APS Environmental Literacy Plan

APS lists among its core values excellence, innovation, collaboration, and stewardship. These values must be applied to solve future environmental problems that its students will meet after they leave the school system. In order to prepare its students for the challenges they will encounter, APS is working to create a cohesive plan to evaluate how it teaches environmental literacy throughout each student's tenure. The following statement summarizes APS's environmental literacy goals:

"To provide students with multiple opportunities to increase their environmental literacy at each grade level in order to enable students to graduate with the knowledge, skills, and dispositions to solve problems and resolve issues individually and collectively that sustain ecological, economic, and social stability."

The APS Environmental Literacy Plan is based on the APS Strategic Plan, Virginia Standards of Learning, and Virginia Environmental Literacy Guidelines. The purpose of this document is to create an outline of the resources that APS has at its disposal to meet its goal of graduating students with high levels of environmental literacy. By creating a centralized location where resources can be listed and analyzed, APS can structure a more comprehensive view of what is being done to meet its environmental literacy goals. This document is the beginning of the evaluation process. This will be a living document, as programs get added, deleted, modified, or moved.

According to the North American Association for Environmental Education, there are four components to environmental literacy. The following is taken from the executive summary for developing an assessment framework for environmental literacy among society:

Competencies	**Knowledge**
Competencies are clusters of skills and abilities that may be called upon and expressed for a specific purpose. Measurement of competencies is the primary objective in large-scale assessments. They include the capacity to: ● Identify environmental issues, ● Ask relevant questions, ● Analyze environmental issues, ● Investigate environmental issues, ● Evaluate and make personal judgments about environmental issues, ● Use evidence and knowledge to defend positions and resolve issues, ● and create and evaluate plans to resolve environmental issues. The expression of a competency is influenced by and influences prior knowledge and dispositions.	Environmental literacy entails knowledge of: ● physical and ecological systems; ● social, cultural and political systems; ● environmental issues; ● multiple solutions to environmental issues; ● and citizen participation and action strategies.

Dispositions	Environmentally Responsible Behavior
Dispositions are important determinants of behaviors related to the environment, both positive and negative. Learners' dispositions toward the environment are thought to influence their willingness to recognize and choose among value perspectives, as well as their motivation to participate in public deliberations about environmental issues. They include: ● Sensitivity; ● attitudes, ● concern, ● and worldview; ● personal responsibility; ● self-efficacy/locus of control; ● and motivation and intentions.	Competencies, knowledge, and dispositions enable and are expressed as behaviors, and environmentally responsible behavior is the ultimate expression of environmental literacy. It describes the point at which competencies, knowledge, and dispositions are brought to bear within a particular context. Treating behavior as a component of large scale environmental literacy assessments, however, is controversial, in part because it is more difficult to assess than the other components. Measures of behavior tend, for obvious reasons, to rely heavily on self reports, which many researchers view as less reliable than other sorts of measures.

The four components of environmental literacy should also be considered through a social justice lens, as environmental stewardship, decisions, policies, and the effects of them, impact different communities in different ways. In order to provide teachers (and possibly students) with background information on the connections between environmental literacy and social justice, a resource list has been compiled. This is a dynamic list that can be modified as resources are used, vetted, and understanding is expanded.

In order for the goal of environmental literacy to be integrated into an already demanding course load, these four components can be aligned with the Virginia Standards of Learning. Each standard is an opportunity to build in components of environmental literacy. General science principles and environmental literacy components dovetail together to help students achieve a meaningful and socially responsible education. Studies show that when using environmental literacy as a framework, students outperform academically compared to traditional programs.

A large component of providing environmental literacy is the Meaningful Watershed Experience (MWEE) that was part of the 2014 Chesapeake Bay Watershed Agreement. As a helpful guide, the NOAA definition of a MWEE is provided here:

> **Meaningful Watershed Experience (MWEE)**: multi-stage activities that include learning both outdoors and in the classroom, and aim to increase the environmental literacy of all participants. Teachers should support students to investigate topics both locally and globally that are of interest to them, learn they have control over the outcome of environmental issues, identify actions available to address these issues, and understand the value of those actions.

All four of these components are required for the experience to qualify as a Meaningful Watershed Educational Experience (MWEE):

Issue Definition: Students identify an environmental question, problem, or issue and explore through background research and investigation.
Outdoor field experiences: Students participate in one or more outdoor field experiences sufficient to collect the data required for answering the research questions and informing student actions.
Action projects: Students participate in an action project during which students take action to address environmental issues at the personal or societal level.
Synthesis and conclusions: Students analyze and evaluate the results of their investigation of the issue and synthesize and communicate results and conclusions.

Superintendent's Advisory Committee on Sustainability (SACS)

APS also demonstrates its dedication to sustainability and environmental literacy through the continued efforts of the Superintendent's Advisory Committee on Sustainability (SACS). The mission of the SACS is to provide recommendations to the Superintendent to achieve APS's sustainability objectives. This committee is also responsible for overseeing the Sustainability Liaison Program, which has a focus on waste reduction (reduce, reuse or recycling efforts), energy conservation, and sustainability projects that are based on the school's needs or are passionate to the students and/or liaisons. This ever-expanding program aims to support teachers at APS by providing a modest stipend in exchange for coordinating and designing sustainability activities that engage students and the APS community. Through the important work of the Sustainability Liaison's, APS increases the frequency of environmental literacy learning. More information on the SACS, including its annual reports and recommendations can be found by clicking on the link above, or by clicking here.

Grade Band Environmental Literacy Targets

Elementary Environmental Literacy Targets

By the end of Grade 5, APS elementary students will engage in experiences that:

- address environmental literacy as outlined in the Virginia SOLs grades K-5,
- occur in their schoolyards or outdoor learning spaces,
- provide the opportunity to participate in local outdoor education opportunities, such as Nature Center class visits in the 1st grade,
- are hands-on, outdoor learning experiences, such as the Outdoor Lab in the 3rd and 5th grade,
- engage them in sustainability education and projects led by their sustainability coordinator or classroom teachers in their schools, and
- fulfill the opportunity to participate in at least one complete MWEE experience.

K-5 Curricular Connections

Middle School Environmental Literacy Targets

By the end of Grade 8, APS Middle School students will engage in experiences that:

- address environmental literacy as outlined in the Virginia SOLs grades 6-8,
- occur in their schoolyards or outdoor learning spaces,
- are hands-on, outdoor learning experiences, such as the Outdoor Lab in the 7th grade,
- engage them in sustainability education and projects led by their sustainability coordinator or classroom teachers in their schools, and
- fulfill the opportunity to participate in at least one complete MWEE experience.

6-8 Curricular Connections

High School Environmental Literacy Targets

By the end of grade 12, APS High School students will engage in experiences that:

- address environmental literacy as outlined in the VA SOLs,
- occur in their schoolyards or outdoor learning spaces,
- engage in research, service projects, clubs or internship opportunities that promotes environmental stewardship,
- offer the opportunity to receive the Board of Education Seal for Excellence in Science and the Environment, and
- fulfill the opportunity to participate in at least one complete MWEE experience.

9-12 Curricular Connections

Additional components to incorporate within curriculum documents:

- Problem-based or project-based learning opportunities that can be connected
- Performance assessments with environmental themes
- Ways to better incorporate outdoor space available at the school
- Social justice components of environmental literacy
- Arlington Water Quality Overview

External Partnerships and Internal Support	
APS Partnering Organizations	Applied Energy Services Corporation, Arlington County Department of Environmental Services, Arlington County Nature Centers, Arlington Master Naturalists, Arlington Outdoor Education Association, Dominion Energy, Eco-Action Arlington, Friends of the Planetarium, National Oceanic and Atmospheric Administration (NOAA), National Wildlife Federation (NWF)
Internal APS Support	Arlington Public Schools recognizes the vital role the many departments within the school system plays in supporting the Environmental Literacy Plan. ● Facilities and Operations ● Food Services ● Information Systems ● Teaching and Learning ● Transportation ● School and Community Relations Through the Science Office, the APS Chemical Hygiene Plan provides guidance on environmentally-conscious chemical use and disposal within Arlington Public Schools and is available to teachers at all grade levels within Canvas.

Resources:

Alice Ferguson Foundation. (2020). Bridging the watershed. Retrieved from https://fergusonfoundation.org/bridging-the-watershed/

Arlington Public Schools. (2018). 2018-2024 APS strategic plan. Retrieved from https://www.apsva.us/strategic-plan/

Arlington Public Schools. (2020). Superintendent's advisory committee on sustainability. Retrieved from https://www.apsva.us/aps-goes-green/superintendents-advisory-committee-sustainability/

Board of Education: Commonwealth of Virginia. (2018). Science standards of learning curriculum framework 2018. Retrieved from http://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml

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Chesapeake Bay Program. (2020). Underwater grasses. Retrieved from https://www.chesapeakebay.net/issues/bay_grasses

Department of the Interior. (n.d.). Every kid outdoors. Retrieved from https://everykidoutdoors.gov/index.htm

National Oceanic and Atmospheric Association. (2017). NOAA meaningful watershed educational experience. Retrieved from https://www.noaa.gov/education/explainers/noaa-meaningful-watershed-educational-experience

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North American Association for Environmental Education. (2020). Environmental literacy framework. Retrieved from https://naaee.org/our-work/programs/environmental-literacy-framework

The College Board. (2020). AP Biology: About the course. Retrieved from https://apstudents.collegeboard.org/courses/ap-biology

The College Board. (2020). AP Environmental Science: About the course. Retrieved from https://apstudents.collegeboard.org/courses/ap-environmental-science

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Virginia Department of Education. (n.d.). Environmental science course content and process guidelines. Retrieved from http://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml.

Virginia Department of Education. (n.d.). Science outcomes: Ecology. Retrieved from http://www.doe.virginia.gov/testing/sol/standards_docs/science/index.shtml.

Kindergarten - Grade 5

This table identifies where environmental literacy instruction takes place at each grade level. These instances are aligned with the Virginia Standards of Learning (SOLs) and should support the central theme of each grade level. In addition, each grade band has identified environmental literacy targets that can be achieved through the cumulative experiences at each level.

Jump to:				
Grade 1	Grade 2	Grade 3	Grade 4	Grade 5

Content Areas and Themes	Environmental Literacy Strands (based on 2018 VA SOL Curriculum Frameworks)	APS Sponsored Opportunities Supporting Environmental Literacy	Suggested or Possible Sustainability Liaison Projects	Example Environmental Field Trips and Individual School Sponsored Environmental Literacy Programs/Projects
Kindergarten				
Science Using my senses to understand my world	K.11 a-c Central Idea: Humans can impact the amount of natural resources by reusing, recycling and conserving. Unit: Earth's Resources (Q4)	None identified	Recycling projects Waste free lunch Engineering challenges with recyclables	Schoolyard Nature Scavenger hunt Trips to local Nature Centers
Social Studies How can I be a good member of the local community?	K.5 a-e Students will use simple maps and globes. K.7 Students will describe how the location, climate, and physical surroundings of a community affect the way people live.	None identified	Mapping schoolyards or local nature centers Recycling project connecting to being involved in the community and helping others in the community.	None identified

	K.10 Students will demonstrate traits of good community members.			
Health Importance of healthy environment to include proper disposal of trash, recycle, reuse & water conservation	Identify everyday items that can be reduced, recycled, repurposed, or reused. (1.1q) The importance of proper disposal of trash and recycling (1.2q, 1.3q) Ways to conserve water and prevent water pollution and why it is important (1.2q, 1.3q)	None identified	School yard recycle project Reuse projects	None identified
Career and Technical Education (CTE)	**Not yet developed**			
Grade 1				
Science How I interact with my world	1.4 a, 1.5 a , 1.8 a-c Central idea: Natural resources (clean air, clean water & undeveloped land) are limited and need to be conserved and used responsibly. These resources also provide the basic life needs for survival of plants and animals. Unit: Earth's Resources (Q4) 1.8 a-c	Nature Center first grade class visits. Students learn about the characteristics of animals (SOL 1.5) and their adaptations to the environment. Students also have opportunities to interact with different animals from the Nature Centers.	Recycling projects Waste free lunch Engineering challenges with recyclables Litter prevention	Green Spring Gardens Local Nature Centers Schoolyard Nature Scavenger Hunt

Social Studies Civics, Economics, Geography, and History through the lens of The Commonwealth of Virginia.	1.2, 1.6, 1.10 Virginia's diverse environment has affected the way people interact with their surroundings. Good community members have certain responsibilities.	None identified	None identified	None identified
Health Importance of healthy environment to include proper disposal of trash, recycle, reuse & water conservation	Identify everyday items that can be reduced, recycled, repurposed, or reused. (1.1q) The importance of proper disposal of trash and recycling (1.2q, 1.3q) Ways to conserve water and prevent water pollution and why it is important (1.2q, 1.3q)	None identified	School yard recycle project Reuse projects	None identified
Career and Technical Education (CTE)	**Not yet developed**			
Grade 2				
Science Change occurs all around us	2.5 c, 2.8 a-c Central idea: Habitats of living organisms may change due to human influence. Unit: Interdependence and Environmental Changes (Q4)	**APS Planetarium show**: The H2O Cycle	Habitat creation in schoolyard Soil erosion reduction	Green Spring Gardens Local Nature Centers

	MWEE Opportunity			
Social Studies Civics, Economics, Geography, and History through the lens of The United States of America**.**	2.3, 2.7: American Indians developed different cultures because they lived in different environments of North America. In the past and present, American Indians have respected and protected the environments that make up their homelands. 2.8, 2.10: Natural resources and scarcity and also addressed. 2.11, 2.12: Good citizens have a variety of responsibilities and make contributions to their communities.	None identified	Connections can be made to habitat creation.	None identified
Health Ways to protect the environment and how it influences health	Explain my environment and how to protect it. (2.1n) Describe how the environment impacts health. (2.2n, 2.3n)	None identified	Posters / visuals to show effects of pollution on environment & health	None identified
Career and Technical Education (CTE)	**Not yet developed**			
Grade 3				

Science Interactions in our world	3.8 a-c Central Idea: Human behaviors can negatively impact organisms and their habitats. Conservation practices can lessen the effects of human activity on the environment. Units: Ecosystems (Q1), Soil (Q3) **MWEE Opportunity**	**Outdoor Lab Trip**: 3rd grade students visit the Outdoor Lab and participate in outdoor experiential learning. SOLs covered: 3.3, 3.5, 3.6, 3.7	Soil conservation Schoolyard garden Composting	Outdoor Lab day trip Schoolyard/neighborhood land use survey **Dominion Energy:** Project Plant It!
Social Studies Civics, Economics, Geography, and History through the lens of Ancient World Cultures	3.6, 3.7, 3.8 Locating geographic features, considering how people in ancient world cultures adapted to their environment, and how different cultures used natural resources. 3.11: Explaining actions that good citizens can take to improve the school and community.	None identified	Creating infographics or other community awareness campaigns. Litter clean-up Recycling/Reuse projects Schoolyard Garden Composting	Jamestown Yorktown Foundation Classroom Visits
Health Understand what happens with waste and recycled materials	Where waste goes (3.1r) What happens to recycled materials (3.1r) How reducing, reusing, and recycling products promotes a healthier environment (3.2r) How to reduce, reuse, and recycle in their home, at their school, and in their community (3.3r)	None identified	School Recycle Project Home Recycle Project Create Infographics on school recycling Create Infographics on community recycling	None identified

Career and Technical Education (CTE)	**Not yet developed**			
Grade 4				
Science Our place in the solar system	4.8 a-d Central Idea: Virginia has many natural resources and "we all live downstream". Unit: Virginia Resources (Q1) **MWEE Opportunity**	**APS Planetarium Show:** The Flight of the Butterfly	Litter cleanups, native species planting, stream studies Water quality testing at local streams Personal water usage log Macroinvertebrate lab	Trip to local stream All National Parks free for grade 4 students: Every Kid Outdoors **Dominion Energy:** Project Plant It!
Social Studies Virginia Studies	VS.2b: Understanding the relationship between physical geography and the lives of the native peoples, past and present VS.3e/f: Jamestown and how it was impacted by the environment and impacted the environment VS.6c: Impact of agricultural practices on the soil	None identified	Creating infographics and other products to raise community awareness about environmental issues.	None identified
Health Health consequences of water pollution	**T**he definition of water pollution (4.1s) How water pollution impacts their health (4.1s, 4.2s)	None identified	Diary of daily habits that use water, analyze how to conserve	None identified

	Strategies to reduce water pollution (4.3t) How to find and participate in local volunteering opportunities (4.2t, 4.3t)			
Career and Technical Education (CTE)	**Not yet developed**			
Grade 5				
Science Transforming matter and energy	5.8 d Central Idea: Erosion and deposition contribute to Earth's constantly changing geosystem. Unit: Changing Earth (Q4) 5.9 a-c Central Idea: Some resources are renewable and others are not. Unit: Conservation of Energy (Q4) **MWEE Opportunity**	**The Outdoor Lab**: students participate in an overnight trip to the Outdoor Lab. They are immersed in outdoor experiential learning activities. SOLs covered: 5.6, 5.8, 5.9 **AES:** Energy demo and class visit	Soil erosion reduction Reduce energy use (energy audits, no lights Friday etc)	Outdoor Lab Overnight Trip
Social Studies Ancient World History	5.2-5.9 Impact of geography on way of life	None identified	Creating infographics and other products to raise community awareness about environmental issues. Connections to soil erosion reduction and ties to flooding in ancient coastal areas	None identified

Health Effects of air and noise pollution on health Strategies to reduce air quality and noise pollution on health and environment	Review the definition of environment (5.1s) The importance of healthy air quality (5.1s, 5.2s, 5.3s) How to reduce harmful air and noise pollution (5.2s, 5.3s)	None identified	List types of noises & rank loudness & strategies to reduce them PBL - create a product that shares health information with elementary age students on the dangers of air pollution	None identified
Career and Technical Education (CTE)	**Not yet developed**			

Grades 6 - 8

This table identifies where environmental literacy instruction takes place at each grade level. These instances are aligned with the Virginia Standards of Learning (SOLs) and should support the central theme of each grade level. In addition, each grade band has identified environmental literacy targets that can be achieved through the cumulative experiences at each level.

Jump to:	
Grade 7	Grade 8

Content Areas and Themes	Environmental Literacy Strands (based on 2018 VA SOL Curriculum Frameworks)	APS Sponsored Opportunities Supporting Environmental Literacy	Suggested or Possible Sustainability Liaison Projects	Example Environmental Field Trips and Individual School Sponsored Environmental Literacy Programs/Projects
Grade 6				
Science Our world, our responsibility	*Water is important for agriculture, power, and public health*: 6.6 f *Watershed systems are dynamic and complex; interactions within these systems may influence the overall health of the watershed*: 6.8 a-d *Natural resource management and health and safety issues related to the use of resources should be considered in the development of public policy*: 6.9 a-f **MWEE Opportunity**	**APS Planetarium Show:** Oasis in Space	Clear signage toward understanding of recycling procedures Cleanup of local watershed Peer to peer education regarding ongoing efforts	Smithsonian Environmental Research Center (SERC) Caring for Our Watersheds National Wildlife Federation: Eco-Schools USA

Social Studies U.S. History	USI.2, USI.3, USI.5, Interactions between people and their environment USII.2 How physical features and climate influence the movement of people USII.4 environmental impact of the rise of big business USII.9: American environmental policy	None identified	Land use study. How has our school campus changed the ecosystem? Research a US Environmental policy (ie. Endangered Species Act)	None identified
Health Air quality and pollution effects on personal health Strategies to protect environment	Create a plan to address community environmental health and safety issues. Create and monitor progress toward a goal to protect the environment. Assess environmental health and safety issues in the community. Identify careers and professions associated with environmental health. Recognize that all individuals have a responsibility to protect and preserve the environment. Explain the role of the Environmental Protection Agency (EPA) and local	None identified	Investigate environmental health careers Use a creative product (PSA, podcast, infographic, social media, etc.) to inform, promote strategies to reduce pollution Biography project of an environmentalist.	None identified

	agencies in protecting the environment.			
Career and Technical Education (CTE)	**Not yet developed**			
Grade 7				
Life Science	*Biotic and abiotic factors: Matter in cycles, energy flow in cycles, relationships:* LS.5 a-c *Interaction and interdependence: predator/prey in food webs, competition and cooperation, niche related to survival:* LS.6 a,b,d *Adaptation for survival: biotic and abiotic factors and physical and behavioral characteristics:* LS.7 a,b *Ecosystems and their components are dynamic and affected by small and large scale environmental changes:* LS.8 b,c *Relationship between ecosystem dynamics and human activity*: LS.9 a-c *Populations change over time due to many factors including environmental ones*: LS.11 c	**The Outdoor Lab**: Students spend the day learning ecological concepts through outdoor experiential education. LS.3 a-c; LS. 4 a, b; LS 5 a-c; LS.6 a-d; LS. 7 a, b; LS.8 a-c; LS.9 a-c; LS.11 c	Removal of invasive plants and planting of native species on school grounds Development and remediation of schoolyard habitats Peer to peer education regarding ongoing efforts	Caring for Our Watersheds National Wildlife Federation: Eco-Schools USA

	MWEE Opportunity			
Social Studies Civics and Economics	CE.3d, e: it is a responsibility of community members to contribute to the common good. CE.4: Effective/thoughtful participation in civic life CE.6, 7, 8 The structure of government and lawmaking process at local, state, and national levels CE.10 Public Policy and decision making	None identified	Follow an environmental law through the lawmaking process Devising a plan to raise awareness of an environmental issue Communicate with lawmakers about environmental issues.	None identified
Health Humans' contribution to pollution Conservation of natural resources	Describe human behaviors that contribute to air, water, soil, and noise pollution. Explain how environmental health is essential to personal and community health. Demonstrate ways to conserve and promote the conservation of natural resources.	None identified	Use a creative product (PSA, podcast, infographic, social media, bumper sticker etc.) to inform, promote strategies to reduce pollution.	None identified
Career and Technical Education (CTE)	**Not yet developed**			
Grade 8				

Physical Science	*Energy storage and transformation within the context of energy conservation:* PS.5 b,c	None identified	Energy Projects which may include: -Local power sources and use analysis integrated with speakers from local government - Signs to turn off lights when rooms are not in use. -Public transportation benefits and solutions to/from school -Electronics recycling events -Energy audits at school and home with communication of results and recommendations Peer to peer education regarding ongoing efforts	National Wildlife Federation: Eco-Schools USA
Social Studies World Geography	WG.2: How humans influence the environment and are influenced by it. WG.4 Considering perspectives regarding natural resources and land use WG.5-13 Describing major physical and environmental features of the different regions of the world, evaluating how economic	None identified	Compare environmental policies of different regions Awareness campaigns of environmental issues Research a group doing environmental work and report on an ongoing project.	None identified

	characteristics of regions impact the environment WG.15: examining the influence of the environment on human migration WG.16: environmental challenges of urban areas WG.18: Cooperation and conflict over resources			
Health Renewable energy and sustainable energy	Explain how humans and the environment are interdependent. Define and describe renewable resources and sustainable energy. Analyze opportunities for community service and advocacy for policies that promote environmental health.	None identified	How does access to clean energy impact human health? Create your own renewable energy company (ie. new solar installation company). Class participation in a local event to promote human health.	None identified
Career and Technical Education (CTE)	**Not yet developed**			

Grades 9-12

This table identifies where environmental literacy instruction takes place in each content area. These instances are aligned with the Virginia Standards of Learning (SOLs). In addition, each grade band has identified environmental literacy targets that can be achieved through the cumulative experiences at each level.

Jump to:		
Social Studies	Health	Career and Technical Education (CTE)

Courses	Environmental Literacy Strands (based on 2018 VA SOL Curriculum Frameworks)	APS Sponsored Opportunities Supporting Environmental Literacy	Suggested or Possible Sustainability Liaison Projects	Example Environmental Field Trips and Individual School Sponsored Environmental Literacy Programs/Projects
Science				
Environmental Science	VDOE Guidelines **MWEE Opportunity**	**The Outdoor Lab**: Each high school is given one day a month for a trip to the Outdoor Lab. Various science classes will send their students to study biology, earth science, environmental science, and ecology. SOLs covered: varies	Implementation and monitoring of school recycling and waste management efforts Focus on peer to peer education regarding ongoing efforts Walk and bike to school campaign to reduce carbon footprint (Safe Routes Partnership).	Chesapeake Bay Foundation field trips Grasses for the Masses project through Chesapeake Bay Foundation NOAA B-WET sponsored projects and field experiences Environmental clubs Internship opportunities

				Water testing at local stream site Trip to water treatment facility National Wildlife Federation: Eco-Schools USA
Biology	*Bacteria affect other organisms and the environment, specifically infectious disease*: BIO.4 e *Synthetic biology has biological implications*: BIO.5 e *Changes in environmental conditions change populations of species in different ways*: BIO.7 b-d *Organisms are part of living systems and demonstrate interdependence with other organisms and the environment*: BIO.8 a-d **MWEE Opportunity**	None identified	Building and installing bird and/or bat boxes for biodiversity Development, maintenance, and education efforts of composting bins in conjunction with cafeteria waste management Focus on peer to peer education regarding ongoing efforts Monitoring and water testing for local streams	Chesapeake Bay Foundation field trips NOAA B-WET sponsored projects and field experiences Environmental clubs Internship opportunities Observing macroinvertebrates and surrounding nature at local stream site Bridging the Watershed (Alice Ferguson Foundation) National Wildlife Federation: Eco-Schools USA EcoAction Arlington: EcoAction Arlington Four Mile Run Conservatory Foundation:

				Four Mile Run Conservatory Foundation
Chemistry	*Stoichiometric relationships*: CH.4.b *Solution concentrations*: CH.4.c *Titration*: CH.4.d CH.6.b	None identified	Monitoring and water testing for local streams Compost digestion and methane production	Chesapeake Bay Foundation field trips NOAA B-WET sponsored projects and field experiences Four Mile Run Conservatory Foundation: Four Mile Run Conservatory Foundation
Physics	*Conservation of Energy*: PH.4b *Optics*: PH.6 *Circuits, electrical power*: PH.8 *Modern/quantum, in particular nuclear, and photoelectric effect/solar panels*: PH.9a, d AP and DE Physics: *Thermal topics including heat engines and laws of thermodynamics*	None identified	Renewable energy projects - ie. wind energy production and circular motion or circuits	None identified
Earth Science	*Many factors affect the use and the conservation of natural resources to include availability, renewal rates, and economics. The use and allocation of these*	None identified	Stream and/or trash and recycling pickup on school grounds	Chesapeake Bay Foundation field trips NOAA B-WET sponsored projects and field experiences

	resources globally have economic, political, and environmental impacts: ES.6 a-d *Water impacts geology and geological processes. Limited freshwater resources are impacted by several factors including human use*: ES.8 a-d *Oceans are dynamic systems that support life and moderate global temperatures. Natural occurrences and human activities can disrupt the equilibrium of the system*: ES.10 a-c, e *The atmosphere is a dynamic system that supports life in many ways. Natural occurrences and human activities can disrupt the equilibrium of the system:* ES.11 a, c, d *Changes in the atmosphere and oceans due to human activity affect global climate*: ES.12 e		Analysis of water movement and erosion on and around school grounds with development of remediation efforts in combination with school and local agencies Focus on peer to peer education regarding ongoing efforts	Environmental clubs Internship opportunities Use school features to observe renewable resources. National Wildlife Federation: Eco-Schools USA
Ecology	VDOE Guidelines **MWEE Opportunity**	None identified	Development and/or maintenance of outdoor classroom with a focus on environmental education Engaging teachers in the use of the outdoor classroom	Chesapeake Bay Foundation field trips NOAA B-WET sponsored projects and field experiences Environmental clubs

			Watershed cleanup	Internship opportunities Water testing at local stream site Use NoVA Parks to go canoeing/kayaking to observe ecosystems Four Mile Run Conservatory Foundation: Four Mile Run Conservatory Foundation Bridging the Watershed (Alice Ferguson Foundation) National Wildlife Federation: Eco-Schools USA
Oceanography	Content guidelines are currently under development by VDOE	None identified	Aquaponics stream study Growing bay grasses for transplanting	Chesapeake Bay Foundation field trips NOAA B-WET sponsored projects and field experiences National Wildlife Federation: Eco-Schools USA Environmental clubs Internship opportunities

AP Biology	<u>Ecology Unit</u> ● *Communication and responses to environmental changes* ● *Energy flow within and across ecosystems* ● *Factors in the growth, density, and success of populations* ● *Factors in community and ecosystem dynamics* ● *Invasive species, human interaction, and environmental changes*	None identified	Local biodiversity analysis with focus on educating teachers and other adults Participate in local citizen science environmental monitoring projects Stormwater management projects to reduce runoffs	Chesapeake Bay Foundation field trips NOAA B-WET sponsored projects and field experiences Environmental clubs Internship opportunities National Wildlife Federation: Eco-Schools USA
AP Environmental Science	<u>Biodiversity Unit</u> ● *Introduction to biodiversity* ● *Ecosystem services* ● *Island biogeography* ● *Ecological tolerance* ● *Natural disruptions to ecosystems* ● *Ecological succession* <u>Land and Water Use Unit</u> ● *The tragedy of the commons* ● *The Green Revolution* ● *Types and effects of irrigation* ● *Pest-control methods* ● *Meat production methods and overfishing* ● *The impacts of mining* ● *Urbanization and ecological footprints*	None identified	Waste and recycling projects focus on educating teachers and other adults Participate in local citizen science environmental monitoring projects	Chesapeake Bay Foundation field trips NOAA B-WET sponsored projects and field experiences Environmental clubs Internship opportunities Water testing at local stream site Use NoVA Parks to go canoeing/kayaking to observe ecosystems Trip to water treatment facility

	● *Introduction to sustainable practices including crop rotation and aquaculture* <u>Energy Resources and Consumption Unit</u> ● *Energy sources and fuel types, including fossil fuels, ethanol, and nuclear power* ● *Global energy consumption and distribution of natural resources* ● *Natural sources of energy, including solar power, wind, geothermal, and hydroelectric power* ● *Energy conservation methods* <u>Atmospheric Pollution Unit</u> ● *Introduction to air pollution* ● *Photochemical smog* ● *Indoor air pollution* ● *Methods to reduce air pollutants* ● *Acid rain* ● *Noise pollution* <u>Aquatic and Terrestrial Pollution Unit</u> ● *Sources of pollution* ● *Human impact on ecosystems* ● *Thermal pollution* ● *Solid waste disposal and waste reduction methods* ● *Pollution and human health*			National Wildlife Federation: Eco-Schools USA

	● *Pathogens and infectious diseases* <u>Global Change Unit</u> ● *Ozone depletion* ● *Global climate change* ● *Ocean warming and acidification* ● *Invasive species* ● *Human impacts on diversity*			
Geospatial Tools and Techniques	*Geospatial technologies, such as geographic information systems (GIS), global positions systems (GPS), and remote sensing to a problem of interest.* *Apply technology to solve the problem, analyze the data, and propose and communicate possible solutions related to environmental issues.*	None identified	None identified	ArcGIS NOAA B-WET sponsored projects and field experiences Environmental clubs Internship opportunities National Wildlife Federation: Eco-Schools USA

Social Studies 9-12				
In all courses students will: ● Use geographic information to determine patterns and trends to understand history ● Explain how indirect cause-and-effect relationships impacted people, places, and events in history ● Evaluate how the environment impacts humans and how humans impact and adapt their environment throughout history and in the present. **WHII**: Resources and economic interdependence **VA/US Hist**: Environmental impact of urbanization ***MWEE Opportunity - Bay health and VA history** **VA/US Govt:** Public policy, governmental role in environmental protection, participation in civic life.		None identified	VA/US Govt: Working to influence public policy on environmental issues Natural resource management and land use vs western expansion Energy policy and politics	ArcGIS and mapping of urban areas and/or resources Land ownership and land use Native-Land.ca
Health				
Health 9 Global health issues & strategies to improve	Examine the impact of global environmental health issues on local communities. Identify global environmental health issues. Evaluate strategies for improving health-related social issues. Develop a long-term plan for oneself and/or the family to	None identified	Peer education Reflection on documentary, movie, article on protecting the environment Roundtable discussion on global health issues and how they relate to Arlington Investigate the Blue Zone Project	None identified

	positively impact a health-related social issue. Identify health-related social issues such as homelessness, underage drinking, and substance abuse. Promote global environmental health and/or disease prevention projects.		Create/produce an invention/product to address a global health issue Schedule a School Clean Up Day or community event Conduct an Eco-friendly audit	
Health 10 Environmental Health, Risks and Factors, Crisis Management Strategies for Natural Disasters and Emergency Situations	Explain how the quality of the environment (e.g., secondhand smoke, carbon monoxide, allergens, lead, toxic chemicals) directly affects a person's health status and quality and length of life. Investigate natural disasters and emergency situations that affect the community. Identify health-related social issues, such as organ donation, homelessness, the spread of infectious diseases, underage drinking, substance abuse, and violence, and their impact on the community. Analyze how health literacy and health-science skills prepare one to become a productive citizen.	None identified	Reflection on documentary, movie, article on protecting the environment Roundtable discussion on global health issues and how they relate to Arlington Create/produce an invention/product to address a global health issue Schedule a School event to bring attention to global health issues Create a law or an environmental plan to improve a negative impact on the environment; write to local legislators about environmental advocacy	None identified

	Describe attributes, characteristics, and interests of individuals in health-related professions and the core academic skills needed for workplace skills in a health career. Identify life-threatening situations that may result from emergencies and natural disasters and community resources for emergency preparedness. Explain the role of health, wellness, education, safety, and business professionals in addressing environmental health concerns. Describe how and where to access community resources related to organ donation, homelessness, underage drinking, and/or substance abuse. Research high school health and medical science industry-recognized credentials (e.g., personal trainer, athletic trainer, dietary aide, dental assistant, certified nurse assistant, home health aide, geriatric aide).		Plan for a natural disaster Use a different discipline (art, music, literature, athletics, etc.) to promote awareness of environmental risk factors Start a school, community or family vegetable garden – donate to local food pantries	

	Design crisis-management strategies for natural disasters and emergency situations. Describe strategies to reduce risk to environmental health, and establish goals for improving environmental health. Identify and create a plan to address a community health-related social issue, such as organ donation, homelessness, underage drinking, or substance abuse. Identify health promotion opportunities to enhance the health and wellness of oneself and others. Identify high school courses that lead to health and medical science industry certifications.			
Career and Technical Education (CTE) - Not yet developed				

Environmental Literacy and Social Justice

Below is a list of resources that can be used to help teachers with the complex social justice issues surrounding environmental literacy. If there are additional resources that you find helpful in your instruction, please share them so that they can be added to the list.

Source	Author/Organization	Grade Level(s)	Notes
The Connection between Social and Environmental Justice	Student Affairs Administrators in Higher Education (NASPA)		A compiled list of resources that address the following: "As the impacts of climate change intensify and disproportionately impact vulnerable and marginalized populations, it has become increasingly harder to ignore just how interconnected issues of social and environmental justice are, and how consequential they have become. Climate change not only impacts the environment but the economic and social realms of human life as well. This blog post highlights a few resources that bring together perspectives from environmental, social, and economic justice lenses, and offer insights that bridge these three critical aspects of sustainability. "
Environmental Justice Factsheet	University of Michigan - Center for Sustainable Systems		"Environmental Justice (EJ) is defined as the equal treatment and involvement of all people in environmental decision making.1 Inspired by the Civil Rights movement, EJ became widespread in the 1980's at the intersection of environmentalism and social justice.2 Environmental injustice is experienced through heightened exposure to pollution and corresponding health risks, limited access to adequate environmental services, and loss of land and resource rights.3 EJ and sustainability are interdependent and both necessary to create an equitable environment for all.4"
Environmental Justice and Eco-Social Justice	University of Colorado, Boulder - Environmental Center		"The environmental justice movement grew in response to the disproportionate environmental burdens communities of color and low-income communities bear including pollution, industrial production and processing facilities, landfills and power plants. Simultaneously these communities often have fewer environmental benefits like parks, gardens and green spaces, while facing inadequate health care, access to healthy food, less political power."