

Weathering and Erosion

Strand	Earth Patterns, Cycles, and Change
Topic	Investigating weathering, erosion, and deposition
Primary SOL	5.7 The student will investigate and understand how Earth’s surface is constantly changing. Key concepts include f) weathering, erosion, and deposition; g) human impact.
Related SOL	5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which b) estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools; c) estimates are made and accurate measurements of elapsed time are made using proper tools; e) independent and dependent variables are identified; g) data are collected, recorded, analyzed, and communicated using proper graphical representations and metric measurements. 5.7 The student will investigate and understand how Earth’s surface is constantly changing. Key concepts include e) changes in Earth’s crust due to plate tectonics.

Background Information

Weathering is the breaking up of rocks due to chemical or mechanical changes. Chemical change can be caused by acid rain or acids emitted by some plants causing some of the minerals within a rock to change. Mechanical change is physically breaking a rock into fragments without changing the chemical makeup of the minerals within it. Erosion is the movement of rock particles by the action of wind, rain, gravity, and other forces of nature.

This activity is best started near the beginning of the school year because it involves recording changes that occur over a long period of time; the longer the time period, the more noticeable these changes will be. Other science units can be incorporated into this lesson, such as observations of plants or evidence of other life in the designated area. Students will be “adopting a spot” for the school year. This spot can be in their backyard, in the school playground, in a local park, or anywhere students may have permission to mark off an area that will not be disturbed. The area chosen may already show signs of erosion. Some good possibilities may be an area under a rainspout where plants have not grown, a place where recent construction has been completed and plants have not yet taken root, and the sides of a stream or creek. It is not important for every student to find a place that already has erosion, because it is just as important for students to identify the factors that prevent erosion.

Repeatedly photographing (or drawing pictures) of the areas chosen is an important part of this project. Digital pictures are best because they do not require expensive processing and can readily be printed out as soon as they are taken.

Materials

- Spiral notebook or journal
- Metric ruler
- Digital or regular cameras (optional)
- Equipment for printing digital photos (optional)

Vocabulary

weathering, erosion

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Introduction

1. Ask students to come up with some environmental changes that are going on around them. They will probably talk about construction of buildings and roads, and they will likely mention the seasons. They may think of soil erosion from heavy rains. Lead them to the idea that those things are causes of changes to the Earth and that the actual changes, such as weathering and erosion, are the effects of those causes. Define weathering and erosion, and tell students they will be tracking some weathering and erosion in the community in which they live.
2. Have students set up a spiral notebook or journal to record the data they will collect during the year. They could also keep a video diary of the changes and/or write their entries in a computer-file diary if they have the equipment to do so.

Procedure

1. Have students “adopt a spot” — an area about two feet by two feet on which to focus for the school year. Help students decide where those places should be, being sure that there is a good variety of places. Some students may need to do this in the schoolyard, so you can use those students’ spots as examples for the students who choose remote areas. You must make sure that the students have permission from the owners of the land to mark off and eventually alter these spots; a signed permission form for each spot may be the best way to document permissions and avoid any problems.
2. Students mark off their spot in some way, for example, by using plastic builders tape. All spots need to be about the same size area.
3. Students should take a picture (or make a drawing/diagram in their journal) of their area and date it. They should look for and record all plant life in the area and all evidence of animal life, such as insects, animal droppings, footprints, etc. Have students look carefully for signs of weathering or erosion and record those. If there are any large stones in the area, observe and record their shapes very carefully. If there are cracks in the ground, have students measure their width and/or length and record the measurements in centimeters.
4. At a designated day every two weeks, have students go back to their spot, make the same observations again, record the same information, make notes about any changes that have taken place, and take a photo (or make a drawing/diagram in their journal) and date it. Because differences occur slowly over time and are not always obvious just by looking, it is necessary to compare photos or drawings/diagrams to discover changes.

As the year goes on and more changes take place, have students create a timeline of the changes by arranging the pictures or drawings/diagrams in the order they were made.

5. As the year progresses, discuss the discoveries the students are making. Have any stones in the area weathered enough to notice the change? Has there been any erosion? If no erosion is taking place, discuss why (e.g., plants are growing, roots are holding the soil, it is a protected place where weather does not affect it).
6. Lead a discussion about the ways humans impact the environment and what people can do to be sure that they contribute to erosion as little as possible. Take the class on a walk around the school grounds and the neighborhood to look for ways humans are impacting their environment. This can include observing that builders put a black plastic fence around their work area to prevent topsoil from washing away before more plants can be planted, or that they plant grass as soon as grading on a construction site is done. Discuss ways humans help prevent erosion, from using strategies that we all can use to laws that ensure that a certain amount of land always stays in its natural state. Ask students to explain some of the possible consequences of urban sprawl in which nearly all forested areas around cities are destroyed to build houses, businesses, roads, and parking lots.

Conclusion

1. If erosion is taking place, in late spring have students design a plan for stopping further erosion and repairing the eroded area. This can include planting plants with good root systems or adding pebbles or rocks to hold the soil. Students whose spots have not eroded can work with students whose spots have, and work together to make a plan for the eroded spot.

Assessment

- **Questions**
 - How does your “spot” compare to another? Compare and contrast the two.
 - If your “spot” is different than someone else’s, describe why they may be experiencing different results.
- **Journal/writing prompts**
 - Collect students’ journals throughout the year and check progress.
 - Describe a plan for erosion in detail.
- **Other**
 - Assess for effectiveness and creativity the students’ plans to prevent further erosion and repair erosion in their spots.
 - Have students produce a PowerPoint presentation on the yearlong project in which they summarize what they learned about weathering and erosion and the ways their knowledge will impact them now and in the future.

Extensions and Connections (for all students)

- Have students research laws in the community that directly address erosion. Have them write a letter to their representative, supporting the laws or asking for more stringent rules for builders, miners, farmers, and others who disturb the land.
- Map out students areas graphically.

Strategies for Differentiation

- Create a two-flap flipbook for defining weathering and erosion. Add pictures to the flipbooks of weathering and erosion from student drawing or Internet collection.
- Explore weathering and erosion by asking students to bring in a picture from home of weathering and/or erosion, and then sort the pictures as a class. Create a digital library of erosion pictures and weathering pictures for students to refer to when making observation entries. Note whether human impact played a role in the weathering or erosion that is displayed.
- Provide a variety of journal samples for students to model questions to be answered and valuable information to observe and make inferences about as you observe your spot.
- Students may complete a video journal, multimedia software flipchart presentation, or a word processing journal depending on their interest, comfort level with software, and technological ability in lieu of a paper spiral notebook or journal.