Chapter 7 Earth's Powerful Forces of Change

THE BIG QUESTION: How do weathering and erosion continually reshape Earth's surface?

Have you ever had to go around a big hole in the road while riding your bike? Or slipped on little rocks that rain had washed into your path? These things might just seem like things to watch out for when you ride your bike. But they actually show that two very strong forces are at work. Weathering and erosion, as you learned about in Chapter 6, are things that change rocks over time. They break rocks into tiny pieces and then move them somewhere new. Together, weathering and erosion are slowly but surely changing the way the Earth looks. They are making changes everywhere from the roads in our neighborhoods to the highest mountains in the world.

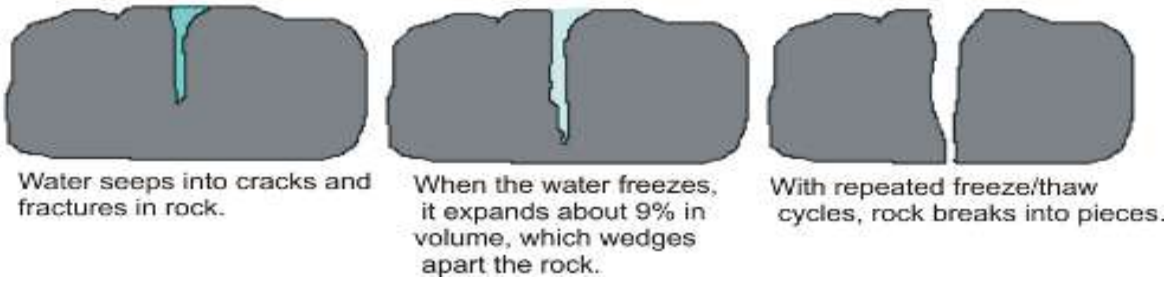
Weathering at Work

Rocks can break into small pieces over time. These tiny pieces can mix with things that used to be alive to make topsoil. Other small pieces collect as sediment. This breaking down of rocks happens when they mix with air, water, and living things. There are two main kinds of weathering: physical weathering and chemical weathering.

Physical weathering is when big rocks break into smaller ones without changing the minerals they contain. Temperature changes cause physical weathering. For instance, in a desert, rocks get hot during the day when the sun shines on them. When rocks get hot, they expand. At night, the desert gets cold, causing the rocks to cool down and shrink slightly. This back and forth, called an endless cycle, makes the rocks' outer layer crumble or flake off bit by bit.

Water can make cracks in rocks bigger. When water gets into the cracks and it gets really cold, the water turns into ice. Ice needs more room than water, so it pushes the cracks in the rocks apart. This happens over and over until the rocks break apart. This is also how potholes are made in streets.

Plants and animals can also make rocks break apart. When tree roots grow, they push into the cracks in rocks. This makes the cracks get wider. Eventually, the rocks break. Animals like badgers and chipmunks also help break rocks when they dig into the ground. This pushes rocks up to where they can break into smaller pieces.



Rain can change rocks. When rain mixes with air, it becomes acid rain. This acid rain is strong and can dissolve minerals in rocks. Over time, it can change the shape of rocks, old gravestones, and stone statues. It can also damage buildings. Even underground, rain can cause rocks to change.

Oxygen in the air can make rocks break down. When oxygen mixes with water and minerals in rocks, it changes them. The rocks become weak and start to crumble. They also change color and become rusty red.

Some plants make rocks change. Look under moss on a rock and you'll see little holes in the rock. Acid from the moss plant did that. Because of this, rocks break into tinier parts and then into sand. Erosion takes the sand away.

The Stone Forest (Shilin) is situated in the Lunan Yu Autonomous County in China.

Sediments on the Move

Geologists say that erosion is when something like wind, water, ice, or gravity moves sand and dirt to new spots. These things are what mostly cause erosion.

Have you ever been to the beach on a windy day? Did you see the wind blowing the sand? When the wind moves fast, it picks up the sand and takes it away. Strong winds can carry the sand for a long way.

Did you ever go to the windy beach and feel the sand hitting your skin? When the wind carries tiny pieces of sand and throws them at the rocks, it can make the rocks wear away. This is like when a sandblasting machine is used to clean things. The wind makes the rocks chip into tiny pieces and then carries them away. Over time, this can make the rocks look shiny or full of tiny holes. The wind can also make big rocks into cool shapes like arches and towers. The wind can even take away some of the rocks, leaving only big rocks standing on small supports. Have you ever seen rocks that the wind has shaped?

When the wind stops, the little pieces it was carrying fall down to the ground or into the water. When the wind does this a lot, layers of these tiny pieces start to pile up. After a while, these layers can turn into rock.

Heading Downstream

Water, like wind, can break and carry away rocks and soil. When it rains, water can carry small bits of rock and dirt down the hill. Sometimes, water even moves big rocks.

As water goes slow, tiny bits of dirt go down to the bottom of rivers or streams. The heaviest dirt goes down first, and the smallest dirt goes down last. Lots of dirt builds up at the end of rivers and in the bottom of lakes. Over a long time, a bunch of dirt also goes to the bottom of the ocean. Just like dust from the wind, the dirt from the water can turn into a special kind of rock one day.

Glaciers are giant masses of ice that can be found in very cold areas like at the tops of tall mountains and in the polar regions. Even though ice is hard, glaciers can still move. They move really, really slowly downhill. As they move, they push, drag, and carry bits of rocks and dirt with them. They can also make more bits of rocks and dirt as they rub against the ground. When glaciers move, they can make huge valleys in the mountains.

When ice melts, it leaves the dirt it was carrying. A long time ago, ice covered big parts of North America, Europe, and Asia. When the weather got warmer, the ice melted and moved back. It left lots of sand, rocks, and dirt behind. These things made hills, mounds, and ridges that you can still see today.

Weathering, Erosion, and Time

Weathering and erosion happen very slowly. They take a long time to show their effects. These processes reshape Earth's surface over a very long time. One example is the Grand Canyon in the southwestern United States. A long time ago, it wasn't there when dinosaurs lived in North America. Wind, rain, and the Colorado River took a very long time to create it. These forces cut and shaped the land to make the big canyon we see today.

Millions of years ago, the Appalachian Mountains were very tall. Then, the wind and rain made them shorter. Today, they are not very tall. Even the biggest mountains in the world will also get smaller over time. But new mountains will be made too.

Sources:

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