

Unit Name: Erosion/Weathering

Time Frame: 1st Trimester

Author: Egg Harbor Township STEM Committee

UNIT

Subject: **STEM**

Country: **USA**

Course/Grade: **2nd Grade**

State/Group: **NJ**

School: **Egg Harbor Township Elementary Schools**

UNIT SUMMARY

The student will investigate and understand the physical changes of the Earth. The student will realize how wind and water changes the shape of the land. While considering factors and forces of weathering and erosion, the student will provide a solution to slow or prevent wind and water from changing the shape of the land.

UNIT RESOURCES

- Erosion: Changing Earth's Surface by Robin Michal Koontz. Reading Level 2.3
- Icebergs, Ice Caps, and Glaciers by Allan Fowler. Reading Level 4.8
- Glaciers by Claire Llewlyn. Reading Level 3.3
- Marshes and Swamps by Gail Gibbons. Reading Level 3.5
- All about Weathering and Erosion VIDEO

Internet Resource Links:

- Discover how rocks break down into soil and how slow, natural forces can actually change the shape of Earth's surface.
<http://www.brainpop.com/science/weather/weathering/preview.weml>
- How are materials from the earth broken down?
http://www.glencoe.com/sites/common_assets/science/virtual_labs/E06/E06.html
- Why Should We Worry About Soil Erosion?
<http://www.abag.ca.gov/bayarea/enviro/erosion/ecare.html>
- Wind Erosion Prevention
<http://www.environment.ualberta.ca/SoilPosters/wind.cfm>
- The Problem of Wind Erosion
http://www.weru.ksu.edu/new_weru/problem/problem.shtml
- Break it down
http://www.geography4kids.com/files/land_erosion.html
- Flood of Evidence
<http://whyfiles.org/107flood/3.html>
- Log it or Leave it?
http://whyfiles.org/shorties/148_salvage_logging/
- Beach Erosion -- A Thin Line of Protection
<http://whyfiles.org/091beach/3.html>

- Beach Erosion -- Invited to the house-warming?
<http://whyfiles.org/091beach/index.html>
- Beach Erosion -- Simple Solutions Boomerang
<http://whyfiles.org/091beach/4.html>

See Appendix A

Occupational Visits:

- Archaeologists
- Cartographers
- Outdoor Guides

STAGE ONE

GOALS AND STANDARDS

Science Standards

- 2-ESS1-1 Make observations from media to construct an evidence-based account that Earth events can occur quickly or slowly.
- 2-ESS2-1 Compare multiple solutions designed to slow or prevent wind or water from changing the shape of the land.
- 2-ESS2-2 Develop a model to represent the shapes and kinds of land and bodies of water in an area.
- 2-ESS2-3 Obtain information to identify where water is found on Earth and that it can be a solid or liquid.

See Appendix B

ENDURING UNDERSTANDINGS

- Wind and water can change the shape of the land.
- Signs of weathering and erosion include: steep cliffs, and harsh weather.
- There are different solutions for preventing wind and water from changing the shape of the land.
- Physical events occur quickly or slowly. (Quickly – Earthquakes, Slowly – Erosion of Rocks)
- Students can identify and represent the shapes and kinds of land and bodies of water in an area and where water is found on Earth.
- Students will identify various career opportunities involving the Earth’s surface: Archaeologists, Cartographers, and Outdoor Guides.

Background Information: See Appendix C

ESSENTIAL QUESTIONS

Change is in everything. How does geology demonstrate the changes that Earth experiences?

What observations assisted you in constructing your evidence-based account about the speed of the Earth's events?

What design solutions were successful at preventing wind or water from changing the shape of the land? Why do you think they were successful?

KNOWLEDGE AND SKILLS

Key Concepts/Vocabulary

- **Geologist**-one who studies the history and development of the Earth's crust.
- **Erosion**-the wearing away and moving of rocks or soil by water, wind, ice, or gravity.
- **Landform**-a natural feature of Earth's surface, such as a valley, mountain, or hill, etc....

Students will know:

- Change is everywhere around us.
- Land is composed of rocks and soil.
- Water and wind are powerful forces that causes mountains and land forms to shrink away from weathering and erosion
- There are four main agents of erosion: wind, water, ice, gravity.
- Wind erosion is common in dry climates.
- Water erosion usually refers to water in oceans, streams, and rivers.
- Some types of gravity erosion are very slow, while others happen very quickly.
- All Types of gravity erosion can change the landscape in a major way.

STAGE TWO

PERFORMANCE TASKS

Part One (Physical Model):

- Create a sand dune and show the effects of wind and water.
- Build a design to prevent the wind and water from changing the shape of the land.

Part Two (Constructing Explanations):

*Expository Piece Assessment

OPTIONAL: Assessment can be in the form of a booklet, pamphlet, or brochure.

- How does weathering and erosion effect land forms?

OTHER EVIDENCE

- **Possible Student Rubric:** Categories include Quality of Information, Mechanics, Problem Solving, and Focused on Task
- Teacher Questions
- Class Discussions
- Formative Assessments
- Math and ELA assignments – Writings, Quizzes, and Assessment

STAGE THREE

LEARNING PLAN

- Teacher will read a story about erosion to the students. See suggested stories in Unit Resources.
- Place students in small groups.
- Have each group build a model of a sand dune.
- **MATERIALS NEEDED** (but not limited to): aluminum baking trays (1 per team of students), sand, straws, water, goggles, twigs, rocks, pine needles, leaves, clay, etc.
- As they are working, discuss with groups how a sand dune is formed and encourage the students to incorporate those features into their model. Students will blow through a straw to demonstrate the effects that wind and/or water will have on the sand dune. Include within your model a possible solution to slow or prevent wind or water from changing the shape of the land.

Wrap-it Up Questions:

- How does human activity contribute to erosion?
- How can erosion be harmful?
- Give an example of erosion in action?
- How does wind cause physical weather?

Appendix A

UNIT RESOURCES:

Landforms

- Introducing Landforms by Bobbie Kalman. Reading Level 3.7
- What Shapes the Land? By Bobbie Kalman. Reading Level 2.4
- What is a Landform? By Rebecca Rissman. Reading Level 2.6

Mountains

- Appalachian Mountains by Jan Mader. Reading Level 2.5
- Hills by Christine Webster. Reading Level 3.3
- Mountains by Christine Webster. Reading Level 3.6
- Rocky Mountains by Jan Mader. Reading Level 3.4
- Mountains by Sheila Anderson. Reading Level 1.8
- Mountains by Larry Dane Brimner. Reading Level 3.0
- They Could Still Be Mountains by Allan Fowler. Reading Level 3.5
- Cliff Climbers by Anita Ganeri. Reading Level 4.0
- Mountains by Anna O'Mara. Reading Level 4.2
- The Sun, the Wind, and the Rain by Lisa Westberg Peters. Reading Level 3.6
- Mountains by Andy Owen. Reading Level 2.8
- Oceans by Anna O'Mara. Reading Level 3.1
- Yellowstone National Park by Margaret Hall. Reading Level 4.4
- Rocky Mountain National Park by Margaret Hall. Reading Level 3.7

Historical Examples:

Fear in a Handful of Dust -- Dustbowl of the 1930s

http://whyfiles.org/199_soil/2.html

- The Geology of the Grand Canyon
http://www.bobspixels.com/kaibab.org/geology/gc_geol.htm

Additional Sites

- <https://sites.google.com/a/solteacher.com/olteacher-com/home/first-grade-virginia-sol-resources/1st-grade-science/science-sol-2-8-sun-earth>
- <http://www.education.com/science-fair/article/chemical-weathering/>
- <http://www.nextgenscience.org/>
- <http://www.sciencea-z.com/>

Images

- Solutions to Tough Problems: Photo Gallery
<http://www.ieca.org/PhotoGallery/SolutionstoToughProblems.asp>
- The Impacts of Erosion: Photo Gallery
<http://www.ieca.org/PhotoGallery/Impacts.asp>

Appendix B

GOALS AND STANDARDS:

Math Standards

- MP.2. Reason abstractly and quantitatively.
- MP.4. Model with Mathematics
- MP.5. Use appropriate tools strategically.
- 2.NBT.A. Understand Place Value
- 2.NBT.3. Read and write numbers to 1000 using base-ten numerals, number names, and expanded form.
- 2.MD.1. Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.
- 2.MD.3. Estimate lengths using units of inches, feet, centimeters and meters.
- 2.MD.4. Measure to determine how much longer one object is than another, expressing the length difference in terms of a standard length unit.

Social Studies Standards

Geography

- S2.Geo.11 Explain how weather, climate, and other environmental characteristics affect people's lives in a place or region.

English Language Arts & Literacy Standards

- RI.1 Ask and answer such questions as who, what, where, when, why, and how to demonstrate understanding of key details in a text.
- RI.3 Describe the connection between a series of historical events, scientific ideas or concepts, or steps in technical procedures in a text.
- RI.4 Determine the meaning of words and phrases in a text relevant to a grade 2 topic or subject area.
- RI.6 Identify the main purpose of a text, including what the author wants to answer, explain, or describe
- RI.7 Explain how specific images (e.g. a diagram showing how a machine works) contribute to and clarify a text.

- RI.9 Compare and contrast the most important points presented by two texts on the same topic.
- W.2 Write informative/explanatory texts in which they introduce a topic, use facts and definitions to develop points, and provide a concluding statement or section.
- W.7 Participate in shared research and writing projects.
- W.8 Recall information from experiences or gather information from provided sources to answer a question.
- SL.1 Participate in collaborative conversations with diverse partners about Grade 2 topics and texts with peers and adults in small and larger groups.

Appendix C

BACKGROUND INFORMATION:

Land is composed of rocks and soil. It is shaped into various landforms by gravity, wind, water, and movements of the Earth's crust. Covering about 70% of the Earth's surface, water moves through a water cycle while evaporating and collecting in lakes, rivers, or returning to the sea.

Mountains can be built or broken down by the elements. Water is a powerful force that causes mountains and land forms to shrink away from weathering and erosion. Wind can have an effect also. Between wind and water, water is the strongest. What is the difference between weathering and erosion?

You will learn about the two types of weathering. Lots of factors can affect which type of weathering predominates (is most effective) in different areas. Climate is one of the most important factors that determines whether chemical weathering or physical weathering is dominant.

There are four main agents of erosion: wind, water, ice, gravity. Some have been very active in our area, while others are important shapers of the land in other parts of the country. (Opportunity for graphing: Technology)

Wind erosion is common in dry climates. It has made many interesting landforms in the American Southwest, including Arches National Park and other areas.

Water erosion usually refers to water in streams and rivers. Stream age, shape, and water flow can create different types of erosion. Water erosion can also happen in "Near Shore Environments," or beaches. Waves cause very different types of erosion than rivers and streams do.

Ice erosion usually means glaciers, and is not to be confused with physical weathering caused by frost action. Glaciers have been important in shaping the landscape of our area and a large part of the Northeast.

Gravity erosion is just what it sounds like. Some types of gravity erosion are very slow, while others happen very quickly. All types of gravity erosion can change the landscape in a major way.