

Water's Effect on Shaping Earth's Surface

Lesson 31

Water's effect on shaping Earth's surface



- Water is always on the move through the water cycle
- No matter what form it is in, water has the ability to reshape Earth's surface
 - Wearing away mountains
 - Carving deep canyons
 - Creating huge underground caves
- **Weathering** and **erosion** are the two main processes by which water breaks down Earth's landscapes
- **Deposition** is the process by which water builds up features on the landscape



Weathering, Erosion, and Deposition

Landscape-changing processes due to **weathering**, **erosion**, and **deposition** related to the action of water in all its forms:

- **WEATHERING** is the process of breaking down rock into smaller fragments
 - **Physical weathering** = if the rock that breaks down stays the same type of rock
 - **Chemical weathering** = if the rock that breaks down becomes a different substance
 - **Biological weathering** = physical or chemical weathering caused by a plant or animal



Weathering, **Erosion**, and Deposition

- After rock becomes weakened and broken down into fragments, those pieces can be transported (carried away) from their original location = this process is called **EROSION**
- The main transporters or agents of **erosion** are:
 - Water, glaciers, gravity, and wind
- **Weathering** tends to be a slow process that can take thousands of years, **erosion** can occur quickly
 - E.g. As fast as it takes for a wave to flatten a sandcastle



Weathering, Erosion, and Deposition

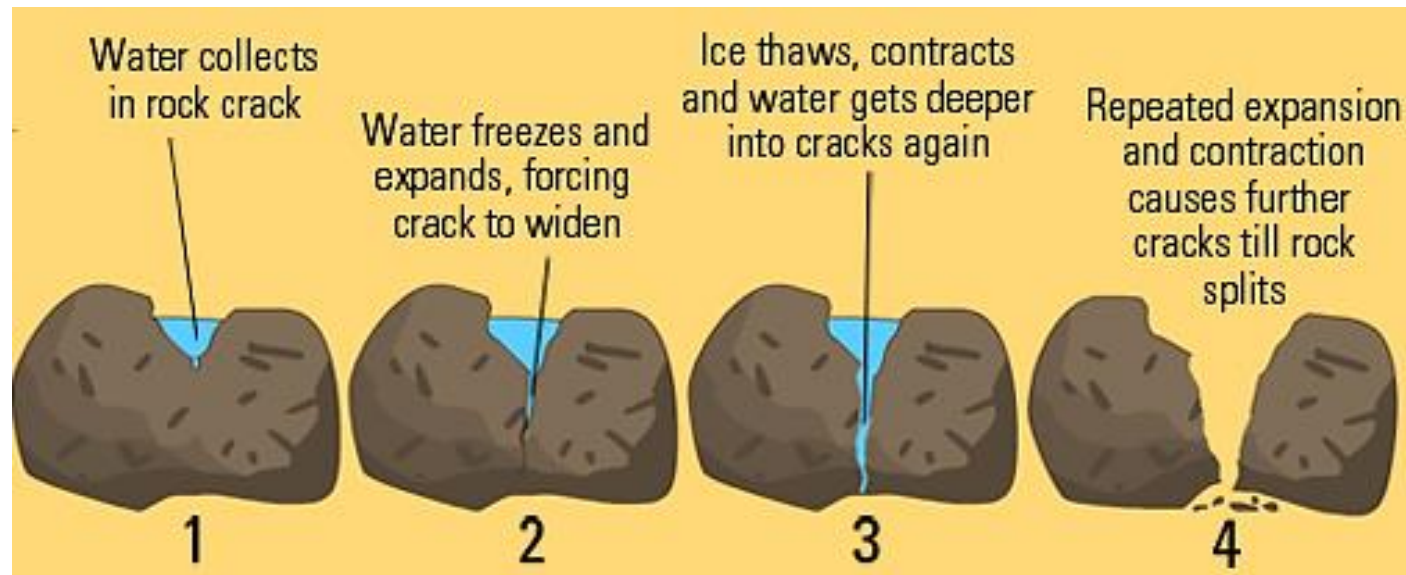
- Breaking down and removing rock are major ways of changing the look of the landscape, but Earth's surface is also changed by being built up
 - One way that happens is through a process called **DEPOSITION**
- After rocks and sediments are picked up and carried away, they must eventually be dropped again somewhere
- **DEPOSITION** creates many notable features on Earth's surface, just like **weathering** and **erosion**
 - E.g. sand dunes, deltas, layers of solid sedimentary rock



How do water and ice weather rock?

Physical weathering

- Water can collect in cracks and pores of rock
- When water freezes, it expands → ice or frost wedging
 - Can break the rock into smaller pieces



How do water and ice **weather** rock?

Chemical weathering:

- Rainwater is slightly acidic
- As rain falls from the sky, it picks up pollutants that can make it more acidic
- When it reaches the ground, the acidic rainwater dissolves some substances from rock on Earth's surface
- The rock gets weaker and wears down or breaks into smaller pieces



How do water and ice **weather** rock?

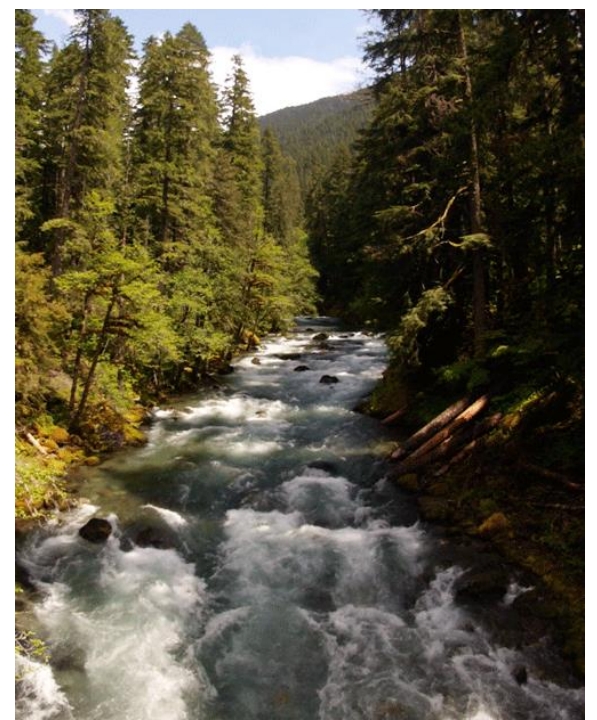
Chemical weathering:

- Acidic rainwater weathers rock under the ground too
- The acidic water dissolves rock that has calcium carbonate in it
- As time passes, bigger and bigger gaps form large hollows in the rock, and can form an underground **cave**
 - If the gaps caused by the water are near the surface the ground at the surface may collapse
 - This causes a **sinkhole** to form
 - An area of land that has lots of sinkholes is called a **karst**



How do water and ice **erode** rock?

- As water moves over Earth's surface, the water can push rocks from one place to another
- This happens especially in **rapids**
 - Places of fast-moving water in a steep, rock river
- The tiny bit of rock that results from constant **erosion** by water becomes sediments
- When rain soaks the side of steep hills and mountains, the force of gravity can cause part of the slope to fall away as a **landslide**



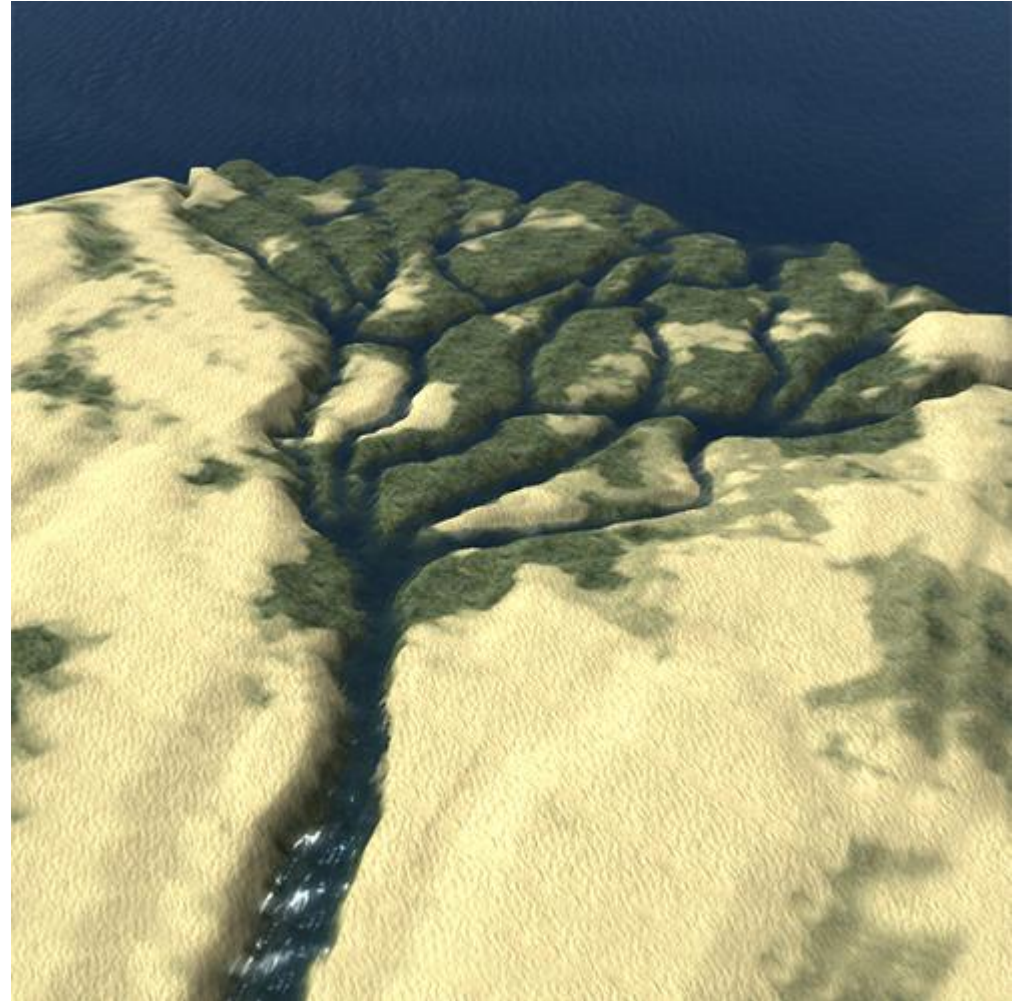
How do water and ice erode rock?

- As glaciers move over Earth's surface, the ice acts like sandpaper
- It picks up and carries away rock material
- It also scrapes the ground beneath it
- The scratch marks that are visible when the ice melts are called **striations**



How do water and ice **deposit** rock?

- When moving water slows down and when moving ice melts, the rocks they carry are released
- These deposits build up as time passes
- When this happens in the place where a river enters a lake or ocean, the deposits form a fan-shape called a **delta**



Summary

- Water breaks down Earth's surface in some places and builds it up in other places
- Three main processes involved in the shaping of Earth's surface:
 - Weathering
 - Physical, chemical, biological
 - Erosion
 - Deposition
- Weathering and erosion act to break down Earth's surface
- Deposition acts to build it up