



Environmental Literacy Model

Title	Broadford Lake Restoration
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School, District	Broad Ford Elementary School, Garrett County
Audience (grade, course)	Grade 5

Curriculum Anchor	Notes
<p>Defining the Learning Objectives and Curriculum Connection</p> <p>Curriculum indicators, performance expectations, and/or learning objectives.</p> <p>LS2-1 The food of almost any kind of animal can be traced back to plants. Organisms are related in food webs in which some animals eat plants for food and other animals eat the animals that eat plants. Some organisms, such as fungi and bacteria, break down dead organisms (both plants or plants parts and animals) and therefore operate as “decomposers.” Decomposition eventually restores (recycles) some materials back to the soil. Organisms can survive only in environments in which their particular needs are met. A healthy ecosystem is one in which multiple species of different types are each able to meet their needs in a relatively stable web of life. Newly introduced species can damage the balance of an ecosystem.</p> <p>LS2-1 Matter cycles between the air and soil and among plants, animals, and microbes as these organisms live and die. Organisms obtain gases, and water, from the environment, and release waste matter (gas, liquid, or solid) back into the environment.</p> <p>ESS2.A Earth’s major systems are the geosphere (solid and molten rock, soil, and sediments), the hydrosphere (water and ice), the atmosphere (air), and the biosphere (living things, including humans). These systems interact in multiple ways to affect Earth’s surface materials and processes. The ocean supports a variety of ecosystems and organisms, shapes, landforms, and influences climate.</p>	

Winds and clouds in the atmosphere interact with the landforms to determine patterns of weather.

ESS2.C Nearly all of Earth's available water is in the ocean. Most freshwater is in glaciers or underground; only a tiny fraction is in streams, lakes, wetlands, and the atmosphere.

ESS3.C Human activities in agriculture, industry, and everyday life have had major effects on the land, vegetation, streams, ocean, air, and even outer space. But individuals and communities are doing things to help protect Earth's resources and environments.

ESS1-1 Support an argument with evidence, data, or a model.

ESS2-1 Develop a model using an example to describe a scientific principle.

3-5-ETS1-2 Generate and compare multiple solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.

5.NBT.A.3a and b Read, write, and compare decimals to thousandths. (builds on grade 4 work to hundredths)

5.NBT.B.7 Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

D2.Geo.1.3-5. Construct maps and other graphic representations of both familiar and unfamiliar places.

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.3.3-5 Use maps of different scales to describe the locations of cultural and environmental characteristics.

D2.His.2.3-5 Compare life in specific historical time periods to life today

SL4 Report on a topic or text or present an opinion, sequencing ideas logically and using appropriate facts and relevant, descriptive details to support main ideas or themes; speak clearly at an understandable pace.

W7 Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.

RI 4 Determine the meaning of general academic and domain-specific words and phrases in a text relevant to a grade 5 topic or subject area

Describing the Local Context

The issue that will serve as the context for learning.

Water quality of Broad Ford Lake, which is the school/town (Oakland) water supply.

Special Notes:

Each school will need to identify a water source nearby to explore water quality issues

Schools without an option may work with Broad Ford Elementary

Broad Ford students can travel to other schools

Identifying the Driving Question

A broad, open-ended, life-relevant question that is based on the standards/learning objectives. Guides inquiry for the investigation(s) and prompts the development of actionable claims.

How can we improve the water quality of local water sources?

*Keep this as open-ended as possible, allowing students to have input

Issue Investigation	Notes
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<p>Asking Questions, Defining Issues and Problems</p> <p>Students define the issue, problem, or phenomenon to be investigated and develop questions that are relevant for investigation.</p> <p>Possible student questions:</p> <p>How does agriculture affect the quality of water and the ecosystem?</p> <p>Do plants help improve water quality?</p> <p>How does stormwater runoff affect the water quality?</p>	<p>Students will be guided to think about questions relative to the driving question.</p>
<p>Planning and Conducting Investigations</p> <p>Students develop plans for collecting, analyzing, and communicating information and/or data to help them answer their questions and understand the problem. Students identify and justify appropriate sources of information and/or data, and determine methodologies for the collection of information and/or data.</p> <p>Build background knowledge with content vocabulary</p> <p>PIERS Lessons (Raindrops to Runoff to Oceans)</p> <p>Water testing, water filters, and micro/macrobenthos at Camp Hickory (Overnight Trip) - Students will learn how to conduct various water tests to determine water quality. They will then use their knowledge of these tests at the Broad Ford Lake site.</p> <p>Broadford Lake (early fall & spring) Students will complete water quality tests. By completing them at different times, they can compare results.</p> <p>GPS & GIS (to mark locations of testing sites) Field Scope</p> <p>Students will use GIS information to determine land use, water flow, and possible issues.</p> <p>History of Broadford Lake - Students will locate information about the lake's history. (Dept. of Environment, Maryland DNR)</p> <p>Test water for baseline data</p>	<p>*Possible partnerships between middle school/high school students, Bass Slayers (SGHS fishing team)</p> <p>This research is how students will understand the importance of their work at Broadford Lake. (town of Oakland's water supply)</p>

<p>Action Project chosen by students (coordinate w/ DNR)</p> <p>Return to the site periodically to collect data for monitoring</p> <p>Link to MWEE lesson plans and supporting documents:</p> <p>MWEE Lessons - BFES/Discover</p>	<p>*coordinate w/ DNR to communicate with landowners and for grant writing</p>
<p>Analyzing and Interpreting Data</p> <p>Students present and share information and/or data to reveal patterns that indicate relationships. Students apply disciplinary concepts as they analyze and interpret information and/or data to make sense of the issue, problem, or phenomenon.</p> <p>Students will use data collected from Pasco sensors – temperature, pH, dissolved oxygen, turbidity, soil pH to analyze water quality and to monitor improvements</p>	<p>Camp Hickory (Overnight Trip)</p> <p>Field Experience at Water Source (Broadford Lake)</p> <p>Ongoing data collection from subsequent visits to the water source prior to action project and after the action project has been implemented</p>
<p>Constructing, Communicating, and Refining Explanations</p> <p>Students identify, synthesize, and apply evidence from their investigations (for example, measurements, observations, and patterns) to draw conclusions about the driving question.</p> <p>Students will use data to identify problem areas around the lake and to propose solutions</p>	<p>*Facilitated by the teacher</p>

<p>Stewardship and Civic Action</p>	<p>Notes</p>
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<p>Developing a Claim and Identifying Solutions</p> <p>Students develop a claim based on conclusions drawn in the Issue Investigation. The claim should reflect a problem, challenge, or opportunity that warrants informed action. Students identify and explore solutions to address the problem, challenge, or opportunity reflected in their claim.</p> <p>Students will discuss possible site locations for improvements. Come to a consensus on the best location for project focus.</p>	
<p>Designing a Plan and Taking Informed Action</p> <p>Students design a plan for implementing solutions through informed action in their classrooms, schools, and/or communities. The plans should include criteria for determining the extent to which the action successfully addresses the problem, challenge, or opportunity reflected in the claim. Students implement their plans.</p> <p>Students will make a plan for communicating with stakeholders. They will present data and project idea to community members as a way to encourage local support for the watershed improvement project.</p> <p>Persuasive writing to landowners/stakeholders and/or community members and business owners</p>	
<p>Evaluating Action</p> <p>Students reflect on the action and determine the extent to which it successfully addresses the problem, challenge, or opportunity reflected in the claim. Students share proposals for sustaining or extending the action.</p> <p>Reflection journal</p> <p>Presentation to 4th graders</p>	<p>Option – digital journal</p>

