

EARTH CONNECTIONS

Resources For Teaching Earth Science



MUDPILE MOUNTAIN

The erosion of a mountain by water can be demonstrated by pouring water on a mudpile. This makes it easy for students, even in flat country, to get a better understanding of mountains, their erosional and depositional landforms, and the processes that form them. This outdoor lesson plan is good for groups of any size. Students will construct a 'mountain' of dirt, pour water over it, and identify landforms caused by erosion and deposition.

Caution students not to carry the comparison of mountain to mudpile too far. Mountains are not just piles of dirt but consist chiefly of bedrock. The bedrock is weathered and transported in several different ways and not just simply eroded away by water. (For more information about weathering, see Earth Connections no. 4 in *Washington Geology*, v. 28, no. 3, p. 38-39, May 2001; online at <http://www.wa.gov/dnr/htdocs/ger/pdf/earthcn4.pdf>).

EROSION AND DEPOSITION

Weathering breaks up rocks, but what process carries the pieces away? Erosion. It breaks down the Earth's crust and carries away the pieces to deposit them elsewhere. The three main agents of erosion are water, ice, and wind.

Running water (rivers and streams) is the most common agent of erosion. Glaciers, immense sheets of moving ice, slowly grind away and carry off large chunks of the Earth's crust. The wind carries sand and dust, which act like sandpaper to wear down the rocks it contacts.

Erosional landforms illustrated by this activity include streams, canyons, and waterfalls. Depositional landforms illustrated include alluvial fans and deltas. This exercise also demonstrates the selective transport of materials by water. Fine particles are carried farther than coarse particles. Fast-moving water carries heavier particles than slow-moving water.

GLOSSARY

Discuss the new vocabulary before starting the activity:

alluvium – silt, sand, clay, gravel, and other loose rock material deposited by flowing water, as in a riverbed or delta.

alluvial fan – the fan-shaped deposit of alluvium left by a stream where it issues from a canyon onto a plain.

bedrock – the solid rock underlying the soil and other loose rock material on the Earth's surface.

canyon – a narrow valley with steep walls, formed by running water.

delta – a triangular alluvial deposit formed where a river enters a large body of water.

deposition – the laying down of material carried by water

erosion – the wearing away of the soil and rock of the Earth's crust

landforms – any physical, recognizable form or feature of the Earth's surface having a characteristic shape and produced by natural causes. Examples include mountains, valleys, deltas, and canyons.

sediment – fragmented rock material, such as silt, sand, clay, gravel, carried and deposited by water, wind, or ice.

silt – sediment made up of fine mineral particles smaller than sand and larger than clay.

transport – to carry from one place to another.

weathering – the mechanical and chemical processes by which rock exposed to the weather turns into soil.

ESSENTIAL ACADEMIC LEARNING REQUIREMENTS

1.2 Students will recognize the components and organization of systems and the interconnections within and among them.

1.3 Students will understand that interactions in the physical environment may cause changes in matter and energy.

2.2 Students will apply science knowledge and skills to solve problems or meet challenges.

3.2 Students will know that science and technology are human endeavors, interrelated to each other, to society, and to the workplace.

GRADE LEVELS

Grades 6–10

SUBJECTS

Earth science and geomorphology

CONCEPTS

Erosion and deposition

SKILLS

Observation, inference, and measurement

OBJECTIVES

Students will learn to identify landforms caused by erosion and deposition.

MATERIALS

3 popsicle sticks or tongue depressors per student
red, green, orange, blue, yellow, and purple crayons
shovel and watering can

TIME NEEDED

1 to 3 hours

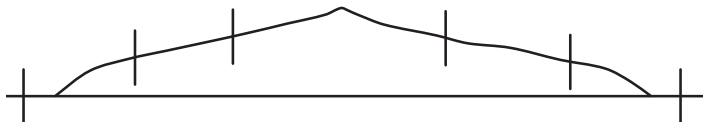
Adapted, with permission, from Glacier National Park Electronic Field Trip [<http://www.sd5.k12.mt.us/glaciereft/> Click on Lesson Plans; then click on Geology.]

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Earth Connections No. 6

PROCEDURE

1. Have each student rule lines 1 centimeter apart across both sides of a popsicle stick, starting from one end. Then have them crayon centimeter-wide bands, neatly, in this order: red, green, orange, blue, yellow, and purple.
2. Take the class outside to a patch of bare ground and dig up dirt, removing larger pebbles and stones. Dump the dirt in a pile and tamp it down to make a 'mountain' about half a meter high.
3. Have the students push their sticks into the 'mountain' and the surrounding 'land', red ends out, so that the sticks are vertical and evenly distributed. (See drawing below) The boundary between the orange and blue bands should be even with the mudpile surface.



4. Have one student sprinkle the 'mountain' with a watering can so that the 'rain' falls straight down. Let everyone in the class have a chance to be the rainmaker, while the others observe and chart the results.
5. After the 'mountain' is well eroded, ask the following questions:

Do some markers indicate where erosion is taking place? Where is the material being removed?

Do some markers indicate where deposition is taking place? Where is dirt being deposited?



RADIO SHACK DONATES EMERGENCY RADIOS TO SCHOOLS.

Don Miller (right) of Washington State Emergency Management Division (WADEM) gives Rex Kerbs, principal of Ptarmigan Ridge Elementary School in Orting, nine programmable weather radios. Don is manager of the Telecommunications and Warning Project for WADEM. Radio Shack Corporation donated the radios for use by the Orting and Sumner school districts. Both cities are located in the Puyallup River valley, which is underlain by extensive lahar deposits from Mount Rainier. The weather radios can provide alerts in the event of a volcanic emergency, such as the detection and confirmation of a lahar (volcanic debris flow) in upper regions of the Puyallup or Carbon River valleys. In 1998, the U.S. Geological Survey, in conjunction with the State of Washington and Pierce County, installed a network of acoustic flow detectors in those valleys to better detect lahars. In the event of a confirmed lahar, a warning message could be broadcast within minutes. Photo by Rob Harper, WADEM.

Which of these landforms can you identify: streams, canyons, waterfalls, lakes, deltas, alluvial fans?

Which is carried farther by the water: sand or silt or rocks?

What, if anything, seems to slow erosion on the 'mountain'?

6. Have the students identify as many of the erosional and depositional landforms on the 'mountain' as they can.
7. Have the students hypothesize why some areas moved at different rates and where the best places to build a house or a waterslide park would be.
8. Let the class continue to erode the 'mountain' and observe it for several days. Measure and record changes in erosion. Draw pictures each day and record measurements in a table.
9. Give extra credit for any photographs of erosional or depositional landforms from magazines or books that are brought to class and correctly identified.

from Schmidt, V. E.; Rockcastle, V. N., 1982, Teaching science with everyday things; 2nd ed.: McGraw-Hill, 210 p.

SUGGESTED READING

DK Publishing, Inc., 1993, The visual dictionary of the Earth: DK Publishing, Inc. Eyewitness Visual Dictionaries, 64 p.

RELATED WEBSITES

Erosion (K–4th grades) <http://www.col-ed.org/cur/sci/sci03.txt>

Changes Due to Erosion (2nd grade) http://www.uen.org/cgi-bin/websql/lessons/14.hts?id=84&core=3&course_num=3020&std=6

Erosion in the Wind (3rd grade) http://www.uen.org/cgi-bin/websql/lessons/14.hts?id=108&core=3&course_num=3030&std=3

Erosion Lab (3rd–4th grades) <http://student.biology.arizona.edu/sciconn/earthscience/erosion.html>

Identifying Erosion (3rd–5th grades) <http://atozteacherstuff.com/lessons/Erosion.shtml>

Demonstrating Erosion in Action (3rd–12th grades) http://btc.montana.edu/nten/trc/lesson30/lesson30_text.shtml

Weathering and Erosion (4th–6th grades) http://btc.montana.edu/nten/trc/eslab_text.shtml#weathering

Gravity and Erosion (8th grade) <http://www.lessonplanspage.com/ScienceGravityErosionMassWasting8.htm> ■

Student Website Design Contest

Technology savvy students can show off their web design skills and win prizes in the 2002 "Nature Greets Technology" contest sponsored by the Department of Natural Resources (DNR), the Department of Information Services, and the Office of Superintendent of Public Instruction.

Now in its fifth year, the contest offers Washington students ages 9 to 19, who are enrolled in public, private, or home school programs, the opportunity to build their own website based on one of two themes: "Forest Fire Prevention is Everyone's Responsibility" or "Conserving Washington's Water."

DNR started this contest to promote wildfire prevention awareness among teenagers. The number of entries has doubled each year, and the quality and sophistication of the entries has also improved.

Entries will be accepted until April 19, 2002. To view specific contest details and the websites of last years' winners, go to <http://www.k12.wa.us/webcontest>.