

Michigan State University Extension
Tollgate Farm and Education Center

WATER AND LAND: THE CONNECTION

Big Idea:

Students will study geological features of the land, investigate soil types, engineer their own erosion barriers, discover what a riparian buffer zone is, and participate in a watershed demonstration. Students will use this knowledge of the nonliving parts of this earth and apply it to uncover how they are connected to the living things in an ecosystem.

Big Question:

- What shapes the earth? What role do humans play?

Michigan NGSS Performance Expectations:

<u>2-PS</u> <u>1-1</u>	Plan and conduct an investigation to describe and classify different kinds of materials by their observable properties.
<u>2-PS</u> <u>1-2</u>	Analyze data obtained from testing different materials to determine which materials have the properties that are best suited for an intended purpose.
<u>2-ES</u> <u>S2-1</u>	Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
<u>2-ES</u> <u>S2-2</u>	Develop a model to represent the shapes and kinds of land and bodies of water in an area.
<u>K-2-E</u> <u>TS1-</u> <u>1</u>	Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool.
<u>K-2-E</u> <u>TS1-</u> <u>2</u>	Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.

Common Core ELA and Math Standards:

ELA-LITERACY.SL.K.1a-b	Participate in collaborative conversations with diverse partners about kindergarten topics and texts with peers and adults in small and larger groups. <ol style="list-style-type: none"> a. Follow agreed-upon rules for discussions (e.g., listening to others and taking turns speaking about the topics and texts under discussion). b. Continue a conversation through multiple exchanges.
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ELA-LITER ACY.SL.K. 2	Confirm understanding of a text read aloud or information presented orally or through other media by asking and answering questions about key details and requesting clarification if something is not understood.
ELA-LITER ACY.SL.K. 3	Ask and answer questions in order to seek help, get information, or clarify something that is not understood.
ELA-LITER ACY.RI.1.6	Distinguish between information provided by pictures or other illustrations and information provided by the words in a text.
ELA-LITER ACY.SL.1. 1a-c	Participate in collaborative conversations with diverse partners about grade 1 topics and texts with peers and adults in small and larger groups. <ul style="list-style-type: none"> a. Follow agreed-upon rules for discussions (e.g., listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by responding to the comments of others through multiple exchanges. c. Ask questions to clear up any confusion about the topics and texts under discussion.
ELA-LITER ACY.SL.1. 3	Ask and answer questions about what a speaker says in order to gather additional information or clarify something that is not understood.
ELA-LITER ACY.SL.2. 1a-c	Participate in collaborative conversations with diverse partners about grade 2 topics and texts with peers and adults in small and larger groups. <ul style="list-style-type: none"> a. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). b. Build on others' talk in conversations by linking their comments to the remarks of others. c. Ask for clarification and further explanation as needed about the topics and texts under discussion.
ELA-LITER ACY.SL.2. 3	Ask and answer questions about what a speaker says in order to clarify comprehension, gather additional information, or deepen understanding of a topic or issue.
ELA-LITER ACY.SL.3. 1a-d	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher- led) with diverse partners on grade 3 topics and texts, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion. b. Follow agreed-upon rules for discussions (e.g., gaining the floor in respectful ways, listening to others with care, speaking one at a time about the topics and texts under discussion). c. Ask questions to check understanding of information presented, stay on topic, and link their comments to the remarks of others. d. Explain their own ideas and understanding in light of the discussion.
ELA-LITER ACY.SL.3. 3	Ask and answer questions about information from a speaker, offering appropriate elaboration and detail.
ELA-LITER ACY.SL.4. 1a-d	Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher- led) with diverse partners on grade 4 topics and texts, building on others' ideas and expressing their own clearly. <ul style="list-style-type: none"> a. Come to discussions prepared, having read or studied required material; explicitly draw on that

	<p>preparation and other information known about the topic to explore ideas under discussion.</p> <p>b. Follow agreed-upon rules for discussions and carry out assigned roles.</p> <p>c. Pose and respond to specific questions to clarify or follow up on information, and make comments that contribute to the discussion and link to the remarks of others.</p> <p>d. Review the key ideas expressed and explain their own ideas and understanding in light of the discussion.</p>
ELA-LITERACY.SL.5.1a-d	<p>Engage effectively in a range of collaborative discussions (one-on-one, in groups, and teacher- led) with diverse partners on grade 5 topics and texts, building on others’ ideas and expressing their own clearly.</p> <p>a. Come to discussions prepared, having read or studied required material; explicitly draw on that preparation and other information known about the topic to explore ideas under discussion.</p> <p>b. Follow agreed-upon rules for discussions and carry out assigned roles.</p> <p>c. Pose and respond to specific questions by making comments that contribute to the discussion and elaborate on the remarks of others.</p> <p>d. Review the key ideas expressed and draw conclusions in light of information and knowledge gained from the discussions.</p>
Math.Content.K.CC.4-5	<p>Count to tell the number of objects.</p> <p>4. Understand the relationship between numbers and quantities; connect counting to cardinality.</p> <p>a. When counting objects, say the number names in the standard order, pairing each object with one and only one number name and each number name with one and only one object.</p> <p>b. Understand that the last number name said tells the number of objects counted. The number of objects is the same regardless of their arrangement or the order in which they were counted.</p> <p>c. Understand that each successive number name refers to a quantity that is one larger.</p> <p>5. Count to answer “how many?” questions about as many as 20 things arranged in a line, a rectangular array, or a circle, or as many as 10 things in a scattered configuration; given a number from 1–20, count out that many objects.</p>
Math.Content.K.MD.1-2	<p>Describe and compare measurable attributes.</p> <p>1. Describe measurable attributes of objects, such as length or weight. Describe several measurable attributes of a single object.</p> <p>2. Directly compare two objects with a measurable attribute in common, to see which object has “more of”/“less of” the attribute, and describe the difference. For example, directly compare the heights of two children and describe one child as taller/shorter.</p>
Math.Content.1.MD.1	<p>Measure lengths indirectly and by iterating length units.</p> <ul style="list-style-type: none"> Order three objects by length; compare the lengths of two objects indirectly by using a third object.
Math.Content.1.MD.4	<p>Represent and interpret data.</p> <ul style="list-style-type: none"> Organize, represent, and interpret data with up to three categories; ask and answer questions about the total number of data points, how many in each category, and how many more or less are in one category than in another.
Math.Content.2.OA.2	<p>Add and subtract within 20.</p> <ul style="list-style-type: none"> Fluently add and subtract within 20 using mental strategies.² By end of Grade 2, know from memory all sums of two one-digit numbers.
Math.Content.2.M	<p>Measure and estimate lengths in standard units.</p> <p>1. Measure the length of an object by selecting and using appropriate tools such as rulers,</p>

D.1-4	<p>yardsticks, meter sticks, and measuring tapes.</p> <p>2. Measure the length of an object twice, using length units of different lengths for the two measurements; describe how the two measurements relate to the size of the unit chosen.</p> <p>3. Estimate lengths using units of inches, feet, centimeters, and meters.</p> <p>4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.</p>
Math.Content.2.M D.10	<p>Represent and interpret data.</p> <p>10. Draw a picture graph and a bar graph (with single-unit scale) to represent a data set with up to four categories. Solve simple put-together, take-apart, and compare problems⁴ using information presented in a bar graph.</p>
Math.Content.3.M D.4	<p>Represent and interpret data.</p> <p>4. Generate measurement data by measuring lengths using rulers marked with halves and fourths of an inch. Show the data by making a line plot, where the horizontal scale is marked off in appropriate units— whole numbers, halves, or quarters.</p>
Math.Content.4.NB T.4	<p>Use place value understanding to round multi-digit whole numbers to any place.</p>
Math.Content.4.M D.4	<p>Represent and interpret data.</p> <p>4. Make a line plot to display a data set of measurements in fractions of a unit ($\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$). Solve problems involving addition and subtraction of fractions by using information presented in line plots. <i>For example, from a line plot find and interpret the difference in length between the longest and shortest specimens in an insect collection.</i></p>

Content Outcomes:

- Understand how different geological features in Michigan are formed
- Differentiate between soil types and implement ways to prevent and resolve erosion
- Investigate the riparian buffer zone
- Learn what a watershed is and how water moves through it

Assessment:

Revisit the big question at the end of the program and discuss, in pairs, small groups, or as a large group. What new understandings have students gained?

Program Introduction:

Welcome to Tollgate Farm! Today we will be exploring Erosion, Landforms, and the Water Cycle! You will be helping us to solve a very important question: What shapes the earth? What role do humans play? What are some nonliving parts of the environment that you've seen before? Which of these exist in Michigan, and specifically on the farm? We will be exploring some of these features and uncovering how they formed. We will also learn that there are many types of soil and see that some move more easily than others. How can we have an impact on the

movement of the land? What are some living things that we see on the farm and how do they depend on certain nonliving parts of an ecosystem?

Tollgate would like to acknowledge that the land we are meeting on today is the original homelands of the Anishinaabe tribal nations. We owe a debt of gratitude to the people who first lived on this land. We honor and respect the many diverse indigenous peoples still connected to this land on which we gather.

Rotations:

- Landform Investigation *Upper Barn*
- Erosion in Forest Studies *Forest*
- Pond and Riparian Buffer Zone *Pond*
- Watershed Activity *Pavillion*

Teacher Resources

Background Information:

- [Glacial Landforms in Michigan Overview](#)
- [How Does Glacial Movement Affect Earth?](#)
- [Dig This! Erosion Investigation Lesson Plan](#)
- [Riparian Buffer Overview](#)
- [Riparian Buffers for Wildlife](#)
- [Shower Curtain Watershed](#)
- [Huron River Watershed Info](#)

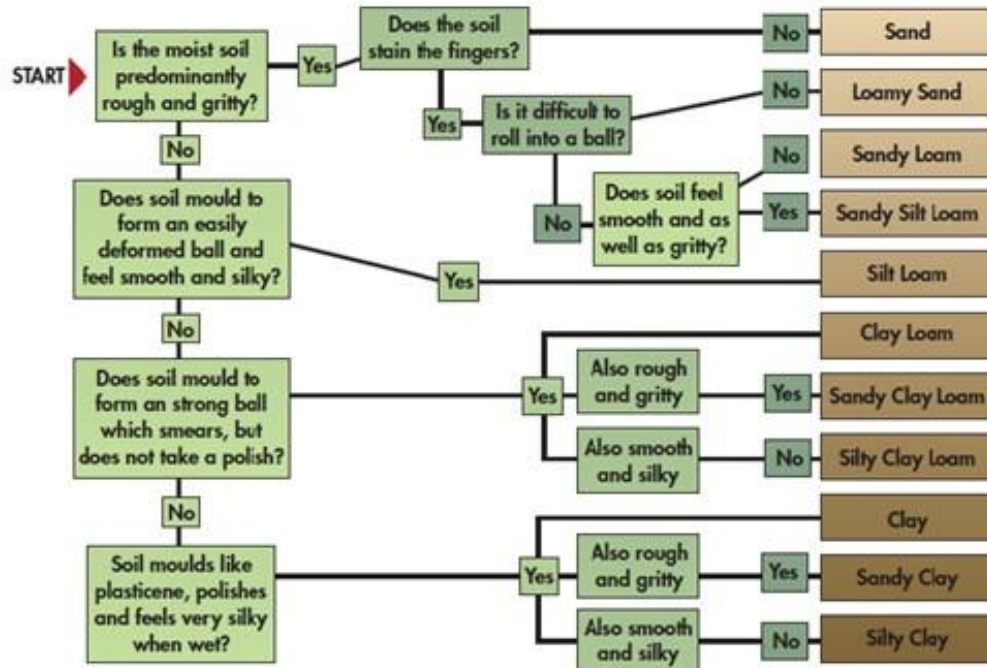
Children's Literature:

- [Dirt: The Scoop on Soil](#) by Natalie M. Rosinsky
- [Watershed Adventures of a Water Bottle](#) by Jennifer Chambers
- [The Snowflake: A Water Cycle Story](#) by Neil Waldman
- [In the Small, Small Pond](#) by Denise Fleming
- [Over and Under the Pond](#) by Kate Messner

CURIOSITY PHOTOS

Following are photographs and questions intended to inspire curiosity and wonder throughout the days leading up to your Tollgate visit.







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