organizations that have developed this Plan have been meeting since October 2009. They have used a collaborative process to develop a Plan with Goals and Strategies that are responsive to the language in the legislation as well as Strategies that are not in the legislation, but are important to Ohio. For example, Ohio's draft Plan includes additional Goals and Strategies related to adult environmental literacy, outdoor family recreation and education opportunities, and a focus on environmental careers.

The ELP Advisory Group, who developed the plan, also considered national survey data on the environmental literacy of Americans, published by the National Environmental Education and Training Foundation (Coyle, 2005), and survey data on the environmental literacy of Ohio adults, commissioned by the Ohio Environmental Education Fund and published in the Ohio Journal of Science (Mancl, Carr and Morrone, 1999 and 2003).

Resources to support the implementation of the Goals and Strategies outlined in this Environmental Literacy Plan are shown in Appendix A. Exemplary programs that are already implementing some of the Strategies are listed throughout this document. Potential funding sources for implementation are listed in Appendix C.

GOAL I: PREPARE THOSE STUDYING TO BE EDUCATORS TO INCORPORATE EE INTO THEIR TEACHING THROUGHOUT THEIR CAREER.

STRATEGIES:

1. Provide high quality preparation in EE for pre-service teachers and non-formal educators.
 - Provide opportunities for practicing/role playing instruction to build confidence in teaching outdoors.
 - Incorporate outdoor education by encouraging joint use agreements to utilize local camps, nature centers, and parks for direct experiences for pre-service teachers.
 - Encourage interaction between pre-service teachers and environmental professionals from the public and private sectors.
 - Analyze the revised Ohio Academic Content Standards for content and practices that could be supported through EE experiences.
 - Demonstrate the advantages of direct contact with nature and the results of the lack of direct contact with nature.
 - Present strategies for overcoming perceived obstacles to teaching outdoors, such as ensuring safety and limiting liability; management of students and materials; addressing parental concerns.
 - Emphasize the interdisciplinary nature of EE.
 - Provide practical examples to pre-service teachers of how to use the school facility as a laboratory, to help students explore how resources and energy flow in and out, and how any green building and green infrastructure features of the school operate.
 - Encourage colleges and universities to incorporate the NAAEE Environmental Education Standards, which have been added to the NCATE protocols, into their pre-service curriculum.

- Provide opportunities to access current EE resources in Ohio and nationally.
- Include topics such as:
 - Ohio’s natural history;
 - how people learn in the outdoors;
 - how to work with diverse audiences ;
 - how to involve families.

GOAL II: SUPPORT CLASSROOM TEACHERS AND EDUCATORS IN OTHER SETTINGS ENHANCE AND EXPAND THEIR USE OF ENVIRONMENTAL EDUCATION.

STRATEGIES:

1. Create professional development opportunities for formal and non-formal educators by partnering with universities, parks and recreation agencies, and environmental educators to translate environmental concepts to high quality, engaging indoor and outdoor experiences.
 - Build on existing programs (e.g., PLT, WILD, WET, HWHP and others listed in Appendix A.)
 - Replicate past successful professional development provided by government agencies, non-profit organizations, OEEF grant recipients, and others.
 - Partner with university programs for professional development.
 - Encourage school boards, administrators, and the Local Professional Development Committees who monitor the renewal of teaching licenses to accept and, if possible, require attendance at EE professional development that is offered.
 - Partner with ODE to include EE professional development opportunities related to Common Core, Academic Content Standards, and Model Curriculum.
2. Create professional development opportunities for formal and non-formal educators that improve environmental subject matter knowledge and increase pedagogical skills in teaching environmental topics and issues while using field based and research based learning.
 - Partner with EE providers (e.g. parks/recreation agencies, environmental educators, state and local parks) to model the instruction of environmental concepts in an outdoor setting.

MIAMI COUNTY PARK DISTRICT

Honey Creek/Upper Great Miami River Watershed Wide Education Extraordinaire
 • Contact: Cinda Hanbuch-Pinkerton, cindahp@miamicountyparks.com

Creative combination of hands-on scientific outdoor investigations with music and art, to help more than 2000 elementary and high school students understand how to protect their watershed. High school students and teachers participated in watershed education trainings, and then worked with park district naturalists to engage elementary students in interactive watershed presentations, models, games, field trips to the local wastewater treatment plant, and stream quality monitoring. Professional artists-in residence/musicians Chris Rowlands and The Banana Slug String Band helped the students create colorful banner-sized watershed murals and unique student-designed watershed costumes and puppets. Students also wrote, recorded, and performed watershed songs for the community at the culminating Honey Creek Watershed Festival.



- Build on existing programs (e.g., PLT, WILD, WET, HWHP, and others listed in Appendix A.
 - Replicate past successful professional development provided by government agencies, non-profit organizations, universities, OEEF grant recipients, and others.
 - Partner with business/industry to take advantage of EE-linked resources, grants, programs, etc.
 - Partner with university programs for professional development.
 - Encourage school boards, administrators, and the Local Professional Development Committees who monitor the renewal of teaching licenses to accept and, if possible, require attendance at EE professional development that is offered.
 - Incorporate technological design related to the environment.
 - Partner with ODE to include EE professional development opportunities related to Common Core, Academic Content Standards, and Model Curriculum.
 - Strengthen environmental education grant funds to support outdoor learning experiences.
3. Create professional development opportunities for teachers that improve the use of innovative technology applications in the study of EE topics.
- Replicate past successful professional development provided by government agencies, non-profit organizations, OEEF grant recipients, and others.
 - Partner with university programs for professional development.
 - Use EdTech for communication, reporting.
 - Incorporate technological design related to the environment.
 - Partner with ODE to include EE professional development opportunities related to Common Core, Academic Content Standards, and Model Curriculum.
4. Increase use of the out-of-doors for teaching and learning.
- Build confidence by modeling quality outdoor teaching and providing opportunities for practicing/role playing.
 - Address barriers to outdoor activities (e.g., safety, transportation, litigation, funding for fieldtrips, mindset, native language/culture).
 - Provide training for addressing the needs of diverse audiences.
 - Capitalize on “nearby nature” by using:
 - school grounds and outdoor classrooms;
 - school and community gardens;
 - neighborhood parks.



SCHOOL GARDENS AND OUTDOOR LEARNING AREAS

Grant funding to help schools develop outdoor learning areas is available from multiple sources listed in the appendices to this plan. Habitats for Learning: A Planning Guide for Using and Developing School Land Labs and other resources are posted online.

- Use EECO Regional Structure to work with school districts to provide training.
 - Provide summer teacher experiences at EE facilities (e.g. camps, nature centers) to connect them to the out-of-doors and build their confidence to engage students in natural settings.
 - Encourage cooperative programming and shared use of facilities with schools, camps, and parks and recreation agencies to provide direct experiences for in-service educators .
5. Involve environmental professionals from universities, government, and business in professional development programs.
 - Build awareness of environmental careers.
 - Utilize professionals as speakers and content providers.
 6. Incorporate real-world applications and authentic problem solving into professional development.
 - Promote integration and critical thinking across the curriculum.
 - Engage students in the use of real tools, techniques, and data sources.
 7. Support a voluntary EE certification program for formal and non-formal educators.
 - Encourage participation in Ohio’s Environmental Education Certification program.
 - Work with ODE to provide additional teaching certification for participation in EE certification programs.
 - Encourage LPDC’s to provide continuing education units for participation in EE Certification programs.

GOAL III: PROVIDE A VARIETY OF EXPERIENCES THAT INCREASE STUDENT ENVIRONMENTAL LITERACY AND CONTRIBUTE TO HEALTHY LIFESTYLES.

STRATEGIES:

1. Assure that students are well equipped to access and assess information and resources.
 - Promote the development of critical thinking skills and the integration of scientific processes across the curriculum.
 - Incorporate scientific inquiry, problem based learning and systems thinking (e.g., use school campus as lab for sustainable practices and for green building).
 - Reference studies that show the connections between unstructured play and development of creative thinking.
 - Increase the use of objective technical resources.
 - Explore the use of technology to gather data about the local environment, including wildlife cameras and websites, GPS, watershed/GIS mapping programs, etc.

2. Prepare students to identify, research, analyze, and address environmental challenges.
 - Provide ideas for topics and resources (e.g., have students examine the benefits and challenges associated with land management by private landowners and local, state, and federal government – and the resulting land use decisions).
 - Work with the Ohio School Facilities Commission to encourage students to investigate green features of school buildings, to understand how they conserve energy, lower utility costs, reduce waste, reduce exposure to harmful chemicals, and reduce storm water runoff.

WAYNESFIELD GOSHEN LOCAL SCHOOLS

“Nature’s Restaurant...Education with a Taste” • Auglaize County
Contact: Cindy Weaver, mlbsig@prodigy.net • 419-568-4451

Provided an educational garden where pre-school students and parent volunteers grew plants to attract birds and butterflies, as well as pizza ingredients, strawberries, potatoes and pumpkins to be used in school programs. Activities were incorporated into the curriculum using collaborators including the local Future Farmers of America chapter, Auglaize Soil and Water Conservation District, Top of Ohio Resource and Development Council, and Kaufman’s Backyard Gardens.



3. Include key environmental literacy concepts in science courses and other experiences required for high school graduation.
 - Use the environment as an integrating context for authentic and rigorous experiences in high school courses in environmental science, biology, and physical geology.
4. Increase the use of the out-of-doors for learning.
 - Encourage field experience as a part of the regular school curriculum.
 - Provide “field experience” lessons, ideas, and resources to teachers.
 - Promote the use of “nearby nature” including school grounds, school gardens, and neighborhood parks.
 - Incorporate green features of school campuses into the school curriculum, so that students explore how the school grounds can provide food and shelter for wildlife; protect native Ohio plants; retain and release storm water; conserve energy; and prevent pollution of the local watershed.
5. Support environmental career awareness.
 - Showcase the variety and economic value of environmental careers.
 - Develop a mentoring program that links environmental professionals with students.
 - Assure that service learning requirements and opportunities include environmental components.
 - Provide field trip opportunities to allow students to see environmental professionals at work.

6. Implement programs that contribute to healthy lifestyles through outdoor recreation and sound nutrition.
 - Showcase how a healthy lifestyle contributes to increased school and work performance.
 - Promote walking and biking to school.
 - Promote safe routes to schools, parks, libraries and other locations used by children.
7. Promote outdoor experiences during recess and physical education .
 - Include physical education in subject matter areas addressed by the Plan.
 - Include research on “green exercise” (e.g., same amount of calories are burned playing softball as when gardening).
 - Encourage the incorporation of natural play areas on school grounds.
 - Encourage participation in outdoor recreation as part of physical education classes (i.e., camping and hiking; kayaking and canoeing; fishing; archery; etc.).

GOAL IV: ENCOURAGE YOUTH AND ADULTS TO PARTICIPATE IN OUTDOOR ENVIRONMENTAL ACTIVITIES AND GAIN AN UNDERSTANDING OF THE VALUE OF CONSERVATION, RECREATION, AND PRESERVATION.

STRATEGIES:

1. Increase family participation in outdoor environmental activities through collaboration with ODNR, parks and recreation agencies, universities, nature centers and other environmental educators.
 - Inform parents about the advantages of engaging their children and themselves in outdoor activities.
 - Increase and promote family-oriented outdoor skills programs.
 - Include special initiatives to increase participation of diverse audiences in activities.
 - Encourage multiple visits to the same place throughout the year and in different seasons.
 - Encourage parents to help their children identify their place in the local ecosystem, for example, what watershed they live in, where the water and electricity in their home comes from, and where wastes from their homes are recycled, treated or disposed.

FRIENDS OF THE LOWER OLENTANGY WATERSHED
 FLOWER: FLOW Educational Resources • Franklin County
<http://olentangywatershed.org/>

This project provided a multi-faceted campaign to educate residents about storm water issues and the Lower Olentangy Watershed Action Plan. The campaign included a canoe float and river clean-up; 8 community dialogue meetings with expert speakers; 2 focus groups; 10 backyard conservation clinics (including a cost share to help residents purchase rain barrels); a bus tour for local media and community leaders; pre-movie slide shows in local theaters; publications, multi-media presentations, and web site coverage. Results of the campaign were shared statewide, and replicable copies of educational materials were provided to other watershed groups in Central Ohio.



2. Educate the public on the outdoors: enjoyment, inspiration, stewardship.
 - Develop and implement a public awareness campaign.
 - Develop relationships with the media to convey important points.
 - Encourage a shift from an indoor to an outdoor culture.
 - Encourage safe opportunities for walking and biking to school.
 - Continue to develop and offer programs that encourage the use of the outdoors for recreation and health benefits.

3. Increase public understanding and adult environmental literacy including the importance of conservation, recreation and preservation.
 - Encourage programs for adults in non-formal settings (i.e., park districts, libraries, municipal recreation facilities, etc.).
 - Educate private landowners about the environmental and economic benefits of good conservation practices.
 - Develop and implement a public educational campaign. Involve various non-profit and agency partners.
 - Provide resources, information, and training to support private landowners.

PICKERINGTON LOCAL SCHOOL DISTRICT

Changing Places • Franklin County,
Contact: marysheridan1@mac.com

Several grants from the Ohio Arts Council and Ohio Environmental Education Fund supported a filmmaker, sculptor, musicians and other artists-in-residence to help Tus-sing Elementary School students and teachers explore the history and use of the land around their school and its wetland and prairie ecosystems. Students communicated their findings to the local community through student-made films, storybooks, quilts, murals, papier-mache puppets, ceramic murals placed at Pickerington Ponds Metropark, and sculpture and murals depicting an imaginary journey by a whale from Alaska to the school. Students compared their own recordings of sounds in the school's wetland area with recordings from a whale listening station in Alaska.



GOAL V: GATHER EVIDENCE THAT DOCUMENTS INCREASES IN ENVIRONMENTAL LITERACY AND ENVIRONMENTALLY FRIENDLY BEHAVIOR

STRATEGIES:

1. Document evidence of students' environmental literacy progress over time
 - Measure the current state of environmental literacy among Ohio's students using existing data from appropriate Ohio Achievement Assessment questions and other baseline data.
 - Measure environmental literacy progress by:
 - using selected items from state assessments;
 - using selected items from the technological literacy test;
 - using alternate assessments such as journals, projects, research and portfolios;
 - ensuring that high school graduates have completed courses that include key environmental topics;
 - encouraging the development of longitudinal studies about student impact and achievement.
 - Track key statistics about student participation in EE programs.
 - Monitor and communicate about national studies and those from other states.
2. Document evidence of increasing environmentally-friendly behavior as a result of EE.
 - Develop and implement systematic methods to document behavior change among Ohio's citizens.
 - Encourage grant makers and program providers to support evaluations that look at longer-term changes in behavior.

IMPLEMENTATION OF THE PLAN

The No Child Left Inside federal legislation, which was introduced in 2009 and re-introduced in 2011, included the following language about implementation of Environmental Literacy Plans:

The Secretary of Education shall award grants to States that will in turn award sub-grants, on a competitive basis, to local educational agencies and eligible partners to support the implementation of the Environmental Literacy Plan. Two years after approval of the Environmental Literacy Plan and biennially thereafter, a report shall be submitted to the Secretary on the implementation of the plan based on approved evaluation activities.

This is a general plan for the State of Ohio. Implementation will depend on the participation of dedicated individuals, agencies and organizations that support the goals of the plan.

The five partners who have drafted this Plan are committed to continuing collaborative efforts already underway to promote the Goals and Strategies outlined.

WE INVITE YOU TO JOIN US!

APPENDICES

APPENDIX A: RESOURCES CURRENTLY AVAILABLE TO ACCOMPLISH STRATEGIES

To assist in implementing Ohio's Environmental Literacy Plan, the ELP Advisory Group offers several specific resources. This resource list will be updated periodically.

- EECO has 12 regions to assist with professional development around the state with a regional director and team of EE professionals in each area that can assist in providing professional development opportunities at the local level. www.eeco-online.org
- The organizations and agencies involved in the ELP development effort can provide content and instructional expertise based on proven national environmental education curricula (such as Project WET, Project WILD, and Project Learning Tree.)
- Local resource agencies such as park districts, Soil and Water Conservation Districts, Solid Waste and Recycling programs, and health departments have expertise, programs and professional development opportunities available at the local level in all parts of the state.
- Local organizations such as Leave No Child Inside Collaboratives, zoos, and science and nature centers are also a rich resource for environmental literacy.
- Many examples of best/outstanding environmental education practices, programs, and materials in Ohio and nationwide have been identified by groups such as EECO, OEEF, ORC and NAAEE. Those programs and practices can be used as models of the type of engaged, high quality learning experiences ODE is promoting in the Academic Content Standards and the Model Curriculum and which are referred to in the ELP. (See *Appendix B: Connections Between the ELP and ODE's Academic Content Standards and Model Curriculum* and the projects highlighted in this publication)

For more information concerning the Environmental Literacy Plan development, contact Brenda Metcalf, EECO Executive Director at brendasmetcalf@aol.com

RESOURCES AVAILABLE BY GOAL AND STRATEGY

GOAL I: PREPARE THOSE STUDYING TO BE EDUCATORS TO INCORPORATE EE INTO THEIR TEACHING THROUGHOUT THEIR CAREER.

STRATEGIES	RESOURCES
<p>1. Provide high quality preparation in EE for pre-service teachers and non-formal educators.</p> <ul style="list-style-type: none"> • Provide opportunities for practicing/role playing instruction to build confidence in teaching outdoors. • Incorporate outdoor education by encouraging joint use agreements to utilize local camps, nature centers, and parks for direct experiences for pre-service teachers. • Encourage interaction between pre-service teachers and environmental professionals from the public and private sectors. • Analyze the revised Ohio Academic Content Standards for content and practices that could be supported through EE experiences. • Demonstrate the advantages of direct contact with nature and the results of the lack of direct contact with nature. • Present strategies for overcoming perceived obstacles to teaching outdoors, such as ensuring safety and limiting liability; management of students and materials; addressing parental concerns. • Emphasize the interdisciplinary nature of EE. • Provide practical examples to pre-service teachers of how to use the school facility as a laboratory, to help students explore how resources and energy flow in and out, and how any green building and green infrastructure features of the school operate. • Encourage colleges and universities to incorporate the NAAEE Environmental Education Standards, which have been added to the NCATE protocols, into their pre-service curriculum. • Provide opportunities to access current EE resources in Ohio and nationally. • Include topics such as: <ul style="list-style-type: none"> – Ohio’s natural history; – how people learn in the outdoors; – how to work with diverse audiences; – how to involve families. 	<ul style="list-style-type: none"> • <i>Best Practices for Environmental Education: Guidelines for Success</i> including Appendix B: Teaching Outdoors • NAAEE Guidelines for Excellence in Environmental Education • EE programs (e.g., PLT, WILD, WET, HWHP) • Habitats for Learning • NCATE EE Accreditation for pre-service • EECO/EETAP Pre-service Teacher Educator survey instrument • ODE licensure requirements • EECO’s EE Certification Program • EECO Annual and Regional Conferences • U.S. Green Building Council’s Center for Green Schools www.centerforgreenschools.org/home.aspx • Ohio School Facilities Commission, www.osfc.ohio.gov/

GOAL II: HELP CLASSROOM TEACHERS AND THOSE IN OTHER SETTINGS ENHANCE AND EXPAND THEIR USE OF ENVIRONMENTAL EDUCATION.

STRATEGIES	RESOURCES
<p>1. Create professional development opportunities for formal and non-formal educators by partnering with universities, parks and recreation agencies and environmental educators to translate environmental concepts to high quality, engaging indoor and outdoor experiences.</p> <ul style="list-style-type: none"> • Build on existing programs (e.g., PLT, WILD, WET, HWHP and others listed in Appendix A.) • Replicate past successful professional development provided by government agencies, non-profit organizations, OEEF grant recipients and others. • Partner with university programs for professional development. • Encourage school boards, administration, and the Local Professional Development Committees who monitor the renewal of teaching licenses to accept and, if possible, require attendance at EE professional development that is offered. • Partner with ODE to include EE professional development opportunities related to Common Core, Academic Content Standards, and Model Curriculum. 	<ul style="list-style-type: none"> • OEEF Outstanding Projects • ORC resources • ODE professional development sessions • EE programs (e.g., PLT, WILD, WET, HWHP) • EECO's EE Certification Program
<p>2. Create professional development opportunities for formal and non-formal educators that improve environmental subject matter knowledge and increase teachers skills in teaching environmental topics and issues while using field-based and research-based learning.</p> <ul style="list-style-type: none"> • Partner with EE providers (e.g. parks/recreation agencies, environmental educators, state and local parks) to model the instruction of environmental concepts in an outdoor setting. • Build on existing programs (e.g., PLT, WILD, WET, HWHP and others listed in Appendix A.) • Build on existing programs (e.g., PLT, WILD, WET, HWHP). • Replicate past successful professional development provided by government agencies, non-profit organizations, universities OEEF grant recipients and others. • Partner with business/industry to take advantage of EE-linked resources, grants, programs, etc. 	<ul style="list-style-type: none"> • OEEF Outstanding Projects • ORC resources • ODE professional development sessions • EE programs (e.g., PLT, WILD, WET, HWHP) • University science departments • Project Dragonfly - Miami University

<ul style="list-style-type: none"> • Partner with university programs for professional development. • Encourage school boards, administration, and the Local Professional Development Committees who monitor the renewal of teaching licenses to accept and, if possible, require, attendance at EE professional development that is offered. • Incorporate technological design related to the environment. • Partner with ODE to include EE professional development opportunities related to Common Core, Academic Content Standards, and Model Curriculum. • Strengthen environmental education grant funds to support outdoor learning experiences. 	
<p>3. Create professional development opportunities for teachers that improve the use of innovative technology applications in the study of EE topics.</p> <ul style="list-style-type: none"> • Replicate past successful professional development provided by government agencies, non-profit organizations, universities, OEEF grant recipients and others. • Partner with university programs for professional development. • Use EdTech for communication, reporting. • Incorporate technological design related to the environment. • Partner with ODE to include EE professional development opportunities related to Common Core, Academic Content Standards, and Model Curriculum 	<ul style="list-style-type: none"> • OEEF Outstanding Projects • Future City Competition • ORC resources • ODE professional development sessions • PLT Green Schools Program
<p>4. Increase use of the out-of-doors for teaching and learning.</p> <ul style="list-style-type: none"> • Build confidence by modeling quality outdoor teaching and providing opportunities for practicing/role playing. • Address barriers to outdoor activities (e.g., safety, transportation, litigation, funding for fieldtrips, mindset, native language/culture). • Provide training for addressing the needs of diverse audiences. • Capitalize on “nearby nature” by using: <ul style="list-style-type: none"> – school grounds and outdoor classrooms; – school and community gardens; – neighborhood parks. 	<ul style="list-style-type: none"> • <i>Best Practices for Environmental Education: Guidelines for Success</i> including Appendix B: Teaching Outdoors • Habitats for Learning • PLT & WILD sections on barriers • WILD School Sites

<ul style="list-style-type: none"> • Use EECO Regional Structure to work with school districts to provide training. • Provide summer experiences for teachers at EE facilities (e.g. camps, nature centers) to connect them to the out-of-doors and build their confidence to engage students in natural settings. • Encourage cooperative programming and shared use of facilities with schools, camps, and parks and recreation agencies to provide direct experiences for in-service educators. 	<ul style="list-style-type: none"> • USDA Farm to School Program • Citizen Science Programs (e.g. Great Backyard Bird Count, Project FeederWatch, Bioblitz, etc.)
<p>5. Involve environmental professionals from universities, government, and business in professional development programs.</p> <ul style="list-style-type: none"> • Build awareness of environmental careers. • Utilize professionals as speakers and content providers. 	<ul style="list-style-type: none"> • Ohio Chemistry Technology Council's "Teachers, Industry and the Environment" (TIE) conference www.ohiochemistry.org • Ohio InterAgency Council for Environmental Education, details at www.eeco-online.org/ • WMAO, Water Management Association of Ohio, www.wmao.org/ • NGWA, National Ground Water Association, www.ngwa.org/ • OCTC, Ohio Chemistry Technology Council, www.ohiochemistry.org • Ohio Academy of Science, www.ohiosci.org • Resource agencies
<p>6. Incorporate real-world applications and authentic problem solving into professional development.</p> <ul style="list-style-type: none"> • Promote integration and critical thinking across the curriculum. • Engage students in the use of real tools, techniques, and data sources. 	<ul style="list-style-type: none"> • Summer professional development programs for teachers such as Miami University's Green Teacher Institute; Lourdes College's Four Seasons Natural Science Exploration • National Engineers Week Future City Competition-Ohio Region, www.futurecity.org • Project WILD's Science and Civics • PLT Secondary Modules • i-Tree Learning Lab www.unri.org/learninglab

	<ul style="list-style-type: none"> Investigating and Evaluating Environmental Issues and Actions by Harold Hungerford et al
<p>7. Support a voluntary EE certification program for formal and non-formal educators.</p> <ul style="list-style-type: none"> Encourage participation in Ohio’s Environmental Education Certification program. Work with ODE to provide additional teaching certification for participation in EE certification programs. Encourage LPDCs to provide continuing education units for participation in EE Certification programs. 	<ul style="list-style-type: none"> EECO is EE Certification Program www.eeco-online.org Ohio Certified Volunteer Naturalists NAI’s Certified Interpretive Guide EE programs (e.g., PLT, WILD, WET, HWHP)

GOAL III: PROVIDE A VARIETY OF EXPERIENCES THAT INCREASE STUDENT ENVIRONMENTAL LITERACY AND CONTRIBUTE TO HEALTHY LIFESTYLES.

STRATEGIES	RESOURCES
<p>1. Assure that students are well equipped to access and assess information and resources.</p> <ul style="list-style-type: none"> Promote the development of critical thinking skills and the integration of scientific processes across the curriculum. Incorporate scientific inquiry, problem based learning and systems thinking (e.g., use school campus as lab for sustainable practices and for green building). Reference studies that show the connections between unstructured play and development of creative thinking. Increase the use of objective technical resources. Explore the use of technology to gather data about the local environment, including wildlife cameras and websites, GPS, watershed/GIS mapping programs, etc. 	<ul style="list-style-type: none"> Children & Nature Network research ODE Academic Content Standards and Model Curriculum HWHP ODNR Falcon Cam and Migration Tracking web pages. www.wildohio.com Raptors in the City Journey North
<p>2. Prepare students to identify, research, analyze, and address environmental challenges.</p>	<ul style="list-style-type: none"> EE programs and competitions (e.g., Project WET, Project WILD, Project Learning Tree, National Engineers Week, Future City Competition, Ohio Envirothon)

<ul style="list-style-type: none"> • Provide ideas for topics and resources (e.g., Have students examine the benefits and challenges associated with land management by private landowners and local, state and federal government - and the resulting land use decisions). • Work with the Ohio School Facilities Commission to encourage students to investigate green features of school buildings, to understand how they conserve energy, lower utility costs, reduce waste, reduce exposure to harmful chemicals, and reduce storm water runoff. 	<ul style="list-style-type: none"> • Various agencies (e.g., local Soil and Water Conservation Districts, health departments, park districts, solid waste management districts and recycling offices, metropolitan planning organizations, and state and federal agencies in the OICEE, such as ODNR, Ohio EPA, Ohio Lake Erie Commission, USDA Natural Resources Conservation Service, USFS Wayne National Forest • Non-profit organizations such as the American Farmland Trust/Ohio, The Nature Conservancy, and Rural Action • Ohio School Facilities Commission, US Green Building Council Center for Green Schools, Alliance to Save Energy Green Schools Program, the Foundation for Environmental Education's Solar Schools initiative http://solarschools.org/ • PLT Green Schools Program
<p>3. Include key environmental literacy concepts in science courses and other experiences required for high school graduation.</p> <ul style="list-style-type: none"> • Use the environment as an integrating context for authentic and rigorous experiences in high school courses in environmental science, biology, and physical geology. 	<ul style="list-style-type: none"> • EE programs and competitions (e.g., PLT secondary modules, Project WILD's Science and Civics, Project Wet's Healthy Water, Healthy People, National Engineers Week Future City Competition, Ohio Envirothon) • Various agencies (e.g., local Soil and Water Conservation Districts, health departments, park districts, solid waste management districts and recycling offices, metropolitan planning organizations, and state and federal agencies in the OICEE • GLOBE www.globe.gov • Association of Fish and Wildlife Agencies' Conservation Education Strategy. www.fishwildlife.org

4. Increase the use of the out-of-doors for learning.

- Encourage field experience as a part of the regular school curriculum.
- Provide “field experience” lessons, ideas, and resources to teachers.
- Promote the use of “nearby nature” including school grounds, school gardens, and neighborhood parks.
- Incorporate green features of school campuses into the school curriculum, so that students explore how the school grounds can provide food and shelter for wildlife; protect native Ohio plants; retain and release storm water; conserve energy; and prevent pollution of the local watershed.

- ODE model curriculum
- Funding Sources for school gardens and outdoor learning areas, listed in Appendix C
- WILD School Sites
www.ohioprojectwild.com
- Local and National Garden Clubs
www.gardenclub.org/
- American Community Garden Association
www.communitygarden.org
- National Garden Association
www.garden.org
- National Wildlife Federation, How-to Guide for Schoolyard Habitats, www.nwf.org
- ODNR et al, Habitats for Learning: A Planning Guide for Using and Developing School Land Labs www.epa.ohio.gov/oeef/oeef_publications.aspx
- US Fish & Wildlife Service, Schoolyard Habitat Project Guide www.fws.gov/chesapeakebay/pdf/habitatguide.pdf
- Action For Children’s “Nurturing Nature” program
- Local Soil and Water Conservation District field days
- Local children’s water festivals in Columbus and Dayton, Hands on the Land in Delaware
- “School Days” events at select Ohio State Parks
- Outdoor education programs that are offered by many camps and nature centers around the state

	<ul style="list-style-type: none"> • Ohio School Facilities Commission, US Green Building Council Center for Green Schools, Alliance to Save Energy Green Schools Program • Mentoring by Science Experts (student/mentor in the field)
<p>5. Support environmental career awareness.</p> <ul style="list-style-type: none"> • Showcase the variety and economic value of environmental careers. • Develop a mentoring program that links environmental professionals with students. • Assure that service learning requirements and opportunities include environmental components. • Provide field trip opportunities to allow students to see environmental professionals at work. 	<ul style="list-style-type: none"> • Take Your Child to Work Day • School career days linked to service learning initiatives • Project WILD’s Science and Civics • PLT Secondary modules • OICEE
<p>6. Implement programs that contribute to healthy lifestyles through outdoor recreation and sound nutrition.</p> <ul style="list-style-type: none"> • Showcase how a healthy lifestyle contributes to increased school and work performance. • Promote walking and biking to school. • Promote safe routes to schools, parks, libraries, and other locations used by children. 	<ul style="list-style-type: none"> • OEEF Outstanding Projects • Childhood obesity campaigns • ODNR Divisions of Wildlife, Watercraft and Parks • School gardens and outdoor learning areas • Ohio Safe Routes to Schools www.dot.state.oh.us/saferoutes • Hike for Health-Ohio Departments of Health and Natural Resources
<p>7. Promote outdoor experiences during recess and physical education.</p> <ul style="list-style-type: none"> • Include physical education in subject matter areas addressed by the Plan. • Include research on “green exercise” (e.g., same amount of calories are burned playing softball as when gardening) • Encourage the incorporation of natural play areas on school grounds. • Encourage participation in outdoor recreation as part of physical education classes (i.e. camping and hiking; kayaking and canoeing; fishing; archery; etc.) 	<ul style="list-style-type: none"> • Various ODNR outdoor skills programs (National Archery in the Schools Program, Passport to Fishing, etc.) • The Critical Role of Recess in Schools (Ramstetter, Murray, & Garner, 2010) • Ohio bikeways Program - ODOT

GOAL IV: ENCOURAGE YOUTH AND ADULTS TO PARTICIPATE IN OUTDOOR ENVIRONMENTAL ACTIVITIES AND GAIN AN UNDERSTANDING OF CONSERVATION, RECREATION, AND PRESERVATION.

STRATEGIES	RESOURCES
<p>1. Increase family participation in outdoor environmental activities through collaboration with ODNR, parks and recreation agencies, universities, nature centers and other environmental educators.</p> <ul style="list-style-type: none"> • Inform parents about the advantages of engaging their children and themselves in outdoor activities. • Increase and promote local family oriented outdoor skills programs. • Include special initiatives to increase participation of diverse audiences in activities. • Encourage multiple visits to the same place throughout the year and in different seasons. • Encourage parents to help their children identify their place in the local ecosystem, for example, what watershed they live in, where the water and electricity in their home comes from, and where wastes from their homes are recycled, treated or disposed. 	<ul style="list-style-type: none"> • Update and maintain <i>Directory of Ohio EE Sites and Resources</i> (2002) • Publicize online resources about parks and other outdoor activities (e.g. naturefind.com) • Children & Nature Network Research Summary (Appendix D) • American Academy of Pediatrics • US Play Coalition • National Wildlife Federation-Backyard Habitat and Great Backyard Bird Count • Explore the Outdoors (ODNR) • Family programs offered in many parks
<p>2. Educate the public on the outdoors: enjoyment, inspiration, stewardship.</p> <ul style="list-style-type: none"> • Develop and implement a public awareness campaign. • Develop relationships with the media to convey important points. • Encourage a shift from an indoor to an outdoor culture. • Encourage safe opportunities for walking and biking to school. • Continue to develop and offer programs that encourage the use of the outdoors for recreation and health benefits. 	<ul style="list-style-type: none"> • “Walk with a Doc” • Access to information sources/ electronic events calendars • Ohio Safe Routes to Schools www.dot.state.oh.us/saferoutes • Hike for Health-Ohio Departments of Health and Natural Resources • Programs offered in many parks

<p>3. Increase public understanding and adult environmental literacy including the importance of conservation, recreation, and preservation.</p> <ul style="list-style-type: none"> • Encourage programs for adults in non-formal settings (e.g., park districts, libraries, municipal recreation facilities, etc.). • Educate private landowners about the environmental and economic benefits of good conservation practices. • Develop and implement a public educational campaign. Involve various non-profit and agency partners. • Provide resources, information, and training to support private landowners. 	<ul style="list-style-type: none"> • Various ODNR programs • Citizen Science Programs (e.g. Great Backyard Bird Count, Project FeederWatch, Bioblitz, etc.) • Ohio Coastal Training Program • Private land planning assistance from ODNR and SWCD’s • Ohio Certified Volunteer Naturalist Program—OSU Extension • Programs offered by local conservation clubs and other non-profit conservation organizations
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GOAL V: GATHER EVIDENCE THAT DOCUMENTS INCREASES IN ENVIRONMENTAL LITERACY AND ENVIRONMENTALLY FRIENDLY BEHAVIOR.

STRATEGIES

RESOURCES

<p>1. Document evidence of students’ environmental literacy progress over time.</p> <ul style="list-style-type: none"> • Measure the current state of environmental literacy among Ohio’s students using existing data from appropriate Ohio Achievement Assessment questions and other baseline data. • Measure environmental literacy progress by: <ul style="list-style-type: none"> – using selected items from state assessments; – using selected items from the technological literacy test; – using alternate assessments such as journals, projects, research and portfolios – ensuring that high school graduates have completed courses that include key environmental topics. • Track key statistics about student participation in EE programs. • Monitor and communicate about national studies and those from other states. 	<ul style="list-style-type: none"> • Ohio Department of Education (ODE) Office of Curriculum, Instruction and Assessment • Links to environmental literacy topics identified in ODE academic content standards and model curricula • Environmental literacy assessment tools from other states • Data on ODNR program participants • Attendance numbers from environmental programs and nature centers that serve schools • Attendance/program numbers data from groups such as the Association of Nature Center Administrators (Ohio chapter); American Camp Association; and Ohio camps and nature centers
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2. Document evidence of increasing environmentally-friendly behaviors as a result of EE.

- Develop and implement systematic methods to document behavior change in Ohio’s citizens.
- Encourage grant makers and program providers to support evaluations that look at longer-term changes in behavior.

- OEPA survey of adult environmental literacy (Ohio Journal of Science)
- Environmental literacy assessment tools from other states
- USFWS’s Report on Hunting, Fishing, and Wildlife Watching Participation
- Roper/Starch national surveys and data
- Data on ODNR program participants
- Data on city park attendance
- Data on parkland expansion
- Attendance/program numbers data from groups such as the Association of Nature Center Administrators (Ohio chapter); American Camp Association; and Ohio camps and nature centers

APPENDIX B: CONNECTIONS BETWEEN THE ELP AND ODE’S ACADEMIC CONTENT STANDARDS AND MODEL CURRICULUM

The Ohio Department of Education’s revised standards, common core standards, model curriculum statements, and other supporting materials can be found on ODE’s website. Please visit www.ode.state.oh.us

[English Language Arts](#), [Mathematics](#), [Social Studies](#), [Science](#).

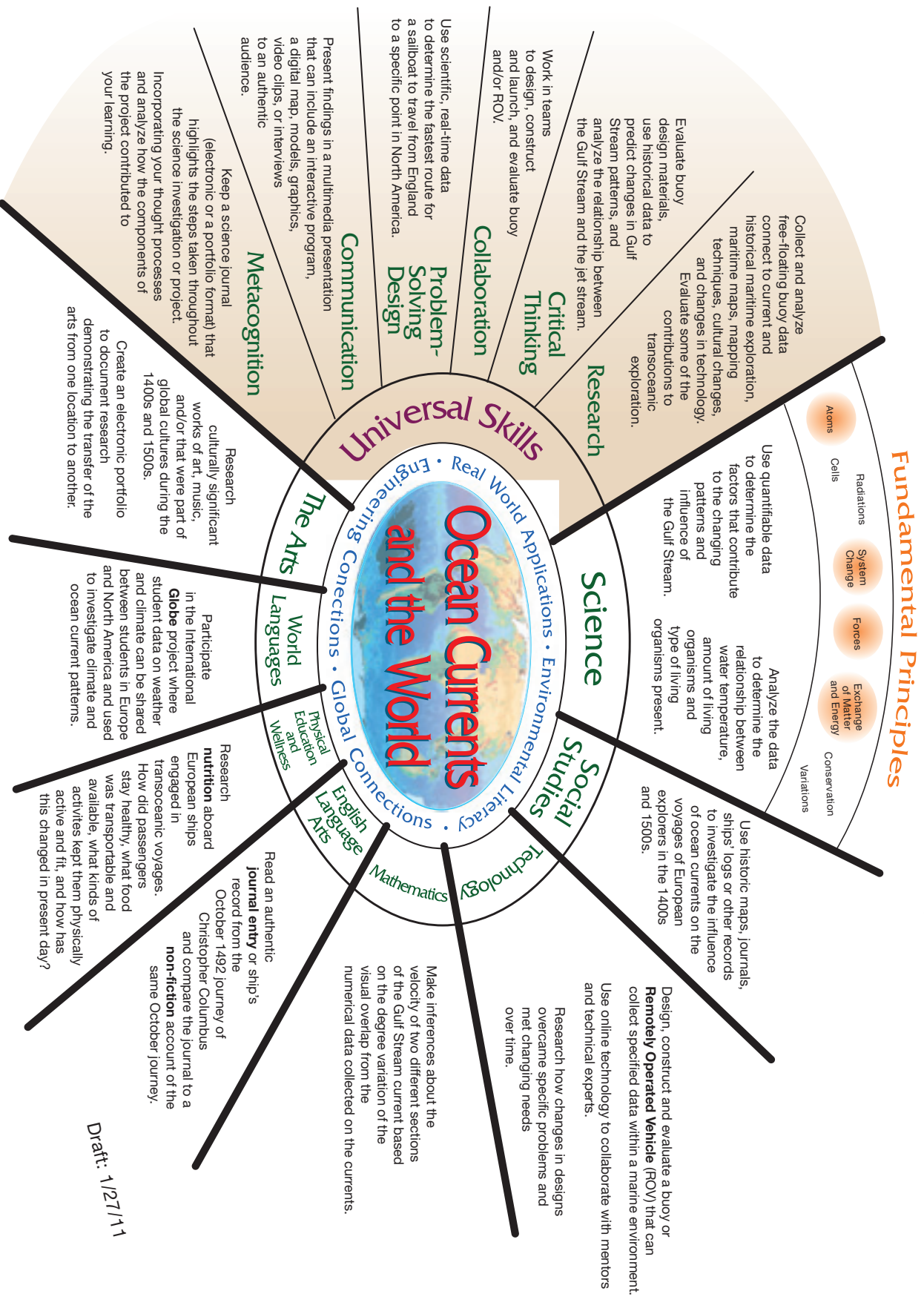
The Eye of Integration is a tool to help teachers design rigorous and relevant projects with other disciplines (such as across Science, Mathematics, English Language Arts, Social Studies, World Languages, The Arts). In addition to the examples included here, there is a blank “Eye of Integration” posted on the science page on the ODE website. The Eye supports real-world investigations and encourages environmental literacy.

The following pages are examples of Eyes of Integration for 7th Grade and High School.

Science Eye of Integration

7th Grade Interdisciplinary Experience

Ohio Department of Education, Curriculum and Instruction[®]



Draft: 1/27/11

APPENDIX C: LIST OF POTENTIAL FUNDING SOURCES

From ODNR

Nature Works grants, the Land and Water Conservation Fund, the Clean Ohio Trails Fund, Project Learning Tree Greenworks grants, WILD school sites grants, Step Outside grants, details at www.ohiodnr.com/tabid/10762/Default.aspx

From Ohio EPA

From Ohio EPA- Clean Water Act Section 319(h) grants, Lake Erie Protection Fund, Ohio Clean Diesel School Bus Fund, Ohio Environmental Education Fund, Surface Water Improvement Fund, details at www.epa.ohio.gov/Default.aspx?tabid=4371

From US EPA

US EPA Environmental Education grants are awarded through both the national Office of Environmental Education www.epa.gov/enviroed/grants.html and smaller grants (but less competition) through the Region 5 office in Chicago (contact Megan Gavin at gavin.megan@epa.gov). Application is usually announced in the Federal Register in September, with deadlines in November. USEPA Five Star Restoration Grants - The Five Star Restoration Program brings together students, conservation corps, other youth organizations, citizen groups, corporations, landowners and government agencies to provide environmental education through projects that restore stream banks and wetlands. Grants are approximately \$10,000 per project. www.epa.gov/owow/wetlands/restore/5star/

From Ohio Government

Grant Sources include the Lake Erie Protection Fund, Ohio Department of Development, Learn and Serve Ohio Grants (Ohio Department of Education), and the Clean Ohio Fund. These grants are described at www.epa.ohio.gov/oef/ee_resources.aspx

From Non-profit Organizations, Foundations, and Federal Agencies

Grant sources include the Fund for Wild Nature, Green Communities, Green Schools Project, Martha Holden Jennings, NASA, National Geographic Society Education Foundation, National Wildlife Federation, NOAA, Ohio Chemistry Technology Foundation, Science Education Council of Ohio, National Gardening Association, Captain Planet Foundation, North Face Explore Fund, and Outdoor Nation grants.

From Corporate Programs

Grant sources include AEP, Duke Energy, Qwest, Honda, Walmart, YSI, Procter & Gamble, Toshiba, Toyota, NiSource, FirstEnergy and Lowes.

APPENDIX D:

RESEARCH THAT SUPPORTS THE OHIO'S ELP GOALS & STRATEGIES

Research Reviews and Compilations

- Charles, C. & Louv, R. *Children's Nature Deficit: What We Know—and Don't Know*. 2009 Children and Nature Network www.childrenandnature.org A growing body of evidence suggests that significant changes in childhood have occurred in the past several decades relating to children's experiences in nature. While there are always exceptions, there are strong indicators of an absence of direct experience with the natural world in many children's everyday lives.
- Coyle, K.J. *Back to School: Back Outside! Create High Performing Students*. 2010 National Wildlife Federation www.nwf.org/News-and-Magazines/Media-Center/News-by-Topic/Get-Outside/2010/09-01-10-Back-to-School.aspx

This report examines the impact of outdoor and environmental education, outdoor time and nature study on student motivation, effectiveness at learning, classroom behavior, focus and standardized test scores. The report shows how outdoor time is connected with wide-ranging academic benefits including;

- improved classroom behavior,
- increased student motivation and enthusiasm to learn,
- better performance in math, science, reading and social studies,
- reduced Attention Deficit Hyperactivity Disorder (ADHD),
- higher scores on standardized tests (including college entrance exams),
- helping under-resourced, low-income students perform measurably better in school.

Back to school: Back Outside spells out how schools can implement outdoor time through recess, school gardens, campus greening projects, field trips, outdoor education programs, environmental learning and safe routes to school programs.

- *Timeout: Using the Outdoors to Enhance Classroom Performance* (NWF, K. Coyle, 2010) This compilation of 19 research studies focuses on the impact of what the report describes as the “increasingly indoor childhood”. Sections include: Lack of Outdoor Time Affects Learning Readiness; Nutritional and Physical Activity Implications; Outdoor Education Improves Classroom and Behavioral Outcomes; and Solutions that can improve the capacity of students.
- *Children's Contact With the Outdoors and Nature: A Focus on Educators and Educational Settings* (Children and Nature Network, 2010) This compilation contains Annotated Bibliographies for 46 research studies. The work is divided into two sections:

Benefits to Children from Contact with Nature reviews research focused on the physical, mental and social benefits that contact with the outdoors and nature provide children. The research is grouped into the following categories: Literature Reviews and Overview Documents; School Performance and Learning; Physical Activity and Weight; and Other Benefits.

Children's Experience of the Outdoors and Nature reviews research focused on the type and amount of contact children have with nature. Research is grouped into the following categories: Outdoor Behavior; Outdoor Spaces; and Environmental Knowledge & Behavior.

- *Fact Sheet-Children's Health and Nature* (National Environmental Education Foundation, 2011) This compilation of research cites and summarizes over 50 references on the connections and impacts of nature and children's health, many from medical journals.
- Tracey J. Woodruff, Daniel A. Axelrad, Amy D. Kyle, Onyemaechi Nweke, and Gregory G. Miller, *America's Children and the Environment: Measures of Contaminants, Body Burdens, and Illnesses, second edition*, Washington, DC: US Environmental Protection Agency, February 2003, EPA 240-R-03-001 Posted at www.epa.gov/economics/children/
- McCurdy, L., Winterbottom, K., Mehta, S., & Roberts, J. (2010) *Using Nature and Outdoor Activity to Improve Children's Health*. Current Problems in Pediatric and Adolescent Health Care 40 (5): 102-117. www.cppah.com Per the National Environmental Education Foundation, (2011) : a complete literature review of the scientific evidence for the physical and mental health benefits of nature.
- Lieberman, G., Hoody, L. (1998) *Closing the Achievement Gap—Using the Environment as an Integrating Context for Learning* State Education and Environment Roundtable. This report presents the results of a nationwide study; describes the major concepts and assumptions underlying Using the Environment as an Integrating Context (EIC); explores a range of successful EIC programs; identifies characteristics of successful EIC programs; and analyzes the implications of EIC-based education for student learning and instruction.

Individual Research Papers/Articles

- Berman, M., Jonides, J., Kaplan, S., *The Cognitive Benefits of Interacting With Nature*. 2008 Psychological Science, Vol. 19, Number 12 Pgs 1207 - 1212 Compares the restorative effects on cognitive functioning of interactions with natural areas versus urban environments, and includes an analysis of the kinds of environments that lead to improvements in directed-attention abilities.
- Powell, K. & Wells, M. *The Effectiveness of Three Experiential Teaching Approaches on Student Science Learning in Fifth-Grade Public School Classrooms*. (2002) The Journal of Environmental Education 33(2) 33-38. The purpose of this study was to compare the effects of 3 experiential science lessons (FOSS, Project WILD, & a modified WILD Activity) in meeting the objectives of the Colorado model content science standards. "Our results suggest that experiential-based programs, such as FOSS and Project WILD, effectively meet objectives of Colorado's model content science standards. By fully incorporating experiential learning techniques, we may be able to achieve our future education goals in science and other curricular areas."
- Morrone, M., Mancl, K., & Carr, K. *Development of a Metric to Test Group Differences in Ecological Knowledge as One Component of Environmental Literacy*. (2001) The Journal of Environmental Education 32 (4) 33-43 The research presented in this article contributes to environmental literacy research by offering a tested, valid survey instrument to measure ecological knowledge—one component of environmental literacy. This article provides an example of how this instrument can be applied by comparing knowledge levels among diverse groups of Ohio citizens. "After examining questions about each of the principles, it is interesting to note that Ohioans appear to be more knowledgeable about global environmental issues than issues that have more local relevance."
- Palazzolo, K. *Environmental Education in Preservice Teacher Education Programs and Elementary Classrooms: A Survey of Teachers in Three Nebraska Counties*. (2002) Doane College, Crete, NE This study assesses Nebraska teachers' perceptions regarding the extent to which environmental topics are taught in their classrooms and adequacy of their pre-service environmental education and analyzes whether teachers who received more pre-service environmental training spend more time

teaching environmental topics. "Amount of pre-service training in environmental topics correlates significantly with amount of time spent on EE in the classroom. Increased amounts of pre-service EE training result in more time teaching environmental topics in the classroom."

- Hoody, L. *The Educational Efficacy of Environmental Education*. 1995 State Education & Environment Roundtable. The purpose of this study was to locate research that assesses the education efficacy of EE; specifically, studies that analyze the influence of EE methods and content on students' ability to learn in subject areas throughout the curriculum. Additionally, the study was designed to find research that evaluates educational programs in EE that use decision-making and problem-solving processes to develop higher level thinking skills. "Our review found that interdisciplinary-based research in EE is poorly represented in the literature." "There are several possible explanations for a lack of research that reinforces the pedagogical strengths of EE. Among the possible reasons are: lack of funding and/or planning for program evaluation; difficulties incorporating assessments of problem-solving and critical-thinking skills into traditional school structures; lack of relevant case examples of interdisciplinary model programs; and most EE researchers are evaluating program outcomes related to environmental attitudes and behaviors rather than assessing general educational impacts of EE."
- Mayer, F.S., McPherson Frantz, C., Bruehlman-Senecal, E., & Dolliver, K. *Why Is Nature Beneficial?: The Role of Connectedness to Nature* 2008 Environment and Behavior 41, 607 Three studies examine the effects of exposure to nature on positive affect and ability to reflect on a life problem. Participants spent 15 min walking in a natural setting, an urban setting, or watching videos of natural and urban settings. In all three studies, exposure to nature increased connectedness to nature, attentional capacity, positive emotions and ability to reflection a life problem; these effects are more dramatic for actual nature than for virtual nature. Mediation analyses indicate that the positive effects of exposure to nature are partially mediated by increases in connectedness to nature and are not mediated by increases in attentional capacity. The discussion focuses on the mechanisms that underlie the exposure to nature/well-being effects.
- Balgopal, M.M. & Wallace, A.M. *Decision and Dilemmas: Using Writing to Learn Activities to Increase Ecological Literacy*. 2009 The Journal of Environmental Education 40 (3) 13-26. Researchers tested whether writing increases ecological literacy in undergraduate elementary education students. The authors asked students to write 3 guided essay addressing the cognitive, affective, and behavioral domains in response to new articles on hypoxia. Of the 22 students, 64% improved their ecological literacy from the 1st essay to the 3rd essay. The authors conclude that writing can be an effective learning tool for increasing ecological literacy. They also posit that ecological literacy is a continuum and not a discrete state. Authentic learners who can recognize dilemmas and potential decisions (and their ecological consequences) are on one end of this continuum.
- Heimlich, J.E., Braus, J., Olivolo, B., McKeown-Ice, R., & Barringer-Smith, L. *Environmental Education and Preservice Teacher Preparation: A National Study*. 2004 The Journal of Environmental Education 35 (2) 17-21. A national study of colleges and universities offering teacher-preparation programs was undertaken to ascertain how environmental education (EE) might be better incorporated into their curricula. "In line with the observations of (previous studies), the greatest challenge facing incorporation of (EE) into teacher-preparation programs is in the political arena. The political system (federal and state) drives many of the teacher-preparation programs. The local politics of school districts—each of which is its own decision-making body in terms of teacher certification requirements—makes single point of entry into teacher-preparation impossible. The "best fit" for incorporating EE into teacher-preparation programs overall appears to be within methods courses."

- McMillan, E.E., Wright, T., & Beazley, K. *Impact of a University-Level Environmental Studies Class on Students' Values* 2004 The Journal of Environmental Education 35 (3) 19-28 This study evaluates the impact of an introductory university-led environmental studies class on the environmental values of students. "The students were found to deepen their environmental values after taking the class, becoming more ecocentric, and less homecentric. They showed greater sophistication in their answers to the final questionnaire and interview questions."
- Holsman, R.H. *Non-science teacher perceptions of environmental education: Results from Environmental Education and Training Partnership (EETAP) focus groups*. 2002 College of Natural Resources, University of Wisconsin-Stevens Point. This report contains findings and implications of a focus group study done by EETAP to increase the effectiveness of reaching formal educators (i.e., teachers) with messages about EE and related training. "In general, EE appears to be associated most often as particular, current environmental issues or as some extension of science. There was almost no immediate recognition of the value of EE for achieving general learning goals. The most apparent implication of the results seems to suggest that the best way to talk about EE is to not call it EE.we should at least not lead with references to the phrase and instead stress the specific outcomes shared by education professionals. ... In other words, we need to give people a reason for listening first by demonstrating the educational value of our product in clear terms and with specific examples to catch their interest before launching into a lecture about the Tblisi declaration and the goals of EE for example."
- Weinstein, N., Przybylski, A.K., Ryan, R.M. *Can nature make us more caring? Effects of immersion in nature on intrinsic aspirations and generosity*. 2009 Personality and Social Psychology Bulletin. 35(10):1315-29. Four studies examined the effects of nature on valuing intrinsic and extrinsic aspirations. Intrinsic aspirations reflected prosocial and other-focused value orientations, and extrinsic aspirations predicted self-focused value orientations. Participants immersed in natural environments reported higher valuing of intrinsic aspirations and lower valuing of extrinsic aspirations, whereas those immersed in non-natural environments reported increased valuing of extrinsic aspirations and no change of intrinsic aspirations. Three studies explored experiences of nature relatedness and autonomy as underlying mechanisms of these effects, showing that nature immersion elicited these processes whereas non-nature immersion thwarted them and that they in turn predicted higher intrinsic and lower extrinsic aspirations. Studies 3 and 4 also extended the paradigm by testing these effects on generous decision making indicative of valuing intrinsic versus extrinsic aspirations.
- Fleming, M.L. *Teachers' Needs: Professional Development Priorities of Formal Pre-K—20 Environmental Educators*. 2010 Environmental Education and Training Partnership and the U.S. Fish and Wildlife Service National Conservation Training Center. In 2009, the U.S. Fish and Wildlife Service's National Conservation Training Center funded a study through EETAP to learn the professional development (PD) needs of environmental educators in the United States through 2015. Eighty-nine needs emerged from individual and focus group interviews with environmental and conservation education leaders and practitioners. Then an online questionnaire distributed to a random sample of environmental education (EE) practitioners gathered data about their professional development preferences and priorities. This report presents the priorities of environmental educators who work with pre-kindergarten through college-age students in formal education systems. Designed as a resource for providers and consumers, this report summarizes the findings and suggests opportunities to enrich environmental education professional development.

- Ramey, L. K. *Rekindling Memories of Yesterday's Children: Making the Case for Nature-Based Unstructured Play for Today's Children*. 2010 [Journal of Sustainability Education](#). 1(1) This research provides a bridge between the memories of adults and the well-being of today's youth – a powerful connector for environmental educators as we struggle to find meaningful tools to persuade adults of the critical need to get children and themselves out into nature and the healing influence of unstructured exploration and play.
- Ramstetter, C. L., Murray, R., & Garner, A. *The Crucial Role of Recess in Schools*. 2010 [Journal of School Health](#), 80(11), 517-526. Recess is at the heart of a vigorous debate over the role of schools in promoting optimal child development and well-being. Reallocating time to accentuate academic concerns is a growing trend and has put recess at risk. Conversely, pressure to increase activity in school has come from efforts to combat childhood obesity. The purpose of this review was to examine the value of recess as an integral component of the school day. The review concludes that recess serves a critical role in school as a necessary break from the rigors of academic challenges. Recess is a complement to, not a replacement for, physical education. Both promote activity and a healthy lifestyle; however, recess—particularly unstructured recess and free play—provides a unique contribution to a child's creative, social, and emotional development. From the perspective of children's health and well-being, recess time should be considered a child's personal time and should not be withheld for academic or punitive reasons.
- Mancl, K., Carr, K., & Morrone, M. *Environmental Literacy of Ohio Adults* (1999) [Food, Agricultural and Biological Engineering, The Ohio State University, Columbus, OH 43210, Strategic Research Group, Columbus, OH 43212, and School of Health Sciences, Ohio University, Athens, OH 45701](#) OHIO J SCI 99 (3): 57–61. Environmental literacy is defined as an understanding of natural systems combined with how they interact with human social systems. Past surveys have measured the “pollution knowledge” of adults. This study instead examined Ohio adult's knowledge of ecological principles as the basis of understanding. A telephone survey of 504 Ohio adults measured their knowledge of ecological principles. As a group, Ohio adults appear to understand four principles of ecology: biogeography, the earth as a biosphere, ecological energetics, and carrying capacity. Some additional attention should be paid to teaching Ohio adults about three principles of ecology: ecosystem succession, biotic interactions, and the importance of diversity. Most importantly, Ohio adults must learn more about the principle of materials cycling. Ohio adults showed poor understanding of the nitrogen, phosphorus, and hydrologic cycle and bioaccumulation.
- Mancl, K., Carr, K., & Morrone, M. *Profile of Ohio Adults with Low Environmental Literacy* (2003) [Food, Agricultural and Biological Engineering, The Ohio State University, Columbus, OH 43210, Strategic Research Group, Columbus, OH 43212, and School of Health Sciences, Ohio University, Athens, OH 45701](#) Ohio Journal of Science 103 (3):38-41. www.epa.ohio.gov/oeef/a_survey_of_environmental_lite.aspx Environmental literacy is defined as an understanding of natural systems combined with how they interact with human social systems. An Ohio study measured adults' knowledge of ecological principles as the basis of understanding. A telephone survey of 504 Ohio adults measured their knowledge of ecological principles along with their demographics. Low literacy adults are significantly different from those who exhibit high literacy. The lowest literacy group was characterized as less educated, below the median household income, older, female, and minority. Low Literacy adults were less likely to engage in outdoor activities and gain information from environmental groups, but are more likely to gain information from television. Low literacy adults are more likely than high literacy adults to use alternative transportation. In targeting environmental education programs to heads of households, adults with low environmental literacy need to be approached differently than those with high literacy.

APPENDIX E: GLOSSARY

This is a listing of the terminology and acronyms found within the document.

Children and Nature Network • The Children & Nature Network (C&NN) was co-founded in 2006 by Richard Louv, whose book sparked the Leave No Child Inside movement. This network is the hub of the movement and was created to encourage and support the people and organizations working nationally and internationally to reconnect children with nature. The network provides a critical link between researchers and individuals, educators and organizations dedicated to children's health and well-being. www.childrenandnature.org

Common Core Standards • The Common Core State Standards for English Language Art (ELA) and Mathematics provide a consistent, clear understanding of what students are expected to learn, so teachers and parents know what they need to do to help them. The standards are designed to be robust and relevant to the real world, reflecting the knowledge and skills that our young people need for success in college and careers. FAQ's about Ohio's connections to Common Core can be found online at www.ode.state.oh.us

Environmental Education (EE) • the process of moving a student from awareness and understanding of environmental systems and issues, to enhancing decision making skills and eventually positively changing their behavior toward the environment.

Environmental Education Certification • a program lead by EECO that allows participants to become certified environmental educators. This rigorous, 6-month program allows participants to learn the basics of environmental education, teaching skills, key environmental, biological and ecological concepts, and evaluation techniques. Upon completion, participants receive certification and are required to maintain their certification with continued training and teaching experience. www.eeco-online.com

Environmental Education Council of Ohio (EECO) • The Environmental Education Council of Ohio (EECO) provides leadership and resources for environmental education throughout the state of Ohio. EECO serves all Ohio citizens by:

Acting as the state affiliate of the North American Association for Environmental Education (NAAEE)

Being a clearinghouse for EE resources and information www.eeco-online.org

Providing outreach to educators

Coordinating statewide activities and leadership in EE

Advocating for high quality, accessible EE throughout the state

Promoting collaboration among agencies, organizations, and institutions interested in advancing EE in Ohio

Environmental Education and Training Partnership (EETAP) • Funding source housed within the USEPA's Office of Environmental Education. EETAP delivered environmental education training, services and resources to education professionals across the U.S. It advanced environmental education with guidelines, standards, accreditation, certification and used Internet technology to deliver courses, information and resources. EETAP made it a priority to reach educators who served ethnically diverse and low-income communities. EETAP's third and final phase started October 2005 and ended February 2011. www.eetap.org

Environmental Literacy (EL) • describes citizens that have the ability to understand environmental concepts and issues; can analyze or evaluate environmental issues; can act or participate in decisions or behaviors that address environmental issues, based on multiple sources of information.

Environmental Literacy Plan (ELP) • a formal plan that must be in place in each state in order to capture funding from NCLI, if/when it passes. Currently being developed by partners from ODE, OEPA, ODNR, OPRA and LNCL. www.ohioenvironmentalliteracyplan.org

Formal Education • education that takes place within a pre-K to 12 classroom setting

Healthy Water, Healthy People (HWHP) • secondary school water quality education program from Project WET and the Hach Scientific Foundation, featuring hands-on activity guides, testing kits, and training for teachers and volunteer monitors. www.projectwet.org

Inservice Education • professional development experienced by educators during their career.

Leave No Child Inside (LNCI) • Leave No Child Inside is a movement of citizens interested in reconnecting children with nature. In Ohio, the movement is called Leave No Child Inside and is organized via a network of local collaboratives known as the Ohio Leave No Child Inside Collaboratives. In other states, such movements have other names. Some are sponsored by government entities or national nonprofits. In Ohio, the movement is a grassroots one. www.ohiolnci.org

Local Professional Development Committees (LPDC) • These are committees that, by law, operate in each school district and non-public charter school to approve professional development criteria and opportunities for formal teachers in their school systems. The purpose of the committees is to review the coursework and other professional development activities proposed and completed by educators within the district to determine if the requirements for renewal of licenses have been met, with the exception of profession pupil services licenses that require credentialing through related licensure boards.

Model Curriculum • The Ohio Model Curriculum is combined with the Standards in a Web-based document that provides information and support on how to plan, develop, implement and evaluate instruction directly aligned to standards. It includes Content Elaborations; Expectations for Learning that will incorporate additional information on teaching strategies through the Examples for the Classroom, and Instructional Strategies. Ohio's Model Curriculum is online at www.ode.state.oh.us

National Association for Interpretation (NAI) • a not-for-profit 501(c)3 professional association for those involved in the interpretation of natural and cultural heritage resources in settings such as parks, zoos, museums, nature centers, aquaria, botanical gardens, and historical sites. For more than 50 years, NAI and its parent organizations have encouraged networking, training, and collaboration among members and partners in support of our mission: inspiring leadership and excellence to advance heritage interpretation as a profession. www.interpnet.com

National Council for Accreditation of Teacher Education (NCATE) • The National Council for Accreditation of Teacher Education (NCATE) is the profession's mechanism to help establish high quality teacher preparation. Through the process of professional accreditation of schools, colleges and departments of education, NCATE works to make a difference in the quality of teaching and teacher preparation today, tomorrow, and for the next century. NCATE's performance-based system of accreditation fosters competent classroom teachers and other educators who work to improve the education of all P-12 students. NCATE believes every student deserves a caring, competent, and highly qualified teacher. www.ncate.org

North American Association of Environmental Education (NAAEE) • NAAEE is a professional, membership organization that provides high quality services in professional development, guidelines for excellence, networking, access to relevant research, and advocacy for both environmental educators and the organizations that train, employ, and support those educators. www.naaee.org

No Child Left Inside (NCLI) • No Child Left Inside is a program that the State of Connecticut created to introduce children to the wonders of nature. It is also the name of a specific piece of national legislation known as the No Child Left Inside Act. The proposed No Child Left Inside Act is bi-partisan legislation introduced in Congress that would support the surging environmental education movement, improve student achievement, and prepare students for jobs in the growing green economy. www.nclcoalition.org

Non-formal Education • education that takes place in the outdoors or outside of the classroom setting, i.e. nature centers, camps, parks, etc.

Ohio Academic Content Standards • Clearly defined statements and/or illustrations of what all students, teachers, schools and districts are expected to know and be able to do. These can be found online at www.ode.state.oh.us

Ohio Department of Education (ODE) • The state educational oversight agency. The vision for ODE is to have all Ohio students to graduate from the PK-12 education system with the knowledge, skills and behaviors necessary to successfully continue their education and/or be workforce ready and successfully participate in the global economy as productive citizens. Ultimately, all students will graduate well prepared for success. www.ode.state.oh.us

Ohio Department of Natural Resources (ODNR) • As an umbrella organization over 11 divisions, the department pulls all these activities into four fundamental mission components: 1) Resource management by sustained productivity of Ohio's renewable natural resources, promoting the wise use of non-renewable natural resources, and protecting Ohio's invaluable threatened and endangered natural resources; 2) Economic development through job creation/expansion/retention, stimulating local economies, developing industry and tourism opportunities, and supporting the present and future economic health of the state; 3) Recreation by providing leisure services and recreation opportunities for the public at all levels; 4) Health and safety through fair and consistent law enforcement participating in regulatory matters and identifying and responding to environmental hazards. www.ohiodnr.com

Ohio Environmental Protection Agency (OEPA) • a state agency that protects human health and the environment by establishing and enforcing regulations for air quality, drinking water and stream water quality, wastewater treatment, and solid and hazardous waste disposal. This is done by: issuing permits to install and operate facilities; providing oversight through inspections and sampling; monitoring and reporting on environmental quality; providing environmental education; providing financial and technical assistance; and taking enforcement actions against violators. www.epa.ohio.gov

Ohio Environmental Education Fund (OEEF) • dedicated funding source for EE that is administered by the OEPA's Office of Environmental Education. Funding comes from fines paid for violations of air and water pollution control laws. The OEEF offers grants up to \$50,000 for education projects targeting pre-school through university students and teachers, the general public, and the regulated community. www.epa.ohio.gov/oeef

Ohio Interagency Council for Environmental Education (OICEE) • informal collaborative of 22 state and 9 federal agencies in Ohio to share informational and educational resources related to the environment. www.epa.ohio.gov/LinkClick.aspx?fileticket=q1cAQwtrOtE%3d&tabid=2243

Ohio Parks and Recreation Association (OPRA) • a nonprofit membership organization comprised of more than 1,300 professionals and citizens striving to provide quality parks and recreation for all Ohioans while protecting Ohio's natural and cultural resources. Parks and recreation agencies, often collaborating with schools, offer environmental education programs for teachers, students and the public. www.opraonline.org

The Ohio Resource Center for Mathematics, Science, and Reading (ORC) • identifies effective instructional and professional development resources and best practices and disseminates them to schools, school districts, and higher education institutions. www.ohiorc.org

Pre-service Education • typically refers to the formal preparation of teachers, usually within the confines of colleges and universities.

Professional Development (PD) • educational opportunities for teachers and non-formal educators to learn more about a particular topic, concept or teaching technique.

Project Learning Tree (PLT) • an environmental education program designed for teachers and other educators, parents, and community leaders working with youth from preschool through grade 12. In Ohio, the materials are only available by attending workshops conducted through the ODNR-Division of Forestry. www.dnr.state.oh.us/tabid/5116/Default.aspx

Project WET (WET) • Project WET is an international, interdisciplinary, water science and education program for formal and non-formal educators of K-12 students. This curriculum is designed to facilitate and promote awareness, appreciation, knowledge, and stewardship of water resources and is available by attending workshops conducted through the ODNR-Division of Soil and Water Resources. www.dnr.state.oh.us/tabid/3501/Default.aspx

Project WILD (WILD) • a supplementary education program emphasizing awareness, appreciation, and understanding of wildlife and natural resources. This pre-K through 12th grade environmental education curriculum is interdisciplinary, hands-on and is available by attending workshops conducted through the ODNR-Division of Wildlife. www.ohioprojectwild.org

Soil and Water Conservation Districts (SWCD) • agencies within the county that provide assistance to land owners and businesses in the protection and conservation of the county's soil and water resources through partnerships with local, state and federal government programs and funding. www.dnr.state.oh.us/tabid/21817/Default.aspx

United States Environmental Protection Agency (USEPA) • the primary federal agency responsible for research, standard-setting, monitoring and enforcement with regard to air and water pollution, solid and hazardous waste disposal, radiation and pesticides. The federal agency develops and enforces regulations, gives grants, conducts research on environmental issues, sponsors partnerships and teaches people about the environment. www.epa.gov

United States Department of Education (USDOE) • The federal educational oversight agency. The mission of the Department of Education is to promote student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access. www.ed.gov

APPENDIX F: REFERENCES CITED

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