

NORTH CAROLINA ENVIRONMENTAL LITERACY PLAN



Executive Summary(TBA)

Foreword(TBA)

The Value of Environmental Literacy

North Carolina requires an environmentally literate citizenry who make informed decisions about complex environmental issues affecting the economy, public health and shared natural resources, such as the water and air on which life depends. Education for environmental literacy can help students meet state academic standards while giving them the citizenship tools needed to participate in the environmental decision making process critical to public health and economic growth. Educated citizens are vital engines for addressing, preventing and solving local environmental problems — be it through monitoring local streams for pollution or participating in strategic planning for sustainable development. Civic involvement provides numerous benefits to schools, faith-based organizations, public parks, neighborhoods and to the environmental health of the community.

Environmental literacy has been recognized as an essential part of a well-rounded education. The *Partnership for 21st Century Skills* states that in addition to mastery of the core subject areas, environmental literacy is a key interdisciplinary theme that should be woven through the academic curriculum to promote higher levels of understanding. The N.C. State Board of Education outlines several goals that must be met to ensure that every public school student in North Carolina graduates from high school “globally competitive for work and postsecondary education and prepared for life in the 21st Century.”¹ This plan for environmental literacy outlines strategies that will enable students to be globally competitive, healthy and responsible and will provide teachers with high-quality professional development aligned with State Board of Education priorities.



Environmental literacy is dependent upon formal education opportunities as well as nonformal education about the environment that takes place settings such as parks, zoos, nature centers, community centers, youth camps, etc. It is the combination of these formal and nonformal experiences that leads to an environmentally literate citizenry.

“Environmental literacy is not simply a body of knowledge, nor is it the result of a collection of experiences. Rather, it results from a marriage of the two and is cultivated over many years.”²

The report *Environmental Literacy in America: What Ten Years of NEETF/Roper Research and Related Studies Say About Environmental Literacy in the U.S.* estimated that 80% of Americans are influenced by incorrect or outdated environmental myths and that only 12% of Americans can pass a basic quiz on energy topics. The report estimated that children get environmental information – about 83% - from the media and that the media is often the sole source of environmental information for adults. While media sources can readily provide broad superficial knowledge on the environment, they are not good at helping people develop a deep knowledge of a subject as the education system can. This lack of access to in-depth environmental knowledge among the public is concerning as environmental problems become more complex and pervasive.³

What is Environmental Literacy?

In North Carolina, environmental literacy is defined as the ability to make informed decisions about issues affecting shared natural resources while balancing cultural perspectives, the economy, public health and the environment.

An environmentally literate citizen:

- Understands how natural systems and human social systems work and relate to one another;
- Combines this understanding with personal attitudes and experiences to analyze various facets of environmental issues;
- Develops the skills necessary to make responsible decisions based on scientific, economic, aesthetic, political, cultural, and ethical considerations; and
- Practices personal and civic responsibility for decisions affecting our shared natural resources.

Details about the process for developing the North Carolina’s definition are outlined in Appendix C.



Environmental Education’s Role

Environmental education is a resource that transcends the classroom—both in character and scope. In the classroom and beyond, the desired outcome of environmental education is environmental literacy.⁴

People who are environmentally literate understand how natural systems function and how humans and the environment are intertwined. To that end, environmental education strives to provide learners with sound scientific information and the vital skills of problem solving, critical thinking and decision-making.

At one time or another, individuals will be compelled to address complex environmental problems affecting the economy, public health or shared natural resources and environmental education provides the necessary tools to solve these problems.⁵

The basic aim of environmental education is to help individuals and communities understand the complex interactions between natural and built environments.⁶ Environmental education includes looking at the biological, physical, social, economic, and the cultural or historical aspects of an issue. By building critical thinking skills, students are able to evaluate and anticipate environmental problems, thus leading to increased environmental literacy.

Environmental education should not be approached as a separate subject taught in schools but rather as a learning context through which educators can weave environmental content into all subject areas. Environmental education holds great promise for improving the quality of learning in America’s classrooms.⁷ When teachers use the environment as a context for learning, they report better student performance on standardized measures of academic achievement in reading, writing, math, science and social studies; reduced discipline and classroom management problems; increased engagement and enthusiasm for learning; and greater pride and ownership in accomplishments.⁸

Environmental education’s principles and best practices directly support the four essential components of environmental literacy:

1. Developing inquiry, investigative, and analysis systems.
2. Acquiring knowledge of environmental processes and human systems.
3. Developing skills for understanding and addressing environmental issues.



4. Practicing personal and civic responsibility for environmental decisions.⁹

Environmental education fits well with many current instructional strategies. For instance, service learning has been recognized as a critical part of student learning and environmental topics lend themselves to service learning projects. This has been evidenced in North Carolina by the success and popularity of environmentally focused high school graduation projects. In addition, Project-based Learning (PBL) is used effectively in many schools to holistically explore community-based environmental issues.

There are other trends in schools that are supported by environmental education including the focus on connecting schools and communities, school reform initiatives, after school programming and the increase in outdoor classrooms on school grounds, i.e. schoolyard habitat programs and school gardens.

Environmental education can help students develop a broad range of skills and supports team teaching and the use of different disciplinary approaches. It also supports a balanced approach to education and the use of developmentally appropriate topics and materials.¹⁰ The ELP Committee recommends the use of national guidelines to ensure that environmental education employs a balanced approach to education with developmentally appropriate materials. More information about the use of national guidelines for environmental education, go to Appendix D.

We are fortunate in this state to have access to a vibrant network of PreK-16 teachers who provide environmental education in classrooms as well as nonformal educators who tailor educational programs to learners of all ages at the state's environmental education centers. The state's network of certified environmental educators and environmental education centers has made North Carolina a leader in the field of environmental education and positions the state to successfully carry out an environmental literacy plan.

Why an Environmental Literacy Plan?

Many schools in North Carolina are incorporating the local environment into their classroom instruction to meet curriculum goals while encouraging systems thinking, real-world problem solving and work readiness skills. The North Carolina Department of Public Instruction has incorporated environmental literacy into its Essential Standards for Science

"In the coming decades, the public will more frequently be called upon to understand complex environmental issues, assess risk, evaluate proposed environmental plans and understand how individual decisions affect the environment at local and global scales. Creating a scientifically informed citizenry requires a concerted, systematic approach to environmental education."
-The National Science Foundation's Advisory Committee for Environmental Research and Education

and Social Studies and recognizes the importance of integrating environmental literacy as an instructional strategy for meeting state and national standards while developing critical thinking and citizenship skills.



The plan will support and align with existing efforts such as North Carolina’s STEM Education Strategy to prepare students for college and the workplace, fully equipped to succeed in the 21st century global, high-skilled, innovation economy while making important decisions that will positively impact public health and environmental quality. The environmental literacy plan supports the STEM Education Strategy’s goals and its three key priorities: to increase STEM achievement, build community understanding and support and to align with public and private resources.¹¹ The environment is a compelling context for teaching STEM because it provides teachers with a diverse range of real-world challenges that engage students in hands-on opportunities to apply and reinforce STEM concepts across multiple subject areas.¹² (See Appendix F for infographic connecting STEM and the environment).

As noted, the intent of the literacy plan is not to add to the workload of our state’s teachers and administrators but to provide a framework to support the integration of environment literacy into the required curriculum and to support schools and teachers who are using the environment to engage students and increase student, teacher and institutional STEM Achievement.

North Carolina school districts will be able to partner with a vast support network of non-profit organizations, natural resource agencies, colleges and universities, environmental education centers and others to develop and evaluate new programs for teacher professional development and capacity building in environmental education. Included would be teacher training institutes, programs providing outdoor experiences for students, new policy approaches for incorporating environmental education into the curriculum at the state or district level, and evaluating the effectiveness of environmental education in improving student achievement. When tied to a coordinated strategy for increasing environmental literacy, these efforts, already existing in many cases, will be part of a larger strategy to increase capacity and infrastructure for environmental literacy in the state.



Benefits of a State Environmental Literacy Plan

Developing a coordinated, strategic environmental literacy plan will help ensure that we are producing graduates who are globally competitive in a 21st century workforce and prepared to work towards a sustainable future for our state. Incorporating the environment into the curriculum improves student achievement, health and nutrition, engages students in learning across core subjects, and better prepares graduates for college and the workforce.

Environment-based learning encourages critical thinking, engage students in hands-on, inquiry-based learning and encourage healthy, active lifestyles while fostering environmental literacy and civic responsibility. In addition to increasing academic achievement, environmental education provides students with the skills to make sound environmental decisions and prepares them to be future leaders and stewards of our natural resources.

Development of the NC Environmental Literacy Plan

The N.C. Department of Public Instruction (DPI) and the Department of Environment and Natural Resources (DENR) entered into a partnership to develop a state environmental literacy plan in fall 2008. The Environmental Literacy Plan (ELP) Working Group, which includes DPI and DENR staff along with stakeholders from the education and environmental communities such as Environmental Educators of N.C. and the N.C. Wildlife Federation, convened for the first time in April 2009 to develop North Carolina's environmental literacy plan. The Working Group has been meeting since that time to determine a framework, develop various components of the plan and to collaborate on environmental literacy initiatives.

Goals and strategies outlined in the N.C. Environmental Literacy Plan align closely with the overarching goals and objectives detailed in the state master plan for environmental education, the *NC Environmental Education Plan*, now in its third edition. The *N.C. Environmental Education Plan* takes an all-encompassing approach to environmental education, focusing on a wide range of audiences including the workforce, community, adults and families as well as children and students. The current edition recommends five statewide goals for environmental education and identifies areas that need strengthening. The plan provides further strategies to improve environmental literacy which were taken into consideration when developing the framework for the N.C. Environmental Literacy Plan. (Appendix E)

North Carolina's Environmental Literacy Plan



Goal of the Environmental Literacy Plan

The goal of the plan is to produce high school graduates who have the ability to make informed decisions about issues that affect shared natural resources while balancing cultural perspectives, the economy, public health and the environment.

To reach this goal, the environmental literacy plan includes three main objectives:

- Objective 1: Show how the state's PreK-12 educational system will prepare students to understand, analyze, and address major environmental challenges facing the state and the nation.
- Objective 2: Provide field experiences as part of the regular school curriculum and create programs that contribute to healthy lifestyles through outdoor recreation and sound nutrition.
- Objective 3: Create opportunities for enhanced and ongoing professional development for teachers that improve their environmental knowledge and skills in teaching students about environmental issues, including the use of interdisciplinary, field-based and research-based learning as well as innovative technology in the classroom.

Components of the Plan

North Carolina's environmental literacy plan is structured into four main components that will enable the state to meet these objectives:

Component 1: Educational Standards

How the state's academic content standards and graduation requirements relate to environmental literacy;

Component 2: Professional Development

Teacher professional development opportunities that should be implemented to support environmental literacy of students;

Component 3: Model School Grounds and Facilities



How model school grounds and facilities will incorporate environmentally responsible practices and provide spaces for interaction with the natural environment; and

Component 4: Measuring Environmental Literacy

How the state will measure the environmental literacy of students.

Strategies for implementing these four components, including securing funding and other necessary support are included as appropriate. *Please note that the strategies for Educational Standards and Professional Development have been combined.

Educational Standards

To be effective, education for environmental literacy needs to be integrated throughout the PreK-12 curriculum in North Carolina's classrooms and include connected, sustained opportunities for students to participate in direct outdoor learning experiences and classroom activities that increase awareness of environmental topics and content knowledge. The Common Core State and N.C. Essential Standards in Science and Social Studies already include some environmental literacy concepts that are infused throughout the K-12 curriculum.

In addition, a course in Earth/Environmental Science is required for high school graduation. This requirement has increased the number of students who are exposed to environmental content and outdoor learning opportunities since its inception in 2000.

Many school districts in North Carolina require high school seniors to complete a graduation project. Many students have successfully chosen to use environmental topics for this project. For those students who choose to take AP Environmental Science and AP Human Geography both contain substantial environmental literacy concepts.

Professional Development

There are many programs available in North Carolina that provide professional development to help educators improve their environmental content knowledge, skill in teaching about environmental issues, and field-based pedagogical skills. These programs often focus on how to incorporate environmental education into the classroom while meeting the state mandated educational standards.

The intent for this plan is not to create new work for already overtaxed teachers, administrators and school systems, but to capitalize on and provide support for the myriad of environmental education resources already available and in use in the state.

North Carolina offers a state certification in environmental education for classroom teachers and nonformal educators. This program utilizes *NAAEE's Guidelines for the Preparation and Professional Development of Environmental Educators* when evaluating instructional workshops for inclusion in the program as quality professional development opportunities.



The program provides educators with content knowledge, field experiences with trained instructors and a wealth of exposure to environmental education resources including educational materials and facilities. Many of the curriculum guides used in the instructional workshops are correlated with the state's requirements for the PreK-12 curriculum and can be used by educators to teach multiple subjects across grade levels.

The Department of Public Instruction has begun offering trainings on the Common Core State and N.C. Essential Standards for nonformal educators to ensure that trainings provided by nonformal educators meet the state standards and assist teachers in incorporating environmental education in multiple disciplines.

The state has more than 200 facilities identified as environmental education centers that provide quality environmental education programming. These centers employ a large number of nonformal educators who provide direct education to students and families as well as professional development for teachers.

STRATEGIES TO SUPPORT EDUCATIONAL STANDARDS AND PROFESSIONAL DEVELOPMENT

The ELP Working Group recognizes that support for environmental literacy within educational standards happens on a variety of levels: the classroom, the school, the school district, and at the state level. As such, recommendations for supporting student environmental literacy at each of those levels are provided for in this plan. Professional development opportunities for teachers are also included at each level. Each strategy outlined below supports one or more of the three overall objectives of the plan.



In the classroom

Below are some strategies that can be applied by educators in and out of the classroom in order to promote environmental literacy.

1. Teachers can integrate content from high quality, proven environmental education materials such as Project WILD, Project WET and Project Learning Tree which have direct correlations to the Common Core State and N.C. State Essential Standards into their curriculum.
2. Teachers can use the environment as a learning context for learning by integrating the environment throughout multiple disciplines.
3. Outdoor field and service learning experiences can be integrated into the regular school curriculum at every grade level.
4. Educators should have access to information on where to seek assistance for a variety of environmental topics in their community, including guest speakers, demonstrations, and materials.

In the School

A supportive school environment will promote environmental literacy across all grade levels and subject areas. Below are some approaches that schools can take in order to promote environmental literacy. Community partners can include non-governmental agencies, parks and recreation departments, colleges and universities, environmental education centers, service clubs and civic organizations.

5. School administrators can support professional development opportunities that increase environmental literacy, especially those programs that offer CEU renewal credits.
6. Schools can encourage extracurricular student academic and/or service-oriented environmental clubs.
7. Schools and community partners can provide opportunities for students to participate in service learning projects and/or internships that relate to the environment and environmental issues.
8. Schools and community partners can promote participation in a variety of environmental competitions, including but not limited to, science fairs, Envirothon, poster and essay contests, Science Olympiad, Blue Heron Bowl, International Earth Science Olympiad, etc.



9. Guidance counselors and Career and Technical Education professionals should be aware of career and college choices that emphasize environmental literacy and the wide variety of environmental careers. They can provide information about a variety of environment-themed two and four year degree programs, internships, and college visitation opportunities.
10. Principals and school administrators can support teacher participation in the N.C. Environmental Education Certification Program by providing incentives for teachers to complete their certification.
11. Teachers and school administrators can take part in professional development opportunities focused on developing school grounds that incorporate natural areas, outdoor classrooms, and instructional leadership.

In the School District

Promoting environmental literacy at the school district level will require developing partnerships and resources that can be shared with all schools.

12. School districts can foster the development of partnerships with local parks, environmental education centers, and universities to provide professional development opportunities, programs, and materials that will increase environmental literacy at the district level. (See the story of Horizons Unlimited under School Snapshots)
13. School districts can establish public/private partnerships to support environmental education coordinators.
14. School districts can support teacher participation in the N.C. Environmental Education Certification Program by providing incentives at the district level.
15. Districts can co-sponsor at least one environmental education professional development opportunity each year with partner organizations.
16. Establish environmental education consultants/coaches at the county or regional level to provide resource support and development and training for classroom teachers.
17. Provide professional development opportunities for teachers and school administrators focused on the development of school grounds



that incorporate natural areas, outdoor classrooms, and instructional leadership for environmental education.

In the State

The Department of Public Instruction (DPI) is making strides towards increasing environmental literacy by serving as a leading partner in the creation of the North Carolina Environmental Literacy Plan. However, additional approaches as outlined below can assist in moving these efforts forward.

18. Create an environmental literacy coordinator position in the K-12 Curriculum, Instruction and Technology division to direct implementation of the Environmental Literacy Plan in partnership with the Department of Environment and Natural Resources.
19. Collaborate with the N.C. Office of Environmental Education and Public Affairs to coordinate and support PreK-12 environmental literacy efforts outside of DPI.
20. Promote partners' efforts to align the K-12 NC Standard Course of Study, Common Core State and N.C. Essential Standards, the Next Generation Science Standards and Foundations for Early Learning documents with the NAAEE PreK-12 Guidelines for Learning, and share these alignments with educators statewide.
21. Develop resources to help teachers access curricula that have been aligned with the essential standards.
22. Recognize, promote, and support other agencies that provide resources regarding current and local environmental data, issues, and solutions.
23. Promote current professional development opportunities, and help develop new training programs for educators that will help meet the state education goals and goals for environmental literacy. Include environmental education and sustainability professional development activities and assessments in the NCDPI Instructional Improvement System.
24. Develop a statewide program to identify, recognize, honor, and provide incentives to schools that are making efforts to increase environmental literacy.
25. Participate in the Green Ribbon Schools program through the U.S. Department of Education and promote other statewide environmental and sustainability related school initiatives.



26. Provide environmental education endorsement or other incentive for teachers to complete their N.C. Environmental Education Certification through the DPI's Licensure Section.
27. Require LEAs to provide at least one environmental education professional development opportunity each year with partner organizations.
28. Establish environmental education resource consultants/coaches at the county or regional level to provide support and training for classroom teachers.
29. Incorporate environmental education concepts and standards in teacher preparation programs.
30. DPI can offer training in the Common Core State and N.C. Essential Standards to nonformal educators.
31. Support the development of North Carolina Center for the Advancement of Teaching (NCCAT) experiences that include environmental education.
32. Provide support for teachers and school administrators focused on the development of school grounds that use natural areas and outdoor classrooms.
33. Incorporate environmental education concepts and standards in teacher preparation programs and support universities and colleges that offer pre-service environmental education curricula.

In Current Graduation Requirements

34. One Earth and/or Environmental Science Course required for graduation.
35. Other courses that contain objectives that relate to environmental literacy are required including Civics and Economics/US History I and II/World History.
36. Students may choose a project related to the environment if their district requires a Graduation Project.
37. Students may choose to complete service related to an environmental issue in districts that require community service for graduation.



In Nonformal Education Opportunities

Environmental literacy is dependent upon both formal and nonformal education opportunities. Nonformal learning opportunities are those that occur outside the formal K-12 education system, often at museums, parks, nature centers or other environmental education centers. In addition to programming for school groups, nonformal educators provide educational opportunities and outdoors experiences for adults and families with preschool aged children.

38. Schools can utilize North Carolina's network of more than 200 environmental education centers as places to find environmental education resources, professional development, school programs, environmental educators and as places to take students and families.
39. Environmental education centers and other program providers will correlate their environmental education programming to the Common Core State and N.C. Essential Standards.
40. Ensure that nonformal educators are highly trained in science and environmental issue investigation to provide students and teachers with a high-quality, rigorous experience.
41. Provide training for nonformal educators in assessment and evaluation of environmental education programs as outlined in the NAAEE Guidelines for Excellence.
42. Support the development of North Carolina Center for the Advancement of Teaching (NCCAT) experiences that include environmental education.
43. Invite teacher participation in annual environmental education conferences and symposia.
44. Environmental education centers can provide professional development opportunities for teachers and school administrators focused on the development of school grounds that use natural areas, outdoor classrooms, and instructional leadership for environmental education.
45. Provide in-school programs and support materials that are made available to teachers.
46. Provide follow-up support to supplementary environmental education program workshops to help teachers implement those programs in the schools.

Model School Grounds and Facilities



Provide strategies for how school facilities and grounds will incorporate environmentally sensitive practices, and provide opportunities for students to get outdoors and connect with the natural world.

School grounds and facilities are an essential part of the effort to increase the environmental literacy of students. Schools are real-life models for sustainable living practices and they demonstrate how technology and innovative planning can be used to reduce a school's environmental footprint.

Many school systems in North Carolina are adopting practices that reduce energy consumption from more energy efficient lighting to the installation of solar panels and wind turbines. These sustainable practices will save schools money over time and have the potential to improve student health and academic performance.

Agencies at the county, city and state level are also looking for ways new school construction and school renovation can meet "green building" design requirements. Many of the state's public schools have already incorporated green building techniques and features. Several new schools have obtained LEED certification, the U.S. Green Building Council's Leadership in Energy and Environmental Design program that certifies buildings are built to specific performance standards.

In addition to incorporating environmentally sensitive practices, schools can use their grounds to provide opportunities for students to learn about the local environment and to use it to study multiple disciplines. It also helps to create a sense of place for students and fosters skills necessary for stewardship of our natural resources.

North Carolina is experiencing a resurgence of interest in creating outdoor learning areas on school grounds. These "outdoor classrooms" include restored natural habitats, gardens, bogs, amphitheatres and other natural learning areas. There are numerous nationwide efforts to connect children to the outdoors, but lack of time and funding for school field trips and limited access to natural play areas has contributed to the rise of innovative natural learning areas on school grounds across the state. "Green schools" and outdoor classrooms can make the study of the environment real and engaging for students. Schools are also taking advantage of nearby creeks,



woods and other natural areas to engage students in learning science and other subjects while experiencing the local environment first-hand.

As part of their outdoor learning areas, schools are creating demonstration sites such as projects that manage stormwater runoff. These projects not only serve to educate students about the environment, they help protect ecosystems and reduce pollution on school grounds. Outdoor spaces can be used as “living laboratories” for STEM based problem solving and Citizen Science programs that provide real world connections and the use of authentic data.

North Carolina was named the tenth most obese state in the country, according to the seventh annual *F as in Fat: How Obesity Threatens America's Future 2010* report from the Trust for America's Health and the Robert Wood Johnson Foundation. In addition, 18.6 percent of children were found to be obese with the state ranking 11th out of the 50 states and D.C. for childhood obesity.¹³ The Centers for Disease Control and Prevention recommend that children have 60 minutes of physical activity a day. Outdoor spaces that are designed to offer engaging play experiences and opportunities for children to move can encourage physical activity.¹⁴

Gardens on school grounds can be used to teach students about healthy lifestyles and nutrition. These gardens can emphasize the connection between how our food is grown and the nutritional benefits of healthy eating habits.

Model school grounds and facilities present wonderful opportunities for innovative partnerships between schools and local organizations, civic groups and PTAs and they also build community involvement. Energy efficiency and other sustainability efforts provide potential money savings to the school system while modeling sustainable living practices and providing an educational opportunity for students.

Strategies to support Model School Grounds and Facilities:



1. Design site plan for new/renovated schools and recommendations for existing schools that encourage and support experiential outdoor education using the following principles:
 - *Use native plants when possible*
 - *Restore natural habitats and create wildlife habitats (bird blinds, bird feeders, bat boxes)*
 - *Provide areas for unstructured play and exploration*
 - *Create gardens and other natural learning areas*
 - *Use demonstration projects that enhance environmental quality (stormwater management, erosion control)*
 - *Encourage healthy lifestyles including physical activity and good nutrition*
 - *Create outdoor gathering spaces*
 - *Use model green schools program guidelines*
 - *Provide a maintenance plan and plans for protecting outdoor learning areas from vandalism*
 - *Provide training to address safety issues with going outdoors*
2. Operate school buildings in an environmentally sensitive and sustainable manner, including a focus on:
 - *Energy*
 - *Water*
 - *Air quality*
 - *Waste*
 - *Access to outdoor spaces*
 - *Views to outside and use of natural light in classrooms*
3. Provide incentives for school systems to adopt the most current sustainable building practices for new and existing buildings using LEED guidelines (U.S. Green Building Council's Leadership in Energy and Environmental Design program)
 - *Support the U.S. Department of Education's Green Ribbon Schools program*
 - *Work with the N.C. Department of Public Instruction and local administrators to gain support*



- *Partner with city, county and state environmental management agencies*
 - *Develop school policies that support sustainability*
 - *Identify funding sources*
4. Increase the number of schools that create learning areas on their school grounds
 - *Promote model schools*
 - *Engage science clubs and student groups*
 - *Establish mentoring programs*
 - *Identify funding for projects*
 5. Develop partnerships with community organizations to support school ground improvements for environmental literacy. Possible partners include:
 - *PTAs*
 - *Local, city and state government agencies*
 - *Private industry*
 - *Environmental Education Centers*
 - *Non-profits (Zoo Society, Grandfather Mtn., Audubon)*
 - *N.C. Department of Transportation's Safe Routes to School program*
 6. Encourage teachers to use existing woods, wetlands, creeks and other natural areas on or near their schools for teaching across disciplines.
 7. Encourage participation in established programs and create new programs as appropriate that enhance outdoor learning environments for students of all ages such as UTOTES (Using the Outdoors to Teach Experiential Sciences), WILD School Sites, etc.
 8. Promote instructional ties to outdoor learning areas including, but not limited to:
 - *Student service learning*
 - *Integration across content areas*
 - *Safety education*
 - *Healthy lifestyles and physical activity*
 - *Nutrition*
 - *Use principles of place-based education*
 - *Project Based Learning*
 - *Citizen Science*

- *STEM Initiatives*



Measuring Environmental Literacy

There are a number of different methods to assess environmental literacy. The purpose of this section of the plan is to explore possible assessment strategies that make sense for North Carolina. Identifying techniques to measure environmental literacy including traditional assessments, counts of student participation or performance, or other mechanisms will be an ongoing process in partnership with the state education agency.

Upon graduation from a North Carolina public high school, students should be able to demonstrate at least a functional level of environmental literacy, meaning that students should have the ability to focus application of knowledge and skills on specific environmental issues. There are a variety of strategies that should be investigated to measure the four main components of environmental literacy: knowledge, affect, skills, and participation. It is important to identify a wide range of potential assessments and to incorporate and emphasize authentic assessments such as local water quality or air quality projects as much as possible. It may be necessary to implement a multifaceted approach including different projects and assessments over the course of students' school careers to effectively measure their level of environmental literacy. The resulting product may be a K-12 Environmental Literacy portfolio in which students collect projects, reflections on field trips and outdoor experiences, or laboratory and data analysis activities that they take with them from grade to grade. Students may also add evidence of trips to state parks or environmental centers that they take with their family or groups like Girl Scouts. The final project could be a personal history and reflection on environmental issues and activities that students experience during their K-12 education.

NAAEE's Guidelines for Learning (K-12) can be used to structure and evaluate environmental education programs and materials. The guidelines can be viewed as national standards for environmental literacy and support state and local environmental education efforts.

The NAAEE *Guidelines for Learning (K-12)* are organized into four strands



and provide a baseline for the knowledge and skills that students should have to be environmentally literate. These guidelines also stress age-appropriate topics. See Appendix F for strand descriptions.

The ELP Working Group supports the national *Guidelines for Excellence* as a comprehensive content and skills learning framework for environmental literacy. Environmentally literate students, upon graduation from twelfth grade, will demonstrate proficiency in each of these strand areas, with evidence that these proficiencies were acquired, at least in part, through outdoor experiences.

POSSIBLE STRATEGIES AND DATA FOR MEASURING ENVIRONMENTAL LITERACY:

Environmental Attitudes & Behavior

1. Data that target environmentally responsible behaviors (recycling statistics, use of public transportation, participation in programs like the SmartCommute challenge; energy consumption rates) will be useful in establishing a baseline of literacy. The first step would be to provide a baseline of environmental literacy. This data will help establish long term success of the plan across a student's school career.
2. Long-term success will also mean that air, water, land quality, and energy consumption in general will improve. State and federal water and air quality standards, the number of LEED certified buildings, and the growing body of environmentally based behaviors research can be used for documentation support.
3. Student participation in Envirothon, Ocean Bowl, and other environment-related competitions on a yearly basis.
4. Student participation in science fairs and research competitions with projects that focus on an environmental issue.
5. Student participation in senior projects that focus on an environmental topic is one way schools can assess their progress.
6. Student participation in service learning projects that focus on environmental issues (including projects in vocational classes such as hybrid car conversions or LEED building projects).



7. Enrollment and pass rates in State Common Core and NC Essential Standards “green technologies” vocational education classes where offered.
8. Number of proposed college majors related to environmental fields such as environmental science, environmental engineering, public health, construction technologies, natural resources and resource management, emerging technologies, geographic information sciences, forestry, public policy, and economics.
9. Number of students graduating from post-secondary schools in “green” career fields.
10. North Carolina data from U.S. Fish and Wildlife Service Annual Survey that measures involvement in wildlife-related outdoor activities.
11. Participation in nonformal education experiences at environmental education centers that are integrated in the school curriculum.
12. Implementation of environmental education activities in classrooms after teacher participation in environmental education professional development.
13. Number of classroom teachers enrolled and certified in the N.C. Environmental Education Certification Program.
14. Downloads or website hits of activities that include experiential, field based work on the school grounds or in the school classroom from DPI toolkits, other state agencies or LEAs.
15. Amount of time students spend outside engaging with nature as part of the school curriculum as recorded by teachers and supported by lesson plans could be included as part of a baseline survey.

Environmental Knowledge/Skills

16. Pass rate for questions related to standards/objectives aligned with environmental literacy from currently required End Of Grade(EOG)/End Of Course (EOC) tests.
 - *5th grade Science EOG*
 - *8th Grade Science EOG*
 - *Biology EOC*
 - *Measures of Student Learning will be implemented*



17. Provide feedback to Accountability staff on Environmental Literacy Plan and find ways to develop new or pull out existing assessment items that tie directly to environmental literacy.
18. Pass rate per goal for standards aligned with environmental literacy using DPI's Goal Summaries for school, district, and state.
19. Use data from North Carolina State University's baseline assessment of environmental literacy in 6th & 8th grade. Support subsequent assessments using the MSELs: Middle school Environmental Literacy Survey developed by the National Environmental Literacy Assessment.
20. Number of students enrolled, testing and pass rates from AP Environmental Science and AP Human Geography test scores (3, 4, 5's), where offered.

Access to Quality Outdoor Learning Environments

21. Number of schools that have quality outdoor learning environments such as schoolyard habitats, wild school sites, outdoor classrooms and other natural areas.
22. Number of schools that practice sustainability initiatives at schools such as water conservation, recycling, composting, etc.
23. Number of Green Schools/Model EE Schools identified in North Carolina.

Recommendations

- Establish a funding source potentially from a percentage of the Department of Environment and Natural Resources' environmental fines and penalties to provide grants to schools and their communities for environmental literacy efforts.
- Establish a state-level incentive through the Department of Public Instruction for teachers to complete the N.C. Environmental Education Certification Program.
- Participate in the U.S. Department of Education's Green Ribbon Schools program and establish a committee representing public

education, environmental education, school grounds and safety and health and nutrition interests.

- Determine a baseline of environmental literacy and establish a process for subsequent follow-up assessments.



School Snapshots

CW Stanford Middle School, Chapel Hill, N.C.



CW Stanford Middle School needed an outdoor, hands-on learning space. The Town of Hillsborough and Orange County needed to reduce stormwater runoff pollution from developed areas. When the two ideas merged, a simple classroom became an “eco-classroom” where students learn outside while improving water quality. Eighth grade science teacher Eric McDuffie developed the idea of an outdoor classroom where he could augment the science curriculum. Through a collaborative process with Orange County resource specialists, other teachers and school administrators, Eric’s idea became a reality. The outdoor classroom includes an amphitheater built by high school students in a small wooded area along a creek between the two campuses. During the process a problem with stormwater runoff created from the construction of both CW Stanford Middle and Orange High Schools that was negatively impacting the creek became apparent. The group received approval from the school board to submit a grant to the NC Clean Water Management Trust Fund and the school district received a \$355,000 grant. The grant is being used



to design and construct stormwater “retro-fits” to reduce the impact from stormwater runoff. The project has successfully engaged students, teachers and the local community in a multi-discipline, curriculum-based, “hands-on” learning experience centered on the local environment. It has instilled a sense of ownership by incorporating the eco-classroom into all grade levels and subject areas beginning from the sixth grade students to the twelfth grade students. It has allowed students and teachers to collaborate with local government staff, parents, civic groups and other community members to increase environmental awareness, stimulate creativity and promote community citizenship.

Evergreen Community Charter School, Asheville, N.C.



Evergreen Community Charter School is a dynamic and innovative public charter school helping serve both the educational and environmental needs of Asheville and Buncombe Counties. Open to all students in grades K through 8, Evergreen offers small class sizes and an experiential, environmentally-focused curriculum. The New Essential Standards for North Carolina are taught through learning “expeditions,” broad topics that connect academic subjects to real world experiences in ways that engage and excite student learners. The school doesn’t use standard textbooks, and builds in additional environmental and service learning components throughout the curriculum. Students participate in frequent outdoor activities, ranging from backpacking and camping to bird counts, river trips and stream clean-ups. Rock climbing begins in the first grade and

culminates with the pinnacle Outward Bound experience in the eighth grade. Environmental topics and lessons are included in every subject and grade level at Evergreen, which has produced outstanding results in science instruction: Evergreen recently received the state designation of Honor School of Excellence for the second consecutive school year, in 2010, 100% of eighth graders passed the Science End-of-grade test, and in the 2011 school year, 100% of Algebra students passed the End-of-Course test.

The entire school community at Evergreen participates in local conservation efforts both on and off campus. School-wide initiatives include waste-free lunches, a comprehensive recycling program, vermi-composting and the use of biodiesel activity buses for transportation. The school incorporates sustainability into the curriculum using campus water and energy saving practices, rooftop solar panels, a school weather station, hoop house and organic garden, cob and straw bale structures and rain gardens in the parking lot to clean storm water run-off. Evergreen's holistic approach to education produces outstanding academic results while helping to grow responsible citizens who will care deeply and take action for the future of our local and global communities.



Asheboro High School Zoo School



The AHS Zoo School is a science focused program for 80 to 100 tenth, eleventh, and twelfth grade students who want to experience high school differently. Learning takes place in a real-life setting on the grounds of the North Carolina Zoo... one of the world's largest natural habitat zoos. Students have unprecedented access to a 1500 acre world-class facility ideal for environmental and biological exploration. Beyond science, the zoo offers relevant experiences in marketing, retail, hospitality, art and much more.

Science holds a wide array of interests for many students and the importance of science in our global society cannot be ignored. In preparing for life in the 21st century, students often find science to be a key to various career opportunities... and, it's just plain FUN! The science focus is integrated across the curriculum, including social studies, English and mathematics. Students develop their critical thinking skills in a variety of ways, ultimately creating a unique platform for understanding important environmental issues.

Southwest Guilford High School, High Point, N.C.



Students in Ms. Haith's *AP Human Geography* class presented site development plans to officials from the City of High Point, Planning & Development Department, Ms. Heidi Galanti and Mr. Doug Loveland. They developed selected sites and presented plans for future development to officials. The challenge was for students to consider applicable plans, zoning, standards for development, environmental regulations, the physical characteristics of the sites, and to utilize sustainability principles. They used comprehensive planning tools and land development controls to layout the sites in detail.



Horizons Unlimited

Salisbury, North Carolina

Horizons Unlimited is owned and operated by the Rowan-Salisbury School System in Salisbury, North Carolina. More than 25,000 students are served each year in programs designed to engage students in real-world science, technology, engineering and mathematics (STEM) education. All programs are aligned with the NC Common Core and Essential Standards, as well as the National Science Standards.

Environmental Education is a high priority focus of the Horizons Unlimited mission. The North Carolina Wildlife Resources Commission, Duke Energy, and Horizons Unlimited partnered more than 10 years ago to develop a unique environmental education field station located at Buck Steam Station on the Yadkin River. This 600-acre site has been designated as a N.C. WILD Education Site. It is used to encourage student participation in research and to create opportunities for positive, responsible interaction with the environment.

Horizons Unlimited also manages an on-site study area. Nature trails and boardwalks allow students to explore a 34-acre wetland that is rarely found in the inner Piedmont region of North Carolina. Steep slopes support oak-hickory and other mesic hardwood forest communities. This area is recognized in the N.C. Registry of Natural Heritage Areas for outstanding natural values.

The Catawba College Center for the Environment and Horizons Unlimited partner to provide a program for students interested in Environmental Education Certification, administered through the Office of Environmental Education and Public Affairs. Student internships also provide opportunities for students in higher education to work with experienced environmental educators to gain experience with students and to learn effective teaching strategies and program design for environmental education.



APPENDIX A

N.C. Environmental Literacy Plan Working Group Members

Members of the NC Environmental Literacy Plan Working Group represent a broad array of interests from the education and environmental communities. The following individuals representing DENR, DPI, EENC, NCAEEC, higher education, teacher education, teachers, environmental non-profits and other stakeholder groups have dedicated a significant portion of volunteer time to this effort:

Patrick Curley, EdD	Onslow County Schools
Tim Gestwicki	N.C. Wildlife Federation
Fay Gore	N.C. Department of Public Instruction
Dana Haine	UNC-Chapel Hill Institute for the Environment
Christina Hester	N.C. Association of EE Centers Harris Lake County Park
Sean Higgins	North Carolina State Parks
Tammy Howard	N.C. Department of Public Instruction
Shelby Laird	Environmental Educators of NC
Laurell Malone	N.C. Central University School of Education
Margaret Martin	N.C. Wildlife Resources Commission
Janet McGinnis	Education Consultant
Robin Moore	Natural Learning Initiative
Jesse Pope	N.C. Association of EE Centers Grandfather Mountain Stewardship Foundation
Lisa Rhoades	N.C. Science, Mathematics and Technology Education Center
Tracey Ritchie	N.C. Office of Environmental Education and Public Affairs
Tom Shepherd	Piedmont Environmental Center
Peggy Sloan	N.C. Aquarium at Fort Fisher
Renee Strnad	N.C. Project Learning Tree
Anne Taylor	Environmental Education Fund
Lisa Tolley	N.C. Office of Environmental Education & Public Affairs
Beverly Vance	N.C. Department of Public Instruction, Science
DeeDee Whitaker	Southwest Guilford High School
Marty Wiggins	N.C. Office of Environmental Education & Public Affairs



Andy Wood
Sarah Yelton

Audubon North Carolina
UNC – Chapel Hill Institute for the Environment



APPENDIX B

Reviewers of the NC Environmental Literacy Plan

Many thanks to all those volunteers who dedicated their time to reviewing this document and providing thoughtful comment.

Cynthia Cudaback, PhD	Ocean And You
Katherine J Revels	Retired teacher
Lois Nixon	Certified Environmental Educator, EENC (Environmental Educators of N.C. Board Member
Cheston Saunders	University of North Carolina Wilmington
Sheila Jones	EENC / Wake Soil and Water Conservation District
Sandy Ruble	EENC
Daniel Smith	NCCU School Administration Graduate
Student	
Jonathan Navarro	Division of Air Quality (NC DENR)
Johnetta Floyd	NCCU Graduate Program
Rosanne W. Fortner	COSEE (Centers for Ocean Sciences Education Excellence)
Bianca Howard	City of Raleigh Solid Waste Services Department
William Moore	Cape Fear Natural Science Academy
Dr. Ken Gracz	T. Wingate Andrews High School
Jim Simons	State Geologist
Robert E. Tufts	Avery County Schools
Sherri P. Spangler-Herman	North Carolina Teacher/Mid-Atlantic Marine Science and National Writing Project
Sandra Doyle	Isaac Dickson School in Asheville City School System
Robert Halpern	NCSTA Administrator, NCSAS Administrator, Work in regional and state science fairs
Keith Bamberger	EENC Board, Employee of N.C. Division of Air Quality
Daniel Prestwood	Gateway School (Caldwell County Schools)
Kerry Piper	Northern Vance High School
Shelby Salley	Graduate Student in Curriculum, Instruction, & Supervision t the Watson School of Education at UNC-W
Frank W. Heath	Assistant Superintendent, ECPPS (Elizabeth City Pasquotank Public Schools)



Susanne Morais
Scott Kyles

Melanie Billings

Fred Beyer
Heather Soja

North Carolina State University
Science Teacher, North Surry High School,
Surry County Schools
North Surry High School Science
Department Chair
Earth Science Education Consultant
Asheboro High School Zoo School



APPENDIX C

Process for Defining Environmental Literacy in North Carolina

The ELP Working Group reviewed many definitions of environmental literacy in developing a definition for North Carolina's Environmental Literacy Plan, with special attention to the *N.C. Environmental Education Plan, 3rd Edition*, written by the N.C. Office of Environmental Education and Public Affairs, and UNESCO's Tbilisi Declaration of 1977. Other environmental literacy definitions considered were the EPA Office of Environmental Education, NAAEE's *Guidelines for Excellence* documents, the Campaign for Environmental Literacy, the Environmental Education and Training Partnership (EETAP), Maryland's *Environmental Literacy Plan Draft Executive Summary*, Connecticut's *Environmental Literacy Plan – A Case for Support*, and Nevada's *Creating A Road Map To Environmental Literacy*. The ELP Working Group realized that the various elements of the state's plan would reference its definition of environmental literacy, thus it was essential that each part of the definition be objective, specific and measurable.



APPENDIX D

NAAEE Guidelines for Learning (K-12)

The National Project for Excellence in Environmental Education, initiated by The North American Association for Environmental Education (NAAEE) has developed a set of guidelines that can be used to structure and evaluate environmental education programs and materials. The guidelines can be viewed as national standards for environmental literacy. The guidelines support state and local environmental education efforts by:

- o Setting expectations for performance and achievement in fourth, eighth, and twelfth grades;
- o Suggesting a framework for effective and comprehensive environmental education programs and curricula;
- o Demonstrating how environmental education can be used to meet standards set by the traditional disciplines and to give students opportunities to synthesize knowledge and experience across disciplines; and
- o Defining the aims of environmental education.

The NAAEE Guidelines for Learning (K-12) are organized into four strands and provide a baseline for the knowledge and skills that students should have to be environmentally literate. These guidelines also stress age-appropriate topics. The strands are:

1. Questioning, Analysis, and Interpretation Skills
Learners should be able to ask questions, speculate, and hypothesize about the world around them, seek information, and develop answers to their questions. Learners should be familiar with inquiry, master fundamental skills for gathering and organizing information, and interpret and synthesize information to develop and communicate explanations.
2. Knowledge of Environmental Processes and Systems

Learners should understand the processes and systems that comprise the environment, including human social systems and influences. That understanding is based on knowledge synthesized from across traditional disciplines and includes a base knowledge of Earth as a physical system, the living environment, humans and their societies, and the relationship between environment and society.



3. **Skills for Understanding and Addressing Environmental Issues**
Skills and knowledge are refined and applied in the context of real-life environmental issues where differing viewpoints about environmental problems and their potential solutions are played out. Environmental literacy includes the abilities to define, learn about, evaluate and act on environmental issues and requires that students possess skills for analyzing and investigating environmental issues and decision-making and citizenship skills.

4. **Personal and Civic Responsibility**
Environmental literate citizens are willing and able to act on their own conclusions about what should be done to ensure environmental quality. Learners understand that what they do individually and in groups can make a difference.



APPENDIX E

Relationship to the NC Environmental Education Plan

The *NC Environmental Education Plan*, now in its third edition, provides goals and objectives for environmental education in North Carolina and strategies for reaching those goals. It takes an all-encompassing approach to environmental education, focusing on a wide range of audiences including the workforce, community, adults and families as well as children and students. The current edition recommends five statewide goals for environmental education:

- Goal 1:** *Increase public participation in environmental awareness and education opportunities.*
- Goal 2:** *Strengthen the environmental education profession, elevate the status of environmental education professionals and improve the quality of environmental education materials and programs.*
- Goal 3:** *Strengthen North Carolina's ability to provide sustainable and comprehensive environmental education programs.*
- Goal 4:** *Increase the number of educators and students who receive environmental education.*
- Goal 5:** *Increase the environmental literacy of adults.*

It also identifies areas that need strengthening. The plan provides further strategies to improve environmental literacy.

The development and implementation of the NC Environmental Literacy Plan will help achieve several of the goals outlined in the NC Environmental Education Plan and is specifically mentioned as a strategy for Goal 4, Objective 4.1: *Integrate environmental education into PreK-12, college and university curricula.* In addition, the NC Environmental Literacy Plan meets objectives and strategies outlined in Goals 2, 3 and 4 including:

Objective 2.2: Increase the number of students pursuing environmental careers and strive for more cultural, economic and geographical diversity among those students.

Objective 2.3: Increase awareness of and the use of environmental education professional standards for North Carolina educators.

Objective 3.1 Increase the number of leaders and organizations that provide quality environmental education across the state.

Objective 3.2: Assess and evaluate environmental education and environmental literacy in North Carolina.

Objective 3.3: Increase funding for environmental education.

Objective 4.2: Increase opportunities for preservice teachers to be trained in environmental education pedagogy and to learn appropriate outdoor teaching techniques.

Objective 4.3: Increase participation of PreK-12 educators in environmental education professional development programs.

Objective 4.4: Increase access to quality environmental education resources.



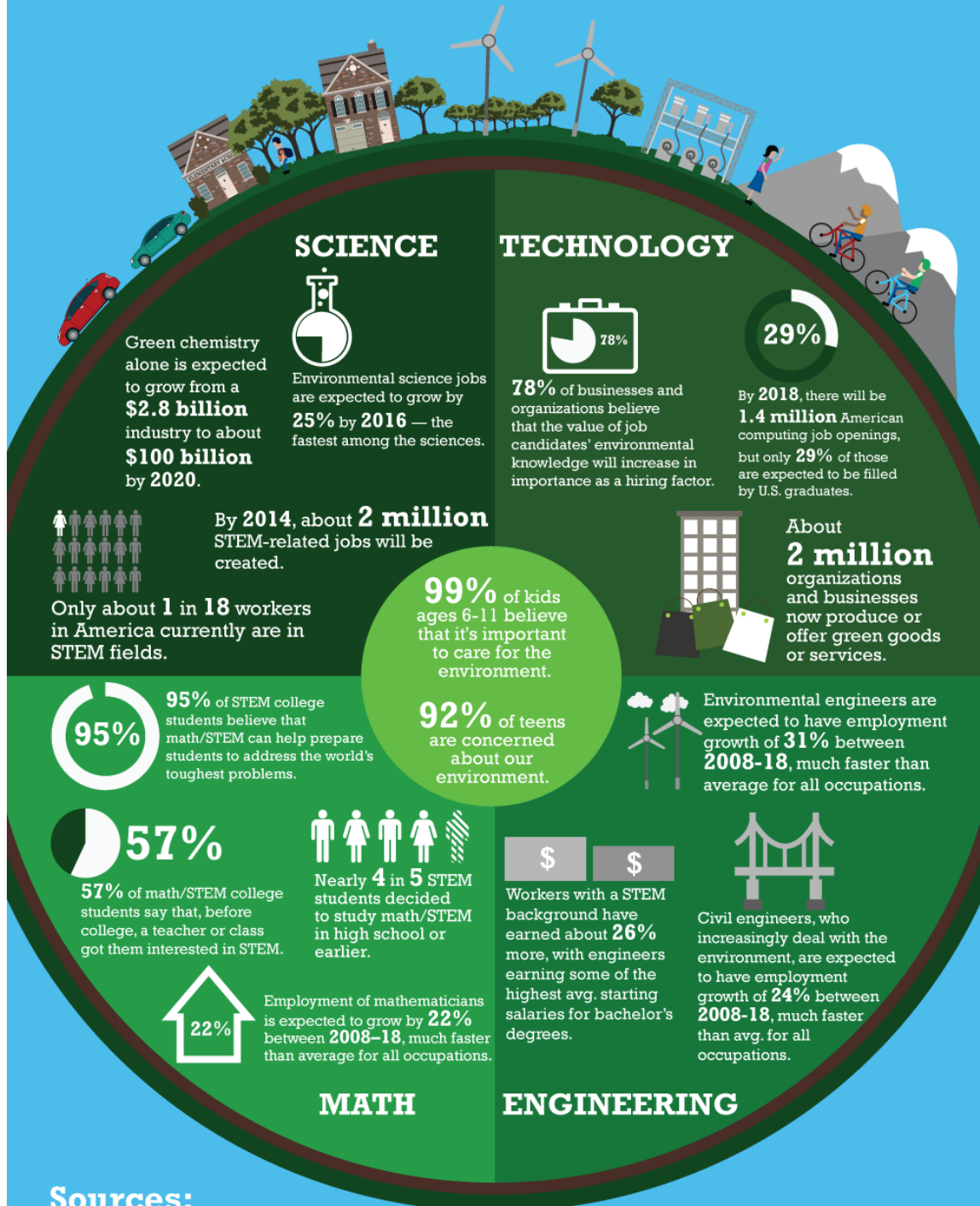
APPENDIX F

STEM & OUR PLANET



STEM & Our Planet

The environment is a compelling context for teaching and engaging today's students in science, technology, engineering and math (STEM).



Sources:

Boys & Girls Clubs of America
 Bureau of Labor Statistics, U.S. Dept. of Labor
 Business & Environment Program of NEEF
 Economics and Statistics Administration, U.S. Dept. of Commerce
 Harris Interactive

Kelton Research
 National Center for Women & Information Technology
 NC STEM Community Collaborative
 Pike Research
 Rutgers, The State University of New Jersey

Find out more: www.eeweek.org

From National Environmental Education Foundation. <http://www.neefusa.org>

ENDNOTES



- ¹ State Board of Education/Department of Public Instruction: Career and Technical Education. *North Carolina Career and Technical Education Planning Guide*. 2012. (Download at <http://www.ncpublicschools.org/docs/cte/standards/2012cteplanning.pdf>)
- ² Maryland Partnership for Children in Nature Environmental Literacy Plan.
- ³ The National Environmental Education and Training Foundation. *Environmental Literacy in America: What Ten Years of NEETF/Roper Research and Related Studies Say About Environmental Literacy in the United States*. Kevin Coyle. September 2005. Washington D.C.
- ⁴The National Environmental Education Advisory Council. *Setting the Standard, Measuring Success, Celebrating Successes: A Report to Congress on the Status of Environmental Education in the United States*. March 2005. p. 10.
- ⁵The Environmental Education Plan. 2010. N.C. Office of Environmental Education.
- ⁶ UNESCO. *Final Report: Intergovernmental Conference on Environmental Education organized by UNESCO in cooperation with UNEP, Tbilisi, USSR, 14-26 October 1977*. Paris: UNESCO, 1977.
- ⁷ *Are We Building Environmental Literacy? A Report of the Independent Commission on Environmental Education*. The Marshall Institute. <http://www.marshall.org/article.php?id=10>
- ⁸ State Education and Environment Roundtable. *Closing the Achievement Gap: Using the Environment as an Integrating Context for Learning*. Gerald A. Lieberman and Linda L. Hoody. 1998. Science Wizards: Poway, Calif. (Download at <http://www.seer.org/extras/excsu.pdf>)
- ⁹North American Association for Environmental Education. *Excellence in Environmental Education: Guidelines for Learning (PreK-12)*. (Download at <http://resources.spaces3.com/47edc444-7bd4-4093-918b-7964644cce75.pdf>)



¹⁰ Advancing Education Through Environmental Literacy. Michele L. Archie. 2003. Association for Supervision and Curriculum Development. Alexandria, VA.

¹¹ NC STEM Education Strategy
https://www.ncstem.org/sites/default/files/STEM_Strategy_NC_WORKING_Draft_v1%2021-1.pdf

¹² *STEM & Our Planet*. National Environmental Education Foundation.
<http://www.neefusa.org>

¹³ *F as in Fat: How Obesity Threatens America's Future 2010*. Trust for America's Health. <http://healthyamericans.org/reports/obesity2010>

¹⁴ ^{Move} *More North Carolina: A Guide to Creating Active Outdoor Play Spaces*. Eat Smart Move More North Carolina.
www.EatSmartMoveMoreNC.com