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The Chesapeake Bay Foundation: Saving a National Treasure

The Chesapeake Bay Foundation is an independent conservation organization working to restore the Chesapeake Bay and surrounding watershed through education, advocacy, restoration, and education.

CBF’s Environmental Education Department
With the largest full-time environmental education staff in the country, our programs provide learner-centered experiences that allow participants to develop understandings of the connections between human activities and the local environment. We partner with teachers, administrators, school districts, and other field-based providers to foster and advocate for environmental literacy and stewardship across the watershed. Our mission is to create a constituency of informed and inspired citizens who will value the Chesapeake as a living, connected system, and who will act to restore clean water and ensure a high quality of life for all inhabitants.

Teacher Professional Learning: Chesapeake Classrooms
The Chesapeake Bay Foundation works to advance environmental education and support classroom learning goals through our Chesapeake Classrooms teacher professional learning program.

Chesapeake Classrooms provides high-quality learning experiences that prepare and empower teachers to increase student engagement, achievement, and stewardship by incorporating environmental literacy and watershed education into their academic programs. Chesapeake Classrooms uses the Meaningful Watershed Educational Experience (MWEE) model for teaching and learning by actively engaging teachers in hands-on experiences in which the core ideas and practices of multiple disciplines are applied to make sense of the relationships between the natural world and society.

The Chesapeake Classrooms program is supported by CBF’s Teacher Environmental Literacy Leaders (TELL) network, an established professional community of teacher leaders in environmental literacy and watershed education. Teachers in the TELL network participate in professional learning experiences focused on content, pedagogical strategies, and leadership skills to support environmental literacy. TELL network participants serve as resource providers, instructional and curricular specialists, and mentors on Chesapeake Classrooms courses; strengthening the role and reach of environmental literacy throughout the watershed and providing support to teachers as they design and implement MWEEs for their students.

Chesapeake Classrooms courses are designed to support state and local educational standards in Maryland, Virginia, Pennsylvania, and the District of Columbia and teacher participants are eligible to earn continuing education or graduate credit through participation in the programs.

For more information on the Chesapeake Classrooms professional learning program, visit cbf.org/ccsummer.
Field Investigation Journal
Course Title: ________________________________________________________________

Dates: ________________________________________________________________

Course Leader(s): __________________________________________________________

Course Leader(s) e-mail: ____________________________________________________

Driving Question: __________________________________________________________

Investigative Questions:

1. ________________________________________________________________
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   ________________________________________________________________

2. ________________________________________________________________
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3. ________________________________________________________________
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4. ________________________________________________________________
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5. ________________________________________________________________
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Day 1

Driving Question: ________________________________________________

Investigative Question(s): _________________________________________

Local issues/problems or phenomena: ________________________________

Weather: _________________________________________________________

Notes: __________________________________________________________

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Journal Entry: ____________________________________________________

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Today supported:

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<thead>
<tr>
<th>MWEE Essential Elements</th>
<th>MWEE Supporting Practices</th>
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<tr>
<td>☐ Issue Definition</td>
<td>☐ Active Teacher Support</td>
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<td>☐ Classroom Integration</td>
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<tr>
<td>☐ Synthesis and Conclusions</td>
<td>☐ Local Context</td>
</tr>
<tr>
<td>☐ Action Projects</td>
<td>☐ Sustained Activity</td>
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Questions for tomorrow: __________________________________________

________________________________________________________________

How the Day Supported MWEE Essential Elements: ___________________
Day 2

Driving Question: ________________________________________________________________

Investigative Question(s): ________________________________________________________

Local issues/problems or phenomena: ______________________________________________

Weather: _______________________________________________________________________

Notes: ________________________________________________________________________

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________________________________________________________________________________

Journal Entry: ___________________________________________________________________

________________________________________________________________________________

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________________________________________________________________________________

Today supported:

MWEE Essential Elements

☐ Issue Definition ☐ Outdoor Field Experience ☐ Synthesis and Conclusions ☐ Action Projects

MWEE Supporting Practices

☐ Active Teacher Support ☐ Classroom Integration ☐ Local Context ☐ Sustained Activity

Questions for tomorrow: ____________________________________________________________

________________________________________________________________________________

________________________________________________________________________________

How the Day Supported MWEE Essential Elements: _________________________________

________________________________________________________________________________

________________________________________________________________________________
Day 3

Driving Question: ____________________________________________________________

Investigative Question(s): ____________________________________________________

Local issues/problems or phenomena: _____________________________________________

Weather: _________________________________________________________________

Notes: ____________________________________________________________________

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Journal Entry: __________________________________________________________________

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<tr>
<td>□ Issue Definition</td>
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<table>
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</thead>
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<tr>
<td>□ Active Teacher Support</td>
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Questions for tomorrow: ______________________________________________________

___________________________________________________________________________

___________________________________________________________________________

How the Day Supported MWEE Essential Elements: ________________________________

___________________________________________________________________________

© 2019 Chesapeake Bay Foundation
Day 4

Driving Question: ____________________________________________________________

Investigative Question(s): _______________________________________________________

Local issues/problems or phenomena: ____________________________________________

Weather: ____________________________________________________________________

Notes: _____________________________________________________________________

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Journal Entry: ______________________________________________________________________

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Today supported:

MWEE Essential Elements

☐ Issue Definition  ☐ Outdoor Field Experience  ☐ Synthesis and Conclusions  ☐ Action Projects

MWEE Supporting Practices

☐ Active Teacher Support  ☐ Classroom Integration  ☐ Local Context  ☐ Sustained Activity

Questions for tomorrow: _________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

How the Day Supported MWEE Essential Elements: ___________________________________

____________________________________________________________________________
Day 5

Driving Question: ______________________________________________________________

Investigative Question(s): ______________________________________________________

Local issues/problems or phenomena: ____________________________________________

Weather: ___________________________________________________________________

Notes: _____________________________________________________________________

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Journal Entry: __________________________________________________________________

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Today supported:

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</tr>
</thead>
<tbody>
<tr>
<td>□ Issue Definition</td>
<td>□ Outdoor Field Experience</td>
<td>□ Synthesis and Conclusions</td>
<td>□ Action Projects</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>MWEE Supporting Practices</th>
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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>□ Active Teacher Support</td>
<td>□ Classroom Integration</td>
<td>□ Local Context</td>
<td>□ Sustained Activity</td>
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</tbody>
</table>

Questions for tomorrow: _________________________________________________________

____________________________________________________________________________

____________________________________________________________________________

How the Day Supported MWEE Essential Elements: ________________________________

____________________________________________________________________________
## Species Identification List

<table>
<thead>
<tr>
<th>SPECIES</th>
<th>LOCATION</th>
<th>QUANTITY</th>
<th>NOTES</th>
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Species Identification List (continued)

<table>
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<tr>
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<th>QUANTITY</th>
<th>NOTES</th>
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# Water Quality Testing Data:

## WATER QUALITY INVESTIGATION

<table>
<thead>
<tr>
<th>ABIOTIC FACTORS</th>
<th>SITE 1</th>
<th>SITE 2</th>
<th>SITE 3</th>
<th>SITE 4</th>
<th>SITE 5</th>
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<tr>
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<td>Time</td>
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<td>Tide</td>
<td></td>
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</tr>
<tr>
<td>Weather</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dissolved O₂</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Turbidity</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Nitrates</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Phosphates</td>
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<tr>
<td>pH</td>
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</tr>
<tr>
<td>Salinity</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**Legend for Dissolved O₂**
- 0 ppm
- 3 ppm
- 5 ppm
- 12 ppm
- Poor
- Fair
- Good

**Legend for Turbidity**
- 0 cm
- 50 cm
- 100 cm
- 150 cm
- 200 cm
- Poor
- Fair
- Good
- Excellent

**Legend for Nitrates**
- 0 ppm
- 0.5 ppm
- 1.0 ppm
- 1.5 ppm
- Poor
- Fair
- Good

**Legend for Phosphates**
- 0.0 ppm
- 0.1 ppm
- 0.15 ppm
- Poor
- Fair
- Good

**Legend for pH**
- 0
- 2
- 4
- 6
- 8
- 10
- 12
- 14

**Legend for Salinity**
- 0 ppt
- 34 ppt
- Fresh
- Brackish
- Salt
Designing Meaningful Watershed Educational Experiences (MWEE): Chesapeake Classrooms Project
Meaningful Watershed Educational Experiences

MWEEs are learner-centered experiences that focus on investigations of local environmental issues that lead to informed action and civic engagement.

MWEEs consist of four essential elements that describe what students do.

**MWEE ESSENTIAL ELEMENTS:**
- Issue Definition
- Outdoor Field Experiences
- Synthesis and Conclusions
- Action Projects

The MWEE also includes four supporting practices that describe “what teachers do” to ensure success.

**MWEE SUPPORTING PRACTICES**
- Active Teacher Support
- Classroom Integration
- Local Context
- Sustained Activity

The Teaching Resources Collections on Bay Backpack provide information, lesson plans, and classroom resources about the Bay and its watershed. Access this information at baybackpack.com/collections.

The Environmental Literacy Model (ELM) is a tool that may be used to think through the details of a MWEE. ELM is designed to help situate the MWEE within the scope and sequence of your curricular program. It also helps to communicate to administrators, school leaders, colleagues, and others how field-based investigations and student action work to support academic standards of learning within the MWEE.

ELM features three primary components which directly align to MWEE essential elements and supporting practices:
- Curriculum Anchor
- Issue Investigation
- Stewardship and Civic Action

The Curriculum Anchor identifies connections to academic standards and establishes life-relevant, local contexts for learning. Defining the learning objectives and driving question within the local context addresses the MWEE essential element of Issue Definition and the supporting practices of Classroom Integration and Local Context.
**Issue Investigation** provides the opportunity for students to construct knowledge and understanding through field-based investigations of a life-relevant phenomenon, problem, or issue. Students work together throughout the investigation to construct, communicate, and refine explanations about the driving question, and thus participate in the MWEE essential elements of *Outdoor Field Experiences* and *Syntheses and Conclusions*.

**Stewardship and Civic Action** empower students to adapt and apply the knowledge they've constructed through investigation. As students develop a claim, identify solutions, design plans, and take informed action, they again address the MWEE essential element of *Syntheses and Conclusions*, and also fulfill the essential element requirement for *Action Projects*.

By doing the full suite of activities outlined in the ELM Planning Document, the supporting strategies of *Active Teacher Support* and *Sustained Activity* from the MWEE are also fulfilled.

---

### ENVIRONMENTAL LITERACY MODEL (ELM)

<table>
<thead>
<tr>
<th>MLEE Essential Elements</th>
<th>Curriculum Anchor</th>
<th>Issue Investigation</th>
<th>Stewardship and Civic Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Issue Definition</td>
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<td>Outdoor Field Experiences</td>
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</tr>
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<td>Synthesis and Conclusions</td>
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<tr>
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<table>
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<th>Issue Investigation</th>
<th>Stewardship and Civic Action</th>
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<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Classroom Integration</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
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<td>Local Context</td>
<td>✓</td>
<td></td>
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</tr>
<tr>
<td>Sustained Activity</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>

The Environmental Literacy Model (ELM) was developed through the Maryland Environmental Literacy Partnership and has been updated in partnership with the Chesapeake Bay Program for use with MWEEs. For more information on ELM, please visit cbf.org/mwee.
The Environmental Literacy Model

Chesapeake Classrooms uses the Environmental Literacy Model (ELM) to support teachers in the development and curricular integration of Meaningful Watershed Educational Experiences.

The Environmental Literacy Model features three primary components:
- Curriculum Anchor
- Issue Investigation
- Stewardship and Civic Action

**CURRICULUM ANCHOR**
Serves to situate the issues investigations and civic engagement within the scope and sequence of a curriculum.

- **Defining the Learning Objectives and Curriculum Connection:** Provides a foundation and connection to standards, curriculum, and/or performance indicators. The learning objectives organize concepts and inform practices emphasized in investigations and civic action.
- **Describing the Local Context:** This component establishes the local connections and life-relevancy of the content and core ideas in the learning. It describes the local environmental phenomenon, problem, or issue in which learning will be situated.
- **Driving Question:** A broad, open-ended, life-relevant question that is based on the standards/learning objectives. The driving question guides inquiry for the investigation(s) and prompts the development of actionable claims through civic engagement.

**ISSUE INVESTIGATION**
Provides the opportunity for students to construct knowledge and understandings about the content/core ideas of the learning objectives through the investigation of a life—relevant issue, problem, or phenomenon.

- **Asking Questions, Defining Issues and Problems:** Students and teachers work together to define the issue, problem, or phenomenon to be investigated and develop questions that are relevant for investigation. Note that this may be ongoing throughout the investigations.
- **Planning & Conducting Investigations:** 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.
• **Analyzing & Interpreting Data:** 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 or phenomenon.

• **Constructing, Communicating, & Refining Explanations:** Students identify, synthesize, and apply evidence from their investigations (for example, measurements, observations, and patterns) to draw conclusions about the driving question. These conclusions will be used to develop claims for informed action.

**STEWARDSHIP AND CIVIC ACTION**
Provides the opportunity for students to adapt and apply the knowledge they’ve constructed through investigation toward authentic, meaningful action.

• **Developing a Claim and Identifying Solutions:** Students work together to develop and present claims based on conclusions drawn in the Issue Investigation. The claims should reflect how the phenomenon, problem, issue explored in the investigations warrants informed action. Students identify and explore solutions to address the phenomenon, problem, or issue reflected in their claim(s).

• **Designing a Plan and Taking Informed Action:** Students develop a plan for implementing solutions to their claims based 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.

• **Evaluating Action:** Students reflect on the action(s) and reflect on 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.
Chesapeake Classrooms Project

Design a Meaningful Watershed Educational Experience (MWEE) For Your Students

PURPOSE

The goal of this assignment is for Chesapeake Classrooms participants to apply their understandings of environmental literacy toward designing a Meaningful Watershed Educational Learning Experience (MWEE) for their students. Throughout the Chesapeake Classrooms course, we will be using the tools in the MWEE Planning Toolbox to develop a plan for how academic learning objectives may be met through locally relevant environmental investigations and informed action. The MWEE Planning Toolbox can be found in the Chesapeake Classrooms Teacher’s Guide as well as in the Educator’s Guide to the Meaningful Watershed Educational Experiences.

Teachers are asked to use the Environmental Literacy Model (ELM) planning document and the ELM Capture Sheet to construct and communicate their MWEEs.

The Chesapeake Classrooms MWEE Project is made up of two parts:

1. ELM Planning Document—This document enables teachers to demonstrate how they might translate the knowledge and skills developed through Chesapeake Classrooms into meaningful learning experiences for their students. The ELM Curriculum Planning Tool consists of three parts: Curriculum Anchor, Issues Investigation, and Stewardship and Civic Action.

2. ELM Capture Sheet—This capture sheet will serve as a summary of your MWEE project.

DIRECTIONS

1. Use the tools in the MWEE Planning Toolbox to plan for using a locally relevant environmental problem, issue, phenomenon, or opportunity as the foundation for achieving learning goals. The MWEE Planning Toolbox can be found in the Chesapeake Classrooms Teacher’s Guide as well as in the Educator’s Guide to the Meaningful Watershed Educational Experiences.

2. A complete Planning Document will include descriptions of how each component of a MWEE will be addressed and links for key lessons and resources. The lessons do not need to be original—please cite sources.

3. Use the ELM Capture Sheet to summarize your plan. (You may choose to use the Capture Sheet as a graphic organizer to help plan what you will enter into the ELM Planning Document, or you may choose to complete the Capture Sheet after you’ve completed the ELM Planning Document).

4. Submit all materials through SharePoint by September 1, 2019. For detailed instructions on accessing and uploading materials to SharePoint, refer to the following instructions.

Each Teacher Environmental Literacy Leadership (TELL) mentor will use the MWEE Audit Tool to provide feedback to each teacher on his/her MWEE. A “passing” score of 70 or higher is required for successful course completion and credit.
Accessing the SharePoint Site

This is a step-by-step guide to access the Chesapeake Classrooms or TELL SharePoint site.

Step 1:  After you register for a summer institute, you will receive an invite e-mail from SharePoint (no-reply@sharepointonline.com) to the email address you provided on the course registration form.

Step 2:  Click the orange text “Go to Chesapeake Classrooms” or the TELL site.

Step 3:  Do one of the following:

A.  If you have a Microsoft account through your school or organization (most do), click “Organizational account” and log in with your credentials.*

B.  If your email account is not through an organization or school, click “Microsoft account” and try logging in that way.

Step 4:  If neither of these options work, you will need to create an account with a Microsoft service of your choice. Click on “Create a Microsoft account, it’s quick and easy!” pictured here and follow the prompts. Once you’ve created an account, notify us of your new Microsoft account’s email address, so that you may receive another email invite for the site. Follow steps from beginning once invite is received.

*MCPS teachers will log in with their network login name @mcpsmd.org, not their actual email address (username@mcpsmd.org)
TROUBLESHOOTING

1. Make sure that the email address you’re trying to use has been ‘invited’ to the site. You need to be accessing the site from the email sent specifically to you by the server.

2. Star/Favorite/Archive the SharePoint invite. Access the site through that invite every time.

3. Once you click on the invite link, if prompted, choose ‘Organizational Account’—your school is an organization.

4. Your school email address and corresponding password is your login for the site.

5. Invites cannot be shared. If you lost the invitation, let us know and we will send another.

6. Check your ‘Spam’ folder if you do not see an invitation.
Capture Sheet

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<th>Title</th>
<th></th>
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<td>Author</td>
<td></td>
<td></td>
</tr>
<tr>
<td>School, District</td>
<td></td>
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<tr>
<td>Audience (grade, course)</td>
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Curriculum Anchor

<table>
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<th>Curriculum Standards/ Learning Objectives</th>
<th>Context</th>
<th>Driving Question</th>
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<tbody>
<tr>
<td>Environmental problem, issue, phenomenon, or opportunity that serves as the context for learning.</td>
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Issue Investigation

<table>
<thead>
<tr>
<th>Student Objectives</th>
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</table>

Stewardship & Civic Action

<table>
<thead>
<tr>
<th>Student Objectives</th>
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# Planning Document

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<thead>
<tr>
<th>Curriculum Anchor</th>
<th>Notes</th>
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<tbody>
<tr>
<td><strong>Defining the Learning Objectives and Curriculum Connection</strong></td>
<td>Curriculum indicators, performance expectations, and/or learning objectives.</td>
</tr>
<tr>
<td><strong>Describing the Local Context</strong></td>
<td>The issue that will serve as the context for learning.</td>
</tr>
<tr>
<td><strong>Identifying the Driving Question</strong></td>
<td>A broad, open-ended, life-relevant question that is based on the standards/learning objectives. Guides inquiry for the investigation(s), prompts the development of actionable claims.</td>
</tr>
</tbody>
</table>
## Issue Investigation

<table>
<thead>
<tr>
<th>Asking Questions, Defining Issues and Problems</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students define the issue, problem, or phenomenon to be investigated and develop questions that are relevant for investigation.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Planning and Conducting Investigations</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>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.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Analyzing and Interpreting Data</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students represent 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 or phenomenon.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Constructing, Communicating, and Refining Explanations</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students identify, synthesize, and apply evidence from their investigations (for example, measurements, observations, and patterns) to draw conclusions about the driving question.</td>
<td></td>
</tr>
<tr>
<td>Stewardship and Civic Action</td>
<td>Notes</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-------</td>
</tr>
<tr>
<td><strong>Developing a Claim and Identifying Solutions</strong>&lt;br&gt;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.</td>
<td></td>
</tr>
</tbody>
</table>

| **Designing a Plan and Taking Informed Action**<br>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. | |

| **Evaluating Action**<br>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. | |
MWEE Audit Tool

This audit tool is designed to help you strengthen your planned or existing project to meet the full definition of a MWEE as defined in the 2014 Chesapeake Bay Watershed Agreement. It will help you assess the degree to which your project already contains the MWEE elements. A low score DOES NOT mean that your project is wrong or bad!

<table>
<thead>
<tr>
<th>Classroom Integration</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>MWEEs are anchored to formal goals for learning and student achievement. They provide authentic, engaging opportunities for interdisciplinary learning that crosses traditional boundaries between disciplines. Some portions of the experience, such the outdoor field experiences, may occur off school grounds and/or be facilitated in partnership with external providers, however, the MWEE should be fully integrated into the scope and sequence of the academic program.</td>
<td></td>
</tr>
<tr>
<td>The primary academic standards and/or learning objectives are clearly defined. Multi-disciplinary objectives are encouraged. (Score 0 if not clear; Score 2 if clearly defined and connected to the issue.)</td>
<td>0 2</td>
</tr>
<tr>
<td>The MWEE clearly supports the identified academic standards and/or learning objectives. (Score 0—does not support the identified standards and/or learning objectives; Score 2—at least part of the MWEE (i.e. the issue investigation or action projects) clearly supports the identified standards and learning objectives; Score 4—all parts of the MWEE clearly and explicitly support the identified standards and learning objectives.)</td>
<td>0 2 4</td>
</tr>
<tr>
<td>The core ideas and practices of multiple disciplines are clearly defined and integrated into the MWEE. (Score 0 if one discipline is clearly defined; Score 2 if one or more disciplines are clearly defined.)</td>
<td>0 2</td>
</tr>
</tbody>
</table>

Subtotal: ____/8

**CRITERIA**

**Less than or equal to 2:** Your project needs to have a clearer connection with academic standards and/or learning objectives to be a MWEE. Don’t be discouraged, there are resources and tools to help! We suggest starting with *An Educator's Guide to the MWEE* to ensure classroom integration in your MWEE.

**Between 3 and 5:** There are elements of classroom integration, but it could be stronger with either (1) better support the academic standards and/or learning objectives you defined or (2) connect with other academic standards and/or learning objectives that may be more appropriately met through the MWEE. Review the sections where you did not score highly and see what you might be able to do to earn more points. Check out *An Educator’s Guide to the MWEE* for help.

**Greater than or equal to 6:** Congratulations! There are always areas for improvement, but your project strongly supports academic standards and learning objectives.

**AREAS FOR IMPROVEMENT**
### Local Context

MWEEs occur within a local context (i.e. schoolyard, neighborhood, town, or community) to establish the life-relevancy of the problem, issue, or phenomenon being studied. Situating the MWEE within local contexts enables students and teachers to explore how individual and collective decisions affect their immediate surroundings and how their immediate surroundings affect the larger environment.

<table>
<thead>
<tr>
<th>The project is linked to a locally relevant issue, problem, or phenomenon. &lt;br&gt;(Score 0 if your issue does not have local relevance; Score 1 if your MWEE is addressing a local issue.)</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>The MWEE provides opportunities to explore the impacts of the locally relevant (i.e. schoolyard, neighborhood, town, or community) environmental issues. &lt;br&gt;(Score 0 if the MWEE does not relate to the local schoolyard, neighborhood, town, or community; Score 1 if the local context is included, but peripheral to the learning objectives; Score 2 if the local context is integral to achieving the learning objectives.)</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 1 2</td>
</tr>
</tbody>
</table>

**Subtotal**

<table>
<thead>
<tr>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>____/3</td>
</tr>
</tbody>
</table>

**CRITERIA**

**Less than or equal to 1:** Your project needs to occur within a local context to be a MWEE. Don’t be discouraged, there are resources and tools to help! We suggest starting with *An Educator’s Guide to the MWEE* to ensure your MWEE is linked to a locally relevant issue, problem, or phenomenon.

**Greater than or equal to 2:** Congratulations! There are always areas for improvement, but overall your project is occurring within a local context.

### AREAS FOR IMPROVEMENT
## Issue Definition

<table>
<thead>
<tr>
<th>Students focus on a locally relevant environmental issue, problem, or phenomenon requiring background research and investigation. Students learn more about the issue through classroom instruction and by making observations, collecting data, conducting experiments, talking to experts, and reviewing credible publications. They also reflect on personal and stakeholder values and perspectives related to the issue.</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>The problem, issue, or phenomenon that you selected for your MWEE is clearly articulated. (Score 0 if the issue is not clear; Score 2 if the issue is clearly defined.)</td>
<td>0 2</td>
</tr>
<tr>
<td>The project makes a clear effort to increase environmental stewardship of the Chesapeake Bay and/or its watershed. (Score 0 if there is no focus on Bay-related issues; Score 1 if the driving question addresses an issue only peripherally related to the Bay or its watershed; Score 3 if the driving question addresses an issue directly related to the Bay or its watershed.)</td>
<td>0 1 3</td>
</tr>
</tbody>
</table>
| The driving question has the following characteristics: (check all that apply)  
- Supports learning objectives  
- Is relevant and related to everyday life  
- Is thought-provoking and intellectually engaging  
- Is open-ended (i.e. typically will not have a single, final, and correct answer)  
- Promotes further inquiry (i.e. raises additional questions)  
- Encompasses both natural and social systems and topics  
- Requires students to revisit the problem frequently as knowledge and understanding evolves  
- Calls for higher-order thinking, including analysis, inference, prediction, and evaluation  
- Includes concepts and practices from multiple disciplines | 0 1 3 5 |
| Students engage in background research in order to understand the issue and develop supporting questions for further investigation. (Score 0 if no background research is required; Score 1 if some background research is required; Score 2 if background research is required and directed by students.) | 0 1 2 3 |
| Students apply prior knowledge and reflect on personal and stakeholder values and perspectives related to the issue. (Score 0 if this is not incorporated; Score 2 if this is incorporated.) | 0 2 |

**Subtotal** | ____/15

### CRITERIA

**Less than or equal to 5:** Your project needs to focus on a locally relevant environmental issue, problem, or phenomenon requiring background research, further inquiry and investigation to be a MWEE. Don’t be discouraged, there are resources and tools to help! We suggest starting with An Educator’s Guide to the MWEE to ensure issue definition in your MWEE.

**Between 6 and 9:** There are elements of issue definition but the identified issue and/or questions could be more comprehensive and complex. Review the sections where you did not score highly and see what you might be able to do to earn more points. Check out An Educator’s Guide to the MWEE for help.

**Greater than or equal to 10:** Congratulations! There are always areas for improvement, but your project is focused on a locally relevant environmental issue, problem, or phenomenon requiring background research, further inquiry, and investigation.

### AREAS FOR IMPROVEMENT
### Outdoor Field Experiences

Students participate in one or more outdoor field experiences sufficient to investigate the issue, problem, or phenomenon. Investigations may involve making observations, collecting data, and/or conducting other activities required for answering their questions and informing student actions. To the extent possible, and within appropriate safety guidelines, students should be actively involved in planning the inquiry that occurs during the outdoor field experience(s). These experiences can take place off-site and on the school grounds.

| Students participate in one or more outdoor field experiences.  
(Score 0 if students do not go outside; Score 3 if students study outdoors once during the course of their MWEE; Score 6 if students study outside more than once.) | 0 3 6 |
|---------------------------------------------------------------|------|
| The outdoor field experiences are directly related to the issue and questions the students are studying.  
(Score 0 if field experiences are not related to the issue; Score 3 if field experiences are indirectly related to the issue; Score 6 if some of the field experiences are directly related to the issue but some are not directly related; Score 9 if all field experiences are directly related to the issue.) | 0 3 6 9 |
| Students are actively involved in planning the inquiry that occurs during the outdoor field experience(s).  
(Score 0 if the students are not involved at all; Score 2 if students are involved but mostly planned by the teacher/external partners; Score 4 if students are actively involved in the planning with some help from the teacher/external partners.) | 0 2 4 |
| Students are actively involved in exploring the driving question and supporting questions during the outdoor field experience(s).  
(Score 0 if the questions are not related to the outdoor experience; Score 3 if the outdoor experience is related to the driving and supporting questions; Score 6 if the outdoor experience is designed to purposefully explore the driving and supporting questions.) | 0 3 6 |

**Subtotal**  

<table>
<thead>
<tr>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>____/25</td>
</tr>
</tbody>
</table>

### CRITERIA

**Less than or equal to 9:** Your project needs to include one or more outdoor field experiences sufficient to investigate the issue, problem, or phenomenon to be a MWEE. Don’t be discouraged, there are resources and tools to help! We suggest starting with An Educator’s Guide to the MWEE to ensure robust outdoor field experiences in your MWEE.

**Between 10 and 16:** Your outdoor field experiences could be more directly connected to investigating the issue and questions being studied and/or student involvement in planning the inquiry could be increased. Review the sections where you did not score highly and see what you might be able to do to earn more points. Check out An Educator’s Guide to the MWEE for help.

**Greater than or equal to 17:** Congratulations! There are always areas for improvement, but your project has one or more outdoor field experiences sufficient to investigate the issue, problem, or phenomenon.

### AREAS FOR IMPROVEMENT
### Action Projects

Students identify, explore, and implement solutions for action. The solutions address conclusions and claims drawn through investigation. Students reflect on the action and determine the extent to which the action successfully addressed the issue, problem, or phenomenon reflected in the claim. Students may also share proposals for sustaining or extending the action.

<table>
<thead>
<tr>
<th><strong>Students participate in an action project.</strong></th>
<th><strong>Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Score 0 if no, Score 6 if yes.)</td>
<td>0 6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>The action project is directly related to the issue the students are studying.</strong></th>
<th><strong>Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Score 0 if the action project is not related to the issue; Score 3 if the action project is indirectly related to the issue; Score 7 if the action project is directly related to the issue; Score 10 if the action project is directly related and a proposed solution to the issue investigated.)</td>
<td>0 3 7 10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Students are actively involved in planning and implementing the action project.</strong></th>
<th><strong>Score</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>(Score 0 if the students are not involved at all; Score 3 if students are involved in implementation, but not design or if they plan a project but don’t implement it; Score 6 if students are involved in both, but the teacher chose the action project; Score 9 if students are involved in both and also chose the action project.)</td>
<td>0 3 6 9</td>
</tr>
</tbody>
</table>

Subtotal: $____/25$

### Criteria

**Less than or equal to 9:** Your project needs to include action projects that address conclusions and claims drawn through the investigation of your issue and questions to be a MWEE. Don’t be discouraged, there are resources and tools to help! We suggest starting with An Educator’s Guide to the MWEE to ensure robust action projects in your MWEE.

**Between 10 and 16:** There are action projects but they could be more directly connected to investigating the issue and questions being studied and/or increased student involvement in planning and implementation. Review the sections where you did not score highly and see what you might be able to do to earn more points. Check out An Educator’s Guide to the MWEE for help.

**Greater than or equal to 17:** Congratulations! There are always areas for improvement, but your project has student-centered action projects that address conclusions and claims drawn through the investigation of your issue and questions.

### Areas for Improvement
## Synthesis and Conclusions

<table>
<thead>
<tr>
<th></th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Students identify, synthesize, and apply evidence from their investigations to draw conclusions and make claims about the issue, problem, or phenomenon. Students communicate these conclusions and claims to internal and external audiences in venues that may range from the school classroom to the larger public community.</td>
<td></td>
</tr>
</tbody>
</table>

### Students have dedicated class time to make conclusions based on their research, outdoor field experiences, and related data analysis.
(Score 0 if no time; Score 2 if students have one in-class opportunity to make conclusions; Score 4 if two opportunities; Score 6 if students regularly revisit their research to make conclusions.)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Students communicate results and conclusions to an audience beyond their classroom.</td>
<td></td>
</tr>
</tbody>
</table>
(Score 0 if none; Score 2 if communicating results to audiences internally within the school [fellow students, other grades within the school, teachers, admin]; Score 4 if communicating results outside of the school [parents, community events, nonprofits, political representatives, conferences, summits]; Score 6 if communicating results to both school and community audiences.)

### CRITERIA

- **Less than or equal to 3:** Your project needs to include synthesis, conclusions, and communication of the claims drawn through the investigation of your issue and questions to be a MWEE. Don’t be discouraged, there are resources and tools to help! We suggest starting with An Educator's Guide to the MWEE to ensure robust synthesis, conclusions, and communication occur in your MWEE.
- **Between 4 and 7:** There is some synthesis, conclusions, and communication of your investigation but it can be more extensive. Review the sections where you did not score highly and see what you might be able to do to earn more points. Check out An Educator's Guide to the MWEE for help.
- **Greater than or equal to 8:** Congratulations! There are always areas for improvement, but your project has student-centered action projects that address conclusions and claims drawn through the investigation of your issue and questions.

### AREAS FOR IMPROVEMENT

Subtotal __/12
### Active Teacher Support

MWEEs depend on teacher facilitation and ongoing support of student learning. Teachers ensure that the essential elements of the MWEE come together to support academic goals for learning while creating opportunities for students to take active roles in their learning.

<table>
<thead>
<tr>
<th>CRITERIA</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level of classroom teacher’s role in determining the issue definition.</strong></td>
<td></td>
</tr>
<tr>
<td>(Score 0 if the teacher is not involved at all; Score 1 if the teacher is involved but mostly facilitated by external partners; Score 2 if teacher facilitated.)</td>
<td>0 1 2</td>
</tr>
<tr>
<td><strong>Level of classroom teacher’s role in the outdoor field investigations.</strong></td>
<td></td>
</tr>
<tr>
<td>(Score 0 if the teacher is not involved at all; Score 1 if the teacher is involved but mostly facilitated by external partners; Score 2 if teacher facilitated.)</td>
<td>0 1 2</td>
</tr>
<tr>
<td><strong>Level of classroom teacher’s role in the selection, design, and implementation of the action projects.</strong></td>
<td></td>
</tr>
<tr>
<td>(Score 0 if the teacher is not involved at all; Score 1 if the teacher is involved but mostly facilitated by external partners; Score 2 if teacher facilitated.)</td>
<td>0 1 2</td>
</tr>
<tr>
<td><strong>Level of classroom teacher’s role in the synthesis and conclusions.</strong></td>
<td></td>
</tr>
<tr>
<td>(Score 0 if the teacher is not involved at all; Score 1 if the teacher is involved.)</td>
<td>0 1</td>
</tr>
</tbody>
</table>

**Subtotal**

| ______/7 |

### CRITERIA

**Less than or equal to 2:** Your project needs to include more teacher facilitation and ongoing support of student learning to be a MWEE. Don’t be discouraged, there are resources and tools to help! We suggest starting with An Educator’s Guide to the MWEE to ensure active teacher support your MWEE.

**Between 3 and 4:** There is some teacher facilitation and ongoing support of student learning but it could be more extensive. Review the sections where you did not score highly and see what you might be able to do to earn more points. Check out An Educator’s Guide to the MWEE for help.

**Greater than or equal to 5:** Congratulations! There are always areas for improvement, but your project has active teacher facilitation and ongoing support of student learning.

### AREAS FOR IMPROVEMENT

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Sustained Activity

MWEES represent sustained activity that engages students from beginning to end. Though a field experience may occur on one day, the total duration leading up to and following the experience involves a variety of rich learning opportunities spread over the course of a unit or multiple units. Experiences such as tours, gallery visits, simulations, demonstrations, and nature walks may be instructionally useful, but alone do not constitute a MWEE.

The MWEE includes multiple opportunities for learning. Outdoor activities are fully supported through sustained classroom experiences both prior to and following the experience.

(Score 0 if the MWEE does not include multiple learning opportunities; Score 1 if the MWEE includes multiple learning opportunities, but there is no meaningful connection among these learning opportunities; Score 3 if the MWEE includes multiple, connected learning opportunities with limited classroom support before and/or after the outdoor experience(s); Score 5 if the MWEE includes multiple, connected learning opportunities with robust and intentional classroom support before and/or after the outdoor experiences.)

<table>
<thead>
<tr>
<th>Score</th>
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<tbody>
<tr>
<td>0</td>
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<tr>
<td>1</td>
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<tr>
<td>3</td>
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<tr>
<td>5</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Subtotal</th>
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</thead>
<tbody>
<tr>
<td>___/5</td>
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</tbody>
</table>

CRITERIA

Less than or equal to 1: Your project needs to be a sustained activity that engages students from beginning to end to be a MWEE. Don’t be discouraged, there are resources and tools to help! We suggest starting with An Educator’s Guide to the MWEE to ensure sustained activity in your MWEE.

Greater than or equal to 3: Congratulations! There are always areas for improvement, but your project is a sustained activity that engages students from beginning to end.

AREAS FOR IMPROVEMENT

For your project to be a MWEE it must incorporate all of the essential elements (issue definition, outdoor field experiences, action project, synthesis and conclusions) and supporting practices (classroom integration, local context, active teacher support, sustained activity) at some level. To determine if your project is a MWEE please follow the criteria below.

IF YOUR TOTAL SCORE IS:

Between 90 and 100—Grade A: Congratulations! There are always areas for improvement but overall you are running a strong MWEE.

Between 80 and 89—Grade B: Your project is meeting the full definition of a MWEE. However your MWEE could be stronger. Review the sections where you did not score highly and see what you might be able to do to earn points. Check An Educator’s Guide to the MWEE for help in those sections.

Between 70 and 79—Grade C: Your project is most likely incorporating all of the components of a MWEE. However your MWEE could be much stronger. Review the sections where you did not score highly, especially if it is an essential element section, and see what you might be able to do to earn points. Check An Educator’s Guide to the MWEE for help in those sections.

Between 60 and 69—Grade D: Your project does not contain enough components to be a MWEE. Don’t be discouraged though, there are resources and tools to help! Review the sections where you did not score highly and see what you might be able to do to earn points. We suggest starting with An Educator’s Guide to the MWEE.

Below 60: Your project is missing the essential elements necessary to meet the full definition of a MWEE. Review the sections where you did not score highly and see what you might be able to do to earn points. We suggest starting with An Educator’s Guide to the MWEE.
Resources
Find more education resources at cbf.org/teacherresources and on the Chesapeake Classrooms SharePoint page.
Planning Toolbox

The entire Educator's Guide to the Meaningful Watershed Educational Experience, including the tools in the MWEE Tool Box may be found at the Chesapeake Bay Program site, baypackpack.com and on our website at cbf.org.
The Chesapeake Bay Watershed

A watershed is all of the land whose water and rainfall will eventually drain into a particular river, lake, bay, or other body of water. The Chesapeake Bay watershed is 64,000 square miles and has 11,600 miles of tidal shoreline, including tidal wetlands and islands. The watershed encompasses parts of six states: Delaware, Maryland, New York, Pennsylvania, Virginia, and West Virginia, as well as Washington D.C. Approximately 17 million people live in the watershed; about 10 million people live along its shores or near them.

MWEE Think Cloud

What are the objectives for learning?

What are the local issues, problems, or phenomena to explore?

What field trips, outdoor assets, or other resources exist at my school?

Who can I work with on this project?

What else do I need to consider?

Your MWEE idea:
Developing Driving Questions

Driving questions are the “big picture” questions. They are central to the MWEE Essential Element of Issue Definition, which aligns with the Environmental Literacy Model’s Curriculum Anchor component. Driving questions engage students in meaningful inquiry by focusing on a locally relevant environmental problem, issue, or phenomenon. These questions—often referred to as essential questions, organizing questions, or overarching questions—are important for sparking curiosity and organizing inquiry for the issue investigation. Posed by the teacher to address specific learning standards or leverage existing resources or programming, driving questions provide students with a framework for learning across disciplines.

Supporting questions are generated by the students to help find the missing information needed to answer the driving question. They should uncover the students current knowledge about the issue, create interest, and begin to frame an investigation that addresses the driving question in a local context. Supporting questions provide an opportunity to bring in a variety of subject disciplines, strengthening the life-relevant and authentic contexts for learning.

### Criteria for Effective Driving Questions

- Support learning objectives
- Are relevant and related to everyday life
- Are thought-provoking and intellectually engaging
- Are open-ended (i.e. typically will not have a single, final, and correct answer)
- Promote further inquiry (i.e. raises additional questions)
- Encompass both natural and social systems and topics
- Require students to revisit the problem frequently as knowledge and understanding evolves
- Call for higher-order thinking, including analysis, inference, prediction, and evaluation
- Include concepts and practices from multiple disciplines

<table>
<thead>
<tr>
<th>MWEE Issue</th>
<th>Driving Question</th>
<th>Supporting Question</th>
<th>Standard(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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<tr>
<td>Supporting Question</td>
<td>Standard(s)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supporting Question</td>
<td>Standard(s)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Identifying MWEE Field Study Sites that Support the Driving Question

Possible Site #1

- Site Location
- Accessibility for students and other logistical considerations (safety, transportation, entrance fees).
- How is this site a good match for your students, grade level, curriculum?
- Does this site provide resources to help you (tools, experts, adult helpers)?
- Are there fees associated with it?

Possible Site #2

- Site Location
- Accessibility for students and other logistical considerations (safety, transportation, entrance fees).
- How is this site a good match for your students, grade level, curriculum?
- Does this site provide resources to help you (tools, experts, adult helpers)?
- Are there fees associated with it?

Possible Site #3

- Site Location
- Accessibility for students and other logistical considerations (safety, transportation, entrance fees).
- How is this site a good match for your students, grade level, curriculum?
- Does this site provide resources to help you (tools, experts, adult helpers)?
- Are there fees associated with it?

Possible Site #4

- Site Location
- Accessibility for students and other logistical considerations (safety, transportation, entrance fees).
- How is this site a good match for your students, grade level, curriculum?
- Does this site provide resources to help you (tools, experts, adult helpers)?
- Are there fees associated with it?
Identifying MWEE Field Study Sites that Support the Driving Question

Outdoor field experiences are essential elements of the MWEE. Field study sites can be located on school grounds or at locations in close proximity to schools such as streams or city parks. They can also take place at offsite locations like state parks, wildlife refuges, or education centers that are equipped with experts, gear, and facilities. A range of individuals, including teachers, environmental educators, natural resource professionals, or trained volunteers, can facilitate field experiences. The following template is an example of a tool for assessing, recording, and communicating the possibilities.

<table>
<thead>
<tr>
<th>Possible Site #1</th>
<th>Possible Site #2</th>
<th>Possible Site #3</th>
<th>Possible Site #4</th>
</tr>
</thead>
<tbody>
<tr>
<td>Site Location</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accessibility for students and other logistical considerations (safety, transportation, entrance fees).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How is this site a good match for your students, grade level, curriculum?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Does this site provide resources to help you (tools, experts, adult helpers)? Are there fees associated with it?</td>
<td></td>
<td></td>
<td></td>
</tr>
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Moving from Synthesis and Conclusions to Action

Once students have had the opportunity to investigate their driving and supporting questions and have begun to generate claims from their synthesis and conclusions, they should work in small groups or as a class to brainstorm and evaluate ideas for action. These actions may include traditional restoration activities, but could also include civic action, community engagement, or other types of projects. Throughout this process, teachers play an important facilitation role by forming groups, observing, moderating, answering questions, encouraging the flow of ideas, and synthesizing findings.

Types of Action Projects

» Watershed Restoration or Protection (e.g., create schoolyard habitat, planting trees or grasses, invasive species removal, community cleanup, stormwater management)

» Civic Action (e.g., town meetings, voting, writing elected officials/decision makers, advocating for policy change)

» Community Engagement (e.g., presentations, social media, event-organizing, messaging at community events/fairs/festivals, mentoring, PSAs, flyers, posters)

» Everyday Choices (e.g., reduce/reuse/recycle/upcycle, composting, energy conservation, water conservation)

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<th>Conclusions from Investigations</th>
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<td>What actions could be taken to address the environmental problem, issue, or phenomenon? See Types of Action Projects above.</td>
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<td>Solution #1</td>
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<td>How would this help to address the environmental problem, issue, or phenomenon?</td>
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<td>What resources would you need?</td>
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Glossary

**Algae**—group of primitive, non-flowering plants that include certain seaweed and microscopic phytoplankton.

**Anadromous Fish**—fish, such as American shad, that migrate from their primary habitat in the ocean to freshwater to spawn.

**Benthic Organisms**—plants and animals living in or on the bottom in aquatic environments.

**Brackish Water**—mixture of fresh and salt water.

**Blueprint**—The Chesapeake Clean Water Blueprint is the mandatory federal/state effort to restore water quality in the Bay and its rivers and streams. It comprises EPA’s science-based pollution limits for nitrogen, phosphorus, and sediment in the Chesapeake Bay watershed and the Bay states and the District of Columbia’s plans to achieve limits.

**Catadromous Fish**—fish, such as the American eel, that migrate from their primary freshwater habitat to the ocean to spawn.

**Copepods**—minute shrimp-like crustaceans; often they are the most common zooplankton in estuarine waters.

**Decomposer**—organisms (chiefly bacteria and fungi) that break down dead organic matter.

**Detritus**—decomposed or partly decomposed plant and animal matter.

**Dissolved Oxygen**—oxygen released into the water by photosynthesis and air—water interactions; essential for respiration of aquatic animals.

**Ebb Tide**—falling or lowering tide.

**Ecology**—the study of interrelationships of living things to one another and to their environment.

**Ecosystem**—an interactive system of a biological community and its non-living environment.

**Erosion**—the wearing away of land surfaces by wind or water; erosion occurs naturally but it is often intensified by land-use practices.

**Estuary**—semi-enclosed, tidal, coastal body of water open to the sea in which fresh and saltwater mix.

**Eutrophication**—over-enrichment of a body of water due to excessive nutrient loading, often resulting in depletion of dissolved oxygen.

**Flood Tide**—rising tide.

**Food Web**—complex interaction of food chains in a biological community.

**Habitat**—the place where a plant or animal lives.

**Intertidal Zone**—the area between high and low tide.

**Marsh**—low, wet, grassland without trees, periodically covered by water.

**Nekton**—free swimming aquatic organism such as fish.

**Nitrogen**—an inorganic nutrient essential for plant growth; excess amounts can cause eutrophication.

**Non-point Source Pollution**—pollutants entering waterways from a general area, such as polluted runoff from farmland or suburban communities.

**Nutrients**—chemicals (primarily nitrogen and phosphorous) necessary for organisms to live.

**Organic Matter**—chemical compounds made with carbon, made in live processes by plants and animals

**pH**—a measure of the acidity or alkalinity of a material, liquid, or solid; estuarine water is, naturally, slightly base.

**Phosphorous**—nutrient essential for plant growth and reproduction; usually associated with polluted farmland runoff, sewage, and detergents.

**Phytoplankton**—the plant form of plankton, most are microscopic; they are important as primary producers in an estuarine ecosystem.

**Photosynthesis**—process by which plants convert sunlight into living tissue using carbon dioxide, water, and nutrients; primary production.

**Plankton**—organisms living suspended in the water column, often microscopic but sometimes visible to the naked eye.
Plant Zonation—the distribution of plant species into zones in response to some habitat condition such as salinity or moisture.

Point-Source-Pollution—pollution from a definable source, such as an outfall pipe.

Polluted Runoff—Stormwater becomes polluted runoff when rain collects oil, fertilizers, pet waste, pesticides, toxic metals, and other pollutants from pavement and other hardened surfaces as it runs into local waterways.

Pollution—presence of abnormally high concentrations of harmful substances in the environment, often put there by people.

Primary Producers—organisms using the sun’s energy and inorganic nutrients to synthesize organic compounds; provides energy to other organisms.

Phytoplankton—the plant form of plankton.

Salinity—the measurement (parts per thousand/ppt) of the amount of dissolved salts in water; 35 ppt for seawater, 0 ppt for freshwater.

Secchi Disk—a white plate-sized disk attached to a rope, that when lowered down into the water measures turbidity or water clarity.

Sediment—particles that accumulate on the bottom of a waterway.

Sewage Treatment Plant—place where sewage is treated to make it safe to be pumped into a river or the Bay.

Tides—periodic movement of a body of water by the gravitational attraction of the moon and sun with the rotation of the earth.

Tributaries—streams and rivers that supply a larger body of water.

Trophic Levels—the levels at which an organism feeds in a food web (producer, primary consumers etc.).

Turbidity—the measurement of water cloudiness; it may be affected by such things as sediment and plankton concentrations.

Underwater Grasses (Bay Grasses)—rooted vegetation that grows beneath the water surface.

Watershed—an area of land that is drained by a specified river or other body of water.

Zooplankton—the animal form of plankton.
## Course Contact Information:

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