Reflect

Have you ever thought about the power of a seed? When a seed sprouts, it is so fragile and tender but it has the power to break through rocks. Even the tiniest plants are responsible for breaking down earth materials and creating soil. How is this possible? Millions of acres of Earth's surface have been changed by plants.

How do plants weather rocks?

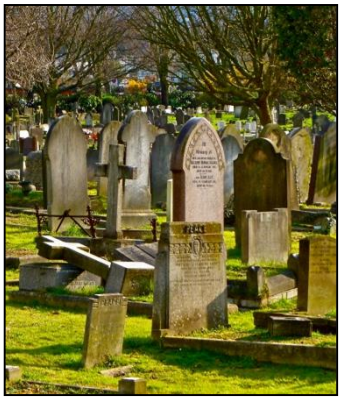
weathering: the breaking down of rocks, soil, and minerals

Plants play a role in the **weathering**, or breaking down, of Earth's surface. This type of weathering is called biological weathering since it is caused by an organism. Plants can weather earth materials in two different ways.

Mechanical weathering: Also known as physical weathering, mechanical weathering is caused by the actual pressure of the plants' roots on the rock. Have you ever seen a sidewalk that has been cracked by the roots of a tree? That is a perfect example of mechanical weathering.

The seeds of plants are blown or dropped by birds into the tiny cracks and crevices in rocks. As the seeds sprout, their roots act like wedges in the opening. The roots slowly apply pressure that breaks the rock apart and into smaller and smaller pieces.

Chemical weathering: Have you ever seen a building or a statue covered with small plants? The roots of the plants attach to the stone and slowly weather away the surface chemically by releasing an acid that breaks down the rock.



Reflect

Mosses and lichens are some of the plants responsible for chemical weathering. Both are small, growing closely to the ground on rock surfaces where they actually change the climate to a more humid chemical environment.

Mosses are non-flowering plants that grow in clumps in damp and shady areas.

A lichen provides a beneficial relationship between two organisms, a fungi and an algae.

Look Out!

Mount Rushmore has to be protected from biological weathering. There is a team of mountain climbers that keep the surface of the monument clean of plant life.

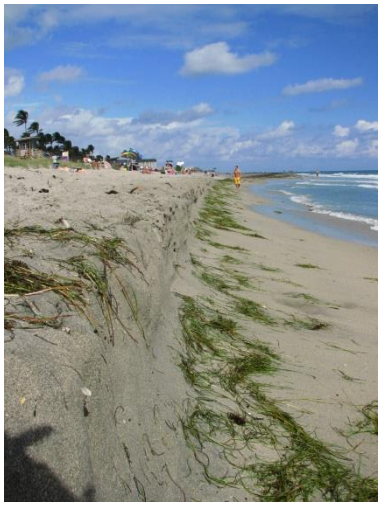
How do plants help and harm regions?

Some plants help preserve an environment, while others can be harmful and damaging to it.

Beach grasses can help hold sand dunes and soil in place to protect a beach area. Beach grasses have a large underground root system that creates a stable area where sand dunes form and grow. Over time, other plants will take root, such as bearberry, cottonwood trees, sand cherry, and junipers.

Two examples of areas that rely on beach grasses to preserve the coast are Nehalem Bay State Park in Oregon and Indiana Dunes State Park on Lake Michigan.

Look Out!



Blowouts (channels or depressions in a sand dune) are a problem on Lake Michigan caused by wind erosion. Human and animals walking on the beach grasses have destroyed the root systems and caused blowouts. An opening in the root system allows onshore winds to erode the sand down to lake level. The area that is destroyed is called a blowout. Beach House, Furnessville, and Big Blowout are three blowout areas along Lake Michigan. Each extends deeply back into the dunes. An area known as the Tree Graveyard was found when a blowout uncovered many dead tree trunks that had been buried in the sand dunes.

Kudzu, also known as Japanese arrowroot, is a very harmful plant. Kudzu was introduced at the 1876 Centennial Exposition in Philadelphia, Pennsylvania, as an ornamental shrub. Kudzu is in "interference competition" with native plants in the area. It grows so fast that is overgrows other shrubs and trees, prevents them from getting sunlight, and causes them to die. It can grow as fast as one foot per day! In the 1930s and 1940s, southern farmers were paid to plant kudzu to stop soil erosion. Over one million acres were planted. Today, kudzu is spreading so fast that it covers 150,000 acres a year.

Some methods that are used to remove kudzu are close mowing every week, burning, and weed killer (herbicides). Also, in Tennessee, North Carolina, and Florida, farmers keep goats and llamas to graze on the kudzu.

What Do You Think?

Did you know that some plants are able to remove toxins and poisons from soil and improve the water quality in streams? Did you know that some plants are used to clean the soil at old mining sites? Visit the Hubbard Brook Ecosystem Study at http://www.hubbardbrook.org. The Hubbard Brook Experimental Forest is in the White Mountain National Forest in central New Hampshire. At its website, you can take a virtual watershed walking tour, observe areas via their webcams, and read about some of their studies and lesson activities.

Try Now

Try a simple activity to see the power of the seed and mechanical weathering.

Bindweed breaking through an asphalt driveway.

You will need:

- A plastic cup
- A measuring spoon
- A plastic spoon for stirring
- 6 tablespoons plaster of Paris
- 3 tablespoons water
- 4 bean seeds
- Paper towel
- Spray bottle

1. Presoak the bean seeds in water overnight.
2. Cover your work area with newspaper, or work outside.
3. Measure six tablespoons of plaster of Paris into the plastic cup.
4. Add one tablespoon of water at a time to the plaster of Paris, stirring after each addition, until you have added all three tablespoons. Note: If your mixture still seems dry after you added all the water, add one teaspoon of water at a time until the mixture is a thick, smooth liquid.
5. Tap the cup on the table to settle the contents, and tidy the sides.
6. Observe the plaster until it begins to solidify.
7. When the plaster begins to solidify, insert your four beans so that two-thirds of each bean is embedded in the plaster.
8. Let the plaster solidify completely.
9. Fold a paper towel in half twice.
10. Moisten the paper towel until it is damp, but not dripping wet.
11. Place the paper towel on top of the bean seeds to water them and place the cup in a sunny window.
12. Make sure to keep the paper towel moist.
13. Observe both the growth of the bean plants and whether the plaster changes.

What Do You Think?

Complete the cause and effect chart by writing the event that would follow the action.

ACTION	RESULTING EVENT
A volunteer group plants beach grasses.	
Wind blows seeds into tiny cracks in a rock cliff.	
Your new neighbor plants small kudzu shrubs in her yard.	
A bunch of kids drives dune buggies over the sand dunes.	
Lichens and mosses start growing on your mom's new statue.	
The beach grass root system is destroyed by people walking through the dunes.	

Events

- Mechanical weathering takes place.
- Chemical weathering takes place.
- Sand dunes are formed.
- Beach grass root systems are destroyed.
- A blowout is formed.
- The house and other plants are overgrown.

Connecting With Your Child

Plants' Effect on Your Region

To help your child learn more about the environment, take a walk together around your house, the neighborhood, a park, or a favorite wooded area.

Look for examples of mechanical or chemical weathering on sidewalks, foundations, walls, bridges, etc. Take along a camera or sketchpad for your child to record their observations. A magnifying glass would be handy to observe small cracks and tiny plants.

If you have access to a state or national park or the shore, talk to the rangers about helpful and harmful plants in the area.

Visit a garden center and learn about plants native to your region and which plants are in "interference competition" with them.

Here are some questions to discuss with your child:

- What kind of weathering did you see?
- How is that weathering changing the area?
- How can weathering be helpful? How can it be harmful?
- What could we do to help preserve an area with plants?