

# Exploring Nature on School Grounds

Providing Meaningful Watershed Educational Experiences

Dec. 14, 2017 | Grace Manubay





# Objectives

- Connect school gardens with environmental literacy initiatives
- Define Meaningful Watershed Educational Experiences (MWEEs)
- Explore planning and implementation tools
- Resources and more information





# School Garden Grant Requirements

- School Wellness Committee
- At least one staff member to oversee the program
- At least five (eight in year two) classroom teachers include garden-based teaching into their teaching practice
- Collaborate with the food service vendor to plan and implement at least three cafeteria-based activities
- Participate in four half-day trainings that take place during DCPS professional development days in partnership with DC Greens' Trellis Program
- **Engage one entire grade level in at least one Meaningful Watershed Educational Experience (MWEE) (one in year one & one in year two)**
- Facilitate school-wide participation in Growing Healthy Schools Month (October) and Strawberries and Salad Greens Day (early spring), sponsored by OSSE
- Complete Mid and End Project Report (includes Staying Power Plan)
- Complete the Continuation Grant to be eligible to receive funds for the second year of the grant



# What is Environmental Literacy?

- Environmental literacy is the development of knowledge, attitudes, and skills necessary to make informed decisions concerning the relationships among natural and urban systems.





# An environmentally literate person...

- Can discuss and describe the ecological and environmental systems and human impact on these systems;
  - Engages in hands-on, outdoor learning experiences that involve discovery, inquiry, and problem-solving;
  - Is able to question and analyze information pertaining to his or her surrounding environment; and
  - Has the capacity to take actions that respect, restore, protect, and sustain the health and well-being of human communities and environmental systems.
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# What guides environmental literacy in DC?

- Local Legislation: Healthy Schools Act of 2010
  - OSSE required to have School Garden and Environmental Literacy Programs
- Mayoral Commitments:
  - Sustainable DC Plan (currently being updated)
    - Goal to ensure all school-age children are educated in sustainability and prepared for a changing green economy
  - Chesapeake Bay Watershed Agreement
    - Environmental literacy goals related to student engagement and sustainable schools



# School Garden/Env Literacy Connections

- Literature review shows that environmental education improves academic performance, enhances critical thinking skills, increases civic engagement, fosters positive environmental behaviors, and develops personal growth and life-building skills, including confidence, autonomy, and leadership.  
(Ardoin et al., 2016)
- Benefits of green schools include improved student health by decreasing asthma triggers, which decreases absenteeism, and greater satisfaction with green school environments, which increases teacher retention.  
(US Green Building Council and American Institute of Architects, 2011)
- Research review showed that garden-based learning has a positive impact on students' grades, knowledge, attitudes, and behavior.  
(Williams and Dixon, 2013)
- Quiz scores after an outdoor science lesson are higher when compared to scores after an indoor science lesson.  
(Dhanapal and Lim, 2013)



# What is a MWEE?

- Learner-centered experiences that focus on investigations into local environmental issues and lead to informed action and civic engagement.
- An approach to implementing environmental literacy initiatives within school districts and states.
- A framework that supports high-quality teaching and learning by actively engaging students in building knowledge and meaning through hands-on experiences, with applications to make sense of the relationships between the natural world and society.
  - Increase student engagement and enthusiasm for learning
  - Support student achievement
  - Advance 21st century skills
  - Promote environmental stewardship and civic responsibility





# Essential Elements: What Students Do

- Issue Definition: Students focus on a driving question that addresses a locally relevant environmental issue, problem, or phenomenon.
  - Classroom instruction
- Outdoor Field Experiences: Students participate in one or more outdoor field experiences to further investigate the issue.
  - Activities on school grounds or off-site which answer student questions and inform student actions.
- Synthesis and Conclusions: Students identify, synthesize, and apply evidence from their investigations to draw conclusions and make claims about the issue.
  - Communicate conclusions to internal and external audiences
- Action Projects: Students identify, explore, and implement solutions for action.
  - Solutions based on conclusions and claims drawn through investigation



# Supporting Practices: What Teachers Do

- **Active Teacher Support:** Involve teacher facilitation and ongoing support of student learning.
- **Classroom Integration:** Anchored to curriculum standards and support formal goals for learning and student achievement.
- **Local Context:** occur within a local context (i.e., schoolyard, neighborhood, town, or community) to establish the life-relevancy of the issue being studied
- **Sustained Activity:** While the field experience may occur on one day, the learning experiences are spread over the course of a unit or multiple units.



# What are you currently doing?

Example: Students go into the garden to see if there are any bugs in their school gardens. They have magnifying glasses and a clipboard to chart mark when they see something.

## **| Issue Definition**

Loss of habitat in urban areas that support pollinators. Food system is dependent on pollinators. How is our school part of this issue? What can students do to help?

## **| Synthesis and Conclusions**

What can we say about the bugs in our garden? What changes can we make in the garden to increase the presence of beneficial insects? Who could we tell about our findings?

## **| Outdoor Field Experiences**

Visits to the garden to make observations. Are there bugs in the garden? Do certain plants attract certain bugs? Are there any insects that we definitely want to see (bees, butterflies) but aren't there?

## **| Action Projects**

What do students want to do with the information they have gathered? Plant more pollinating plants? Create signage?



# What are you currently doing?

Example: Students go into the garden to see if there are any bugs in their school gardens. They have magnifying glasses and a clipboard to chart mark when they see something.

## **| Active Teacher Support**

Classroom teacher is involved in planning and implementing the lessons and activities in partnership with the school garden coordinator or other teachers.

## **| Classroom Integration**

Correlated with learning standards, DCPS Cornerstones, etc.

## **| Local Context**

Schoolyard – someplace they should be going every day.

## **| Sustained Activity**

Visits to the schoolyard throughout the year – does not have to be just once.

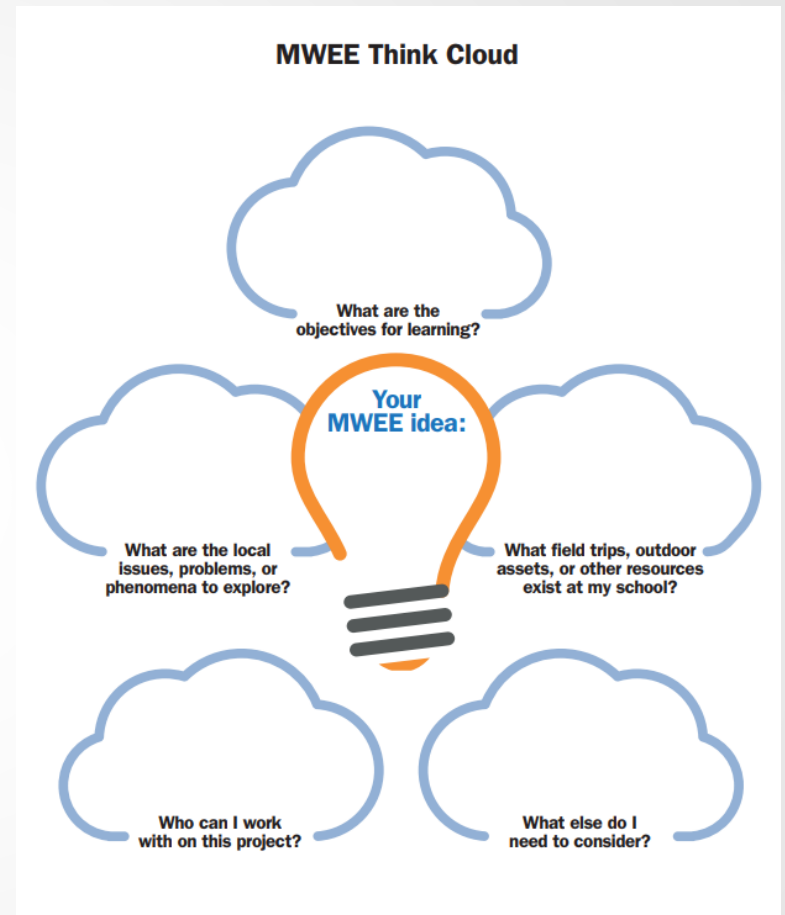




# Planning and Implementation Tools

## MWEE Planning Toolbox

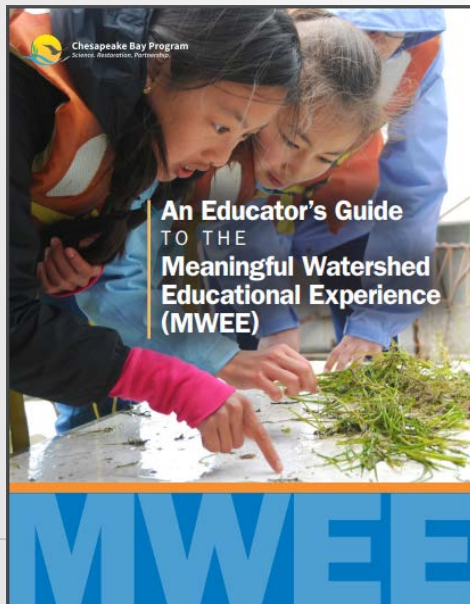
- Worksheets that help develop driving questions, identify field study sites, and brainstorm action projects
- Maryland's Environmental Literacy Model uses similar steps to help plan (curriculum anchor, issue investigation, stewardship and civic action)
- MWEE Audit Tool to help assess the degree to which your project already contains MWEE elements





# MWEE-Specific Resources

- [Bay Backpack](#) – clearinghouse of information
  - MWEE Educator’s Guide and Toolkit (download links on sidebar):  
<http://baybackpack.com/mwee/what-is-a-mwee>
  - School Grounds for Learning:  
[http://baybackpack.com/schoolyard\\_projects/about](http://baybackpack.com/schoolyard_projects/about)





# Resources: BY DC Teachers FOR DC Teachers

## Environmental Literacy Framework

*for the District of Columbia*

Environmental literacy is the development of knowledge, attitudes, and skills necessary to make informed decisions concerning the relationships between natural and urban systems.



An environmentally literate\* person:

- can discuss and describe ecological and environmental systems and human impacts on these systems;
- engages in hands-on, outdoor learning experiences that involve discovery, inquiry, and problem solving;
- is able to question and analyze information pertaining to his or her surrounding environment; and
- has the capacity to take actions that respect, restore, protect, and sustain the health and well-being of human communities and environmental systems.

\*as defined in the DC Environmental Literacy Plan adopted 2014

- Aligned with NGSS
- Guiding questions
- Suggestions for field experiences at every grade level
- Real-world applications of STEM





# Environmental Literacy Framework

The Environmental Literacy Framework is a guide for schools that identifies the knowledge and skills District students need to become environmentally literate. The framework is outlined by **grade level** (Pre-K–Grade 8) or **science subject area** (high school) and aligned with the **Next Generation Science Standards (NGSS) Performance Expectations**. Included are **environmental contexts for learning** and **guiding questions** designed to scaffold content appropriate to each grade level. Based on themes taken from the Sustainable DC Plan, **sustainability initiatives** provide starting points for in-depth investigations and suggestions for extending learning beyond the classroom.

Grade Level	NGSS Performance Expectations	Environmental Contexts for Learning: Guiding Questions	Sustainability Initiatives
Pre-K	See the District of Columbia's Early Learning Standard 5.0: Scientific Inquiry*	<b>The World Around Us:</b> How can we use our five senses to learn about the environment?	<b>Nature:</b> Extend your classroom into the schoolyard.
K	K-PS3-1, K-PS3-2, K-LS1-1, K-ESS2-2, K-ESS3-1, K-ESS2-1, K-ESS3-2.	<b>Living Things:</b> What do plants and animals need to survive?	<b>Nature/Food:</b> Visit an urban garden or farm.
1	K-2-ETS-1-1, 1-LS1-2, 1-LS3-1, 1-ESS1-1, 1-ESS1-2.	<b>Patterns and Growth:</b> How do natural patterns affect living things? How do plants and animals change over the course of their lives?	<b>Nature:</b> Visit a zoo/aquarium.
2	2-PS2-1, 2-PS2-2, 2-LS2-1, 2-LS2-2, 2-LS4-1, 2-ESS2-1, 2-ESS2-2, 2-ESS2-3.	<b>Changing Landscapes:</b> How do plants and animals support each other in our community? What forces change our local landscape?	<b>Water:</b> Explore a local waterway. <b>Built Environment:</b> Survey your neighborhood.
3	3-LS2-1, 3-LS3-2, 3-LS-4, 3-ESS2-1, 3-ESS2-2, 3-ESS3-1.	<b>Environmental Changes and Adaptations:</b> How have local changes in climate affected the environment? How do living things adapt to changes in the environment?	<b>Nature:</b> Travel to a rural farm. <b>Waste:</b> Tour a recycling center or landfill.
4	4-PS3-2, 4-PS3-4, 4-ESS3-1, 4-ESS3-2, 4-LS1-1, 4-LS1-2, 4-ESS1-1, 4-ESS2-1.	<b>Earth's Resources:</b> How do humans use natural resources? What processes influence the Earth's physical features?	<b>Waste:</b> Conduct a cafeteria waste audit. <b>Transportation:</b> Organize a walk/bike to school day.
5	5-PS3-1, 5-LS1-1, 5-LS2-1, 5-ESS2-1.	<b>Web of Life:</b> We are what we eat; how does energy cycle through the food web? How do the four spheres of the Earth's systems interact?	<b>Food/Water/Nature:</b> Engage in an overnight Meaningful Watershed Educational Experience.

\*NGSS does not include standards for Pre-K.

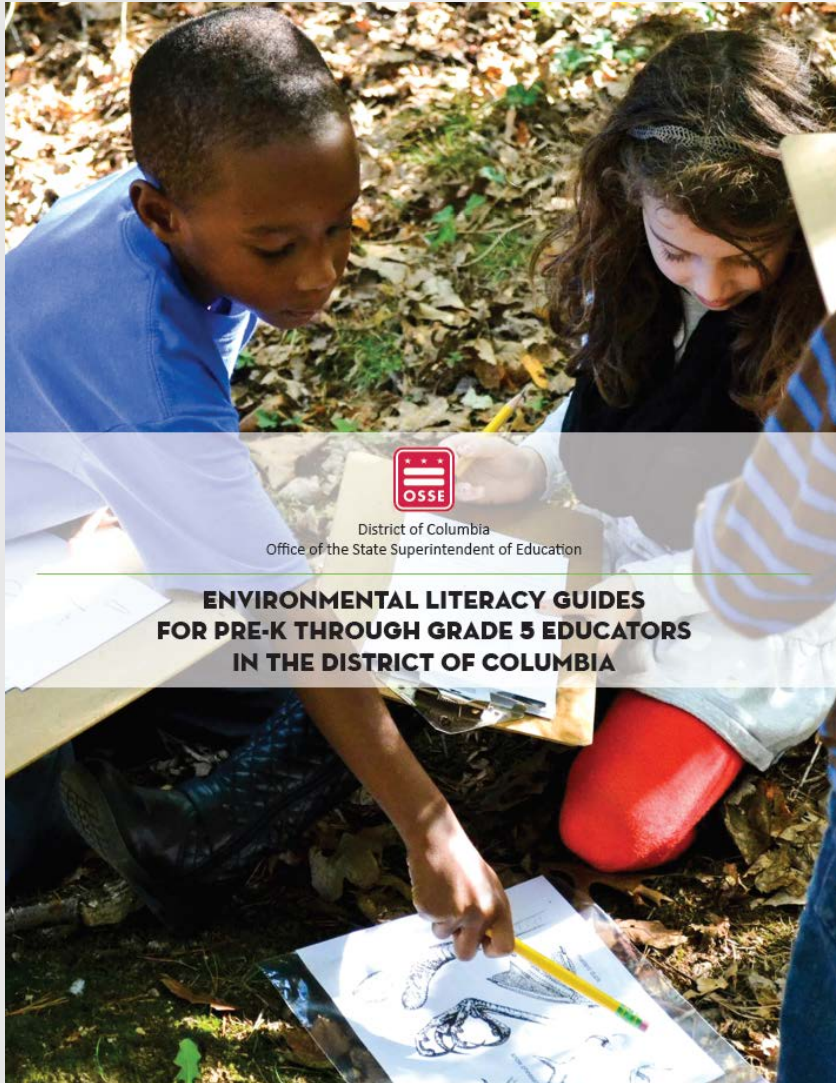
Grade Level	NGSS Performance Expectations	Environmental Contexts for Learning: Guiding Questions	Sustainability Initiatives
6	MS-ESS3-1, MS-ESS3-2, MS-ESS3-3, MS-ESS3-4, MS-ESS3-5.	<b>Earth and Human Activity:</b> What are the consequences of human activity on air, land, and water over time?	<b>Built Environment:</b> Tour a green infrastructure site.
7	MS-LS2-1, MS-LS2-2, MS-LS2-3, MS-LS2-4, MS-LS2-5.	<b>Exploring Solutions:</b> How can we creatively address the environmental consequences of human activity?	<b>Nature/Water:</b> Improve local watershed health by reducing stormwater runoff at your school. <b>Food:</b> Define healthy-eating and design a personal healthy-eating goal.
8	M5-PS3-1, M5-PS3-2, M5-PS3-3, M5-PS3-4, M5-PS3-5.	<b>Earth Works:</b> How do the choices you make affect the environment?	<b>Waste:</b> Analyze your carbon footprint and create a personal action plan to reduce it. <b>Energy:</b> Conduct a school-wide energy audit.

High School Subject Area	NGSS Performance Expectations	Environmental Contexts for Learning: Guiding Questions	Sustainability Initiatives
Earth Science	HS-ESS2-2, HS-ESS2-4, HS-ETS1-1, HS-ESS3-1, HS-ESS3-5, HS-ETS1-1.	<b>Our Changing Planet:</b> How do changes in climate occur, and how do they impact Earth's systems and human activity?	<b>Waste/Transportation:</b> Research the ways current transportation and waste systems impact climate.
Biology	HS-LS1-5, HS-LS1-6, HS-LS1-7, HS-LS2-1, HS-LS2-2, HS-LS2-7, HS-ETS1-2.	<b>Designing and Evaluating Solutions:</b> What are the ecological impacts of our food choices? How can humans reduce their environmental footprint?	<b>Food:</b> Design and evaluate a nutrition plan for a healthy adult that supports a sustainable local food system. <b>Nature:</b> Conduct a biodiversity transect.
Chemistry	HS-PS1-2, HS-PS1-3, HS-PS1-6, HS-ESS2-2, HS-ESS2-5, HS-ESS2-6, HS-ETS1-3.	<b>Collect and Analyze Data:</b> What evaluation can be made about the health of the District and its residents based on a cross-section of data?	<b>Nature/Water:</b> Conduct water-, soil-, and air-quality tests in the District and analyze the results.
Physics	HS-PS3-3, HS-PS3-4, HS-ETS1-4.	<b>Alternative Energy:</b> What innovations will help meet future energy needs?	<b>Energy/Built Environment:</b> Compare the efficiency of existing power systems and design a carbon-neutral energy generation system.





# Environmental Literacy Guides



- Expanded the Environmental Literacy Framework
- Aligned with NGSS and C3 Framework for Social Studies State Standards
- Suggestions for activities in different locations
  - Classroom
  - School Grounds
  - Nearby
  - Off-Site



# Example Grades

## GRADE 1

By the end of first grade, an environmentally literate student knows how natural patterns affect living things and how different cultures interact with the environment.



### NGSS Performance Expectations

- 1-LS1-1. Use materials to design a solution to a human problem by mimicking how plants and/or animals use their external parts to help them survive, grow, and meet their needs.
- 1-LS3-1. Make observations to construct an evidence-based account that young plants and animals are like, but not exactly like, their parents.
- 1-ESS1-1. Use observations of the sun, moon, and stars to describe patterns that can be predicted.

### College, Career, and Civic Life (C3) Framework for Social Studies State Standards

- D2.Eco.4.K-2. Describe the goods and services that people in the local community produce and those that are produced in other communities.
- D2.Geo.4.K-2. Explain how weather, climate, and other environmental characteristics affect people's lives in a place or region.
- D2.Geo.9.K-2. Describe the connection between the physical environment of a place and the economic activities found there.

### Essential and Guiding Questions

- How do natural patterns affect living things?
- How do plants and animals change over the course of their lives?
- How do humans mimic plants and animals to solve problems?

### Example Activities

CLASSROOM	SCHOOL GROUNDS	NEARBY	OFF-SITE
<ul style="list-style-type: none"> <li>• Create a sun dial and make regular observations.</li> <li>• Research examples of products that mimic nature (e.g., helmet/turtle shell).</li> <li>• Identify how climate and the environment affect economy and trade of Maya, Aztec and Inca cultures.</li> </ul>	<ul style="list-style-type: none"> <li>• Plant sunflowers and observe how they move during the day towards the sun.</li> <li>• Raise butterfly larvae to draw how animals change over time.</li> <li>• Observe how different materials absorb or reflect sunlight and heat on the playground.</li> </ul>	<ul style="list-style-type: none"> <li>• Go on a community walk four times per year (once per season).</li> <li>• Sketch observations of different plants to observe changes over time.</li> </ul>	<ul style="list-style-type: none"> <li>• Partner with local businesses whose work reflects items found in nature (e.g., helicopter/seeds, bike shop for helmets/turtles).</li> <li>• Learn how Native American cultures connect with the environment at the National Museum of the American Indian.</li> </ul>

## GRADE 4

By the end of fourth grade, an environmentally literate student knows how humans use natural resources and how what processes influence Earth's physical features.



### NGSS Performance Expectations

- 4-ESS3-1. Obtain and combine information to describe that energy and fuels are derived from natural resources and their uses affect the environment.
- 4-ESS3-2. Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.
- 4-ESS2-1. Make observations and/or measurements to provide evidence of the effects of weathering on the rate of erosion by water, ice, wind or vegetation.
- 4-ESS2-2. Analyze and interpret data from maps to describe patterns of Earth's features.

### College, Career, and Civic Life (C3) Framework for Social Studies State Standards

- D2.Eco.3.3-5. Identify examples of the variety of resources (human capital, physical capital, and natural resources) that are used to produce goods and services.
- D2.Geo.2.3-5. Use maps, satellite images, photographs, and other representations to explain relationships between the locations of places and regions and their environmental characteristics.
- D2.Geo.5.3-5. Explain how the cultural and environmental characteristics of places change over time.

### Essential and Guiding Questions

- How do humans use natural resources?
- What natural processes influence Earth's physical features?

### Example Activities

CLASSROOM	SCHOOL GROUNDS	NEARBY	OFF-SITE
<ul style="list-style-type: none"> <li>• Create a commodity chain for energy that describes where/how your school gets power and usage patterns.</li> <li>• Make stop motion films to animate the causes, types, and solutions for erosion problems in DC.</li> </ul>	<ul style="list-style-type: none"> <li>• Explore your schoolyard using the Schoolyard Report Card and look for signs of erosion and areas of vegetation. Use data compiled to plan an action project.</li> </ul>	<ul style="list-style-type: none"> <li>• Investigate potholes as an example of how natural processes impact physical features, use a 2 liter bottle, to show ice, physical weathering in a 2 liter bottle</li> <li>• Walk to a nearby stream to look for signs of erosion.</li> </ul>	<ul style="list-style-type: none"> <li>• Go on a boat trip on the Anacostia and/or Potomac River to learn about how humans have used natural resources, how that has impacted the rivers, and also observe how processes have influence the shape of the rivers (erosion, sedimentation, etc.).</li> </ul>

<https://osse.dc.gov/sites/default/files/dc/sites/osse/publication/attachments/Environmental%20Literacy%20Guides.pdf>



# Next Steps

- Think about your current garden-based activities and what you plan to do. Where is there room for student-driven investigation?
- Meet with other teachers to get ideas on what they are doing in the classroom, and how a visit to the garden can support the learning objectives.
- Brainstorm ways to lead students toward action projects – in the school garden or elsewhere in the community where they can see impact.
- Already planning for spring plantings or other activities? Use the MWEE Audit Tool to determine areas to make it a richer, more authentic learning experience.



Q&A





Please complete the  
Session Feedback Form

<https://goo.gl/forms/Mxhfld4IDmPQwnY43>