Going Green in Anne Arundel County Public Schools

Pillar 3: Environmental and Sustainability Education

Environmental Literacy Requirement

In 2010, Maryland became the first state in the nation to implement an environmental literacy high school graduation requirement. In 2011, the Maryland State Department of Education (MSDE) instituted Environmental Literacy Curriculum Standards Pre-K through 12 to be fulfilled by local education agencies. In 2013, Anne Arundel County Public Schools (AACPS) passed the Sustainability Policy that includes environmental literacy education. Long before these policies, environmental education was an important part of AACPS. Since 1971, AACPS's Arlington Echo Outdoor Education Center and other local non-profit environmental education providers have given AACPS students opportunities to learn outdoors about their local environment.

Environmental Literacy Curriculum

Environmental Literacy in AACPS is integrated throughout the pre-K through high school curriculum. Through interdisciplinary learning activities in their regular curriculum courses, both in the classroom and outdoors, students investigate their local environment, environmental systems, and sustainability. Outdoor learning is a required part of the student experience. Environmental Literacy standards align and integrate with Next Generation Science Standards, Social Studies C3, Common Core as well as the cultural arts. Together with STEM learning and our requirement of student action, environmental literacy/education creates engaging learning experiences and is a key part of AACPS.

Grade	Description of Environmental Literacy Grade Level Units
PK	**What's the Trouble with Trash?** Students learn about trash, landfills, and litter on land and water. Students learn to recycle at school and home, not to litter and to clean up litter (with adult help). Outdoor learning takes place at school. Students take action by hosting a recycling picnic at school for family members to share what they have learned.
K	**Why are Trees Terrific?** Students use outdoor experiences to identify plant needs, the parts of a tree and natural resources. Students engage in a field experience and learn about forest ecology, that trees protect water quality and provide food and homes for living things. Integrated as part of the regular curriculum throughout the year, students continue to use trees as a basis for learning about natural resources, including taking action by planting and caring for a tree.
1	**How Can We Help The Monarch Butterfly?** Students investigate and take action on issues related to Monarch butterflies. Students care for and observe Monarch caterpillars and study Monarch habitat needs, migration and causes of Monarch population decline. Outdoor learning takes place at school. Students take action by tagging/releasing the butterflies and by maintaining schoolyard Monarch gardens.

2	**How Can We Improve Wildlife Habitats?** Students conduct research on local and global habitats and the human impact on them. Outdoor learning takes place at school. Students take action by propagating native plants for use at home.
3	**How Cool is Composting?** Students compost at school and learn that composting reduces the amount of waste entering landfills. Outdoor learning takes place at school. Students take action by informing others about the environmental benefits of composting.
4	**How Has Human Activity Affected Maryland's Living Things?** Students investigate the human impact on climate, land, water, and living things. Students conduct investigations/collect data through their science curriculum and field experience to complete project based learning action projects. Students conduct background research, investigate and collect data, and analyze and take actions back at school. Students learn and understand issues affecting the Chesapeake Bay and how they can make a difference.
5	**How Do We Make Our School Greener?** Students work to acquire or maintain MAEOE Maryland Green School status by conducting audits on energy, water, waste or transportation. Students take action to reduce resource use at school and conduct a second audit to assess the success of their efforts.
6	**How Do We Use The Chesapeake Bay Sustainably?** Through the ecology of Chesapeake Bay species and restoration projects, students examine the human interaction with the environment including policy, economics, and historical significance in addition to stormwater runoff, the biology of living things, restoration, and pollution. Students participate in a field experience and action projects depending on the project for their school. All projects use water quality and environmental issues affecting living things to investigate the Chesapeake Bay.
7	**How Can You Make A Difference?** Students investigate the impact of human population growth on the availability of natural resources and environmental quality. Students use a Green School Report Card to evaluate their school. Students make personal choices to make positive environmental changes at school and in their community.
8	**How Are Humans Affecting Our Global Environment?** Students investigate the causes and effects of environmental change. Students work in cooperative groups to research one of the ways that humans impact the natural change process. Students learn about global issues such as climate change and invasive species.
Biology	**How Have Human Activities Impacted Biodiversity?** Students analyze manmade and human features in the environment on school grounds, and determine if these features promote effect surrounding aquatic ecosystems. Students conduct a Bioblitz on school grounds, select one human activity, and analyze the impact of this human activity on the environment and biodiversity. Students design a solution to reduce the negative effects on environment and biodiversity.
Government	**How should federal, state, and local governments collaborate to create policies to protect ecosystems like the Chesapeake Bay?** Students investigative the interaction of government and non-government agencies on environmental issues. Students examine the Federal government's influence on nationwide environmental issues, the Chesapeake Bay region and Maryland. Students consider the actions and influence of state and local governments and non-governmental entities influence on government action and public opinion. Students present their findings to inform the public, persuade government action, or add support to non-governmental entities.
Health	Students investigate how the changes in the environment affect health. They examine how global climate change effects the spread of infectious disease and how the environment influences the emergence of disease.

6th Family & Consumer Science	Students investigate the green movement's impact on the fashion industry and present research on a chosen topic.

Assessments
Assessment in the AACPS Environmental Literacy curriculum takes many forms. Elementary assessments include projects or products such as journal entries, drawings, maps, or models. Assessment at this level also includes teacher observation of student attitudes and student participation in activities such as classroom discussion, recycling, tree planting or composting. Assessment of environmental literacy learning at the middle and high school levels is integrated into course assessments such as tests and projects.

Additional Environmental Opportunities
In addition to the environmental learning and projects listed above, which are embedded into the curriculum for all students, there are additional opportunities for students to investigate and take action on local environmental issues. Through our Terrapin Connections program, students in 80 classrooms raise terrapins, collect growth data, observe behaviors, learn care and husbandry protocols, examine environmental issues and research the natural history of the Diamondback Terrapin. Many schools utilize programs offered by non-profit organizations and Maryland State Department of Natural Resources such as horseshoe raise and release, the Maryland amphibian and reptile atlas, Trout in the Classroom and other citizen science monitoring programs.

Environmental Science Courses

All twelve AACPS comprehensive high schools offer AP Environmental Science. The Environmental Science elective course is offered at ten of the twelve high schools and one of our alternative education sites. Student enrollment in AP Environmental Science for the 2015-2016 school year is 1,046 students. Enrollment for the Environmental Science elective is 363 students. Additionally, 24 students are enrolled in an Environmental Resource Management pathway at the Center of Applied Technology.

STEM, Green Technologies, Career

- Each AACPS high school offers a unique Signature Program. A Signature brings together educators with local business and community leaders to make classroom instruction relevant, interesting, and challenging for students with opportunities that connect to the 21st century workplace. Environmental Literacy is the Signature at one high school, and many other Signature themes include concepts that address human impact on the global environment.
- The STEM Magnet High School program has a green technology option. Students participate in environmentally focused specialty classes including Environment and Society and Green Architecture.
- The STEM Magnet High School programs offers a Community Challenge course where students are paired with businesses/community members to develop real world solutions. Examples of student development projects include invasive species removal plans, app development for stormwater tour, bicycle with cart to supply healthy food (fruits and vegetables) to AACPS community, and bioretention area redesign.
- The STEM Middle School Magnet Program offers students an inquiry-based, interdisciplinary environment to explore diverse subjects. Student entering 6th grade are required to attend a 2-day

outdoor field experience. STEM themes often engage students in environmental issues especially focused on the Chesapeake Bay.

- The Environmental Literacy and Outdoor Education Office offers yearlong and semester internships for students on topics including submerged aquatic vegetation mapping, wildlife camera trap monitoring, native bee surveys, environmentally themed mural design, and phytoplankton monitoring in collaboration with NOAA/NOS Marine Biotoxins Program.
- The Curriculum for Agricultural Science Education (CASE) at one high school provides a high level of educational experiences to students to enhance the rigor and relevance of agriculture, food, and natural resources subject matter. CASE uses science inquiry for lesson foundation, and concepts are taught using activity-, project-, and problem-based instructional strategies.
- Our Center for Applied Technology Environmental Resource Management (ERM) program gives students working knowledge and first-hand experience in the areas of water resources, fisheries/wildlife, soil, forests and watershed restoration. Project/Problem-based learning allows students to investigate environmental topics, research best practices, and experiment with new ideas to identify restoration and sustainability practices.
- All of the Center for Applied Technology programs, from Welding to Culinary Arts, include activities focused on sustainability practices for that industry.
- In the Biomedical Allied Health program, students are designing and developing a vertical garden to enhance air quality and improve courtyard aesthetics.
- Students from 3 High Schools participate in an annual Career Symposium sponsored by the Chesapeake Bay Foundation.



Teacher Professional Development

AACPS continues to develop and implement a robust environmental literacy professional development plan. The plan includes teachers, administrators, environmental literacy leaders, and non-school-based environmental education providers. Content includes information on environmental literacy and local environmental issues, outdoor instruction methodology, issue investigation, and hands-on/project based learning and action.

Last year, over 520 teachers were trained in environmental literacy and outdoor education. Courses are offered through the Environmental Literacy and Outdoor Education Office as well as with the STEM, English Language Learners, Science, and Social Studies offices. Professional Development is offered through partnerships with local non-profits such as the Chesapeake Bay Foundation and the Annapolis Maritime Museum.

In addition to teacher PD, environmental literacy instruction is also incorporated in administrator training in the Leadership Development Institute and University of Maryland EdD Educational Leadership.



Civic and Community Engagement

Watershed Stewards Academy

AACPS and the Anne Arundel Department of Public Works (AADPW) collaborated to create the AA County Watershed Stewards Academy (WSA), a unique community outreach and environmental action program. WSA educates community leaders to become “Master Watershed Stewards” who develop partnerships between citizens, organizations, businesses and local government to take responsibility for private property storm water quality and quantity, achieving restoration and preservation of their respective sub-watersheds. WSA continues as a non-profit and joint project with AACPS. Master Watershed Stewards (now 170) engage 10,000 individuals annually on watershed issues, plant over 8,500 native plants and improve over 100,000 s.f. of watershed.

Anne Arundel County Department of Public Works (AADPW)

AACPS and AADPW collaborate to combine large scale stormwater restoration projects with environmental literacy learning to provide a local environmental action project. AADPW builds and restores large scale streams and stormwater outfalls and students plant the projects, test water quality and learn about engineering and environmental practices.

AACPS Stream Restoration Project

The AACPS Stream Restoration Project was created in 2013 when the Advanced Studies and Programs Office obtained Maryland Department of Natural Resources funding. This project is currently offered to high school students through a Signature Magnet Program. Stream Team Student Leaders work together to organize and implement the planting of 1,000 native trees in watersheds to improve the overall health of the ecosystem. Southern and Broadneck high school students recently worked with elementary and middle school students, planting 915 trees at 10 schools.

Arlington Echo Outdoor Education Center

AACPS Arlington Echo Outdoor Education Center, is a community model for sustainable best practices. This Maryland Association for Environmental & Outdoor Education (MAEOE) Green Center demonstrates solar panels, LED lighting, native plant gardens, rainscapes, a living shoreline, pervious pavement, rainbarrels, swales and bioretention areas. The Center has sold over 15,000 rainbarrels over the past 12 years, which have been installed at homes and businesses throughout Anne Arundel County and Maryland, supporting stormwater reduction and raising awareness of watershed issues.

Green Schools

AACPS participates in the MAEOE Maryland Green Schools Program, which requires that parents and community members work with schools to help them become green schools. Community members

engage through school environmental fairs, student presentations, school community gardens, and professional development for teachers.




Meaningful Outdoor Learning Experiences

AACPS is committed to providing meaningful outdoor educational experiences for all students. Each environmental literacy unit (see above) incorporates the components of a meaningful outdoor learning experience. Our definition of a "meaningful" experience is based on the Chesapeake Bay Program's definition of a "meaningful watershed educational experience," which includes the following components and practices.

Components

1) Issue Definition: Throughout the pre K though high school curriculum, students investigate a variety of environmental issues in an age-appropriate way from multiple perspectives. Issues include but are not limited to solid waste, deforestation, habitat loss, water quality, climate change, use of natural resources, the environment and human health, and environmental policy.
2) Outdoor Field Experiences: Multiple outdoor learning experiences on school grounds and/or other locations in the community are a required part of instruction at six elementary grade levels, and in one required middle school course and one required high school course.
3) Action Projects: Environmental literacy issue investigation culminates in environmental action projects at every elementary grade level, pre K through fifth grade, and in one middle school course and one high school course.
4**) Synthesis and Conclusions**: Because the environmental literacy units are embedded as part of the curriculum, students are conducting projects and reflecting on their actions.

Essential Practices

1) Active Teacher Support: The environmental literacy curriculum is designed to be implemented by classroom teachers. Elementary, middle and high school classroom teachers, supported by environmental literacy resource teachers, professional development, and supporting programs.
2) Classroom Integration: The AACPS environmental literacy curriculum is rooted in classroom learning, integrating standards from multiple content areas such as Common Core Language Arts and Math, Next Generation Science Standards, and C3 Social Studies. Use of outdoor spaces for instruction is an important component.
3) Local Context: All student investigations are connected to local contexts. Global issues are studied with the purpose of taking action locally.
4) Sustained Activity: Throughout the pre K though high school curriculum, AACPS environmental literacy includes multiple days of instruction, investigation, and environmental action. At some grade

levels, for example, the first grade Monarch butterfly unit, learning experiences begin in the fall and are completed with an action project in the spring.