The Effect of Weather, Erosion, and Deposition in Texas Ecoregions

7.8B: I can analyze the effects of weathering, erosion, and deposition on the environment in ecoregions of Texas
Weathering

• The breakdown of rock material by physical/mechanical and chemical processes.
Mechanical/Physical Weathering

• Mechanical or physical weathering is the process by which rock is broken down into smaller pieces by physical changes. Some ways that rock can be broken down physically include:
  – **Temperature Change** – a rise in temperature will cause a rock to expand and a decrease in temperature will cause a rock to contract. Repeated changes in temperatures will cause the rock to crumble.
  – **Abrasion** – rock can be broken down by the action of other rocks; wind, water, glaciers, and gravity carry different sized pieces of sediment that can strike a rock causing it to break apart or wear down.
  – **Animal Action** – animals digging and burrowing can cause rock to break apart or become more exposed to other agents of weathering.
  – **Plant Growth** – roots of plants break apart rock as they grow and increase in size.
Mechanical/Physical Weathering

Weathering due to abrasion when bits of sand carried in the wind

Weathering due to temperature change

Weathering due to animal burrowing

Weathering due to plant root growth
Chemical Weathering

- The breakdown of rocks by chemical reactions. Occurs more often in locations with high precipitation rates and high temperatures.
  - Oxidation – when materials in rock react with the oxygen in air or water causing a chemical change. Examples include rusting and corrosion.
  - Natural Acids – Some acids form naturally when chemical in the atmosphere combine with water in the air and cause acid precipitation. The acid precipitation weathers rock and changes its composition. Carbonic acid can also form when carbon dioxide dissolves in water. When carbonic acid comes into contact with some rocks, it causes a reaction that breaks the rock down chemically.
  - Acids from organisms – certain living organisms produce acids that break down rock. Lichen and mosses produce weak acids that break down the rock that they grow on.
Chemical Weathering

Weathering due to the oxidation of certain materials in the rock

Weathering due to plant acids

Weathering due to carbon acid chemically breaking down rock
To form caves
Erosion

- Erosion is the process by which weathered rock pieces are carried away. During the process of erosion, sediment is removed from one area on Earth’s surface and carried to another. Erosion is reduced by vegetation (plant life). Agents of erosion include the following...
  - Moving water
  - Wind
  - Glaciers
  - Gravity
Agent of Erosion # 1 - Moving Water

• Certain factors affect water erosion
  – Gradient or steepness of a slope will affect the speed of the water. The faster the water is moving, the more it can erode.
  – Discharge – the amount of water in a stream or river is called discharge. If a stream’s or river’s discharge increases, so does its erosive energy.

• Landforms from Water Erosion
  – Canyons and valleys form when flowing water moves downhill and cuts through the landscape.
Palo Duro Canyon

The **Palo Duro Canyon** in the panhandle of Texas was formed due to water erosion.
Agent of Erosion # 2 – Wind

- Abraded rock (small pieces of rock or sand) are picked up and moved by wind. Areas that have little precipitation, high temperatures, and high elevation experience a lot of wind erosion. Wind erosion is reduced by obstacles such as tall trees, hills/mountains, or manmade objects.

- Landforms from Wind Erosion
  - Desert pavement – the removal of fine (small) sediment by wind is called deflation. The wind moves all the fine sediment and leaves all the larger pieces behind that are too heavy. The resulting landscape is known as desert pavement.
Agent of Erosion # 3 - Glaciers

- Glaciers are a large mass of moving ice down a slope (kind of like a giant frozen river that is moving). As glaciers move down the slope, they pick up and move sediment. As the glaciers melt, they deposit the materials that had become embedded in the ice.
Agent of Erosion # 4 - Gravity

• Rapid Mass Movement
  – When rocks and sediment move down a slope very quickly. Example includes landslides, mudslides, and rock falls. Occurs in areas with steep slopes.

• Slow Mass Movement
  – All rocks and topsoil on a slope are gradually moving downhill – the slow movement of material down hill is called creep.
Deposition

- When the agent that is responsible for the erosion stops moving the sediment, the rock fragments are dropped and deposited in a new location.
- Some formations due to deposition are...
  - **Floodplains** – the sediment that is deposited after flood waters recede
  - **Deltas** – when a river flows into an ocean, the river slows down and deposits the sediment it was carrying
  - **Alluvial fans** – when a stream flows down hill onto a flat land surface, the sediment forms a fan-shaped deposit
  - **Beaches** – when water moves down hill and meets a non-flowing body of water, it slows down and deposits the sediment. Waves also help shape the beach.
  - **Dunes** – when wind carrying sand is blocked by an upward slope, it slows down and deposits the sediment, causing the sand to pile up
Texas Ecoregions

• Texas has wide variety of features with a range of abiotic factors supporting the different ecosystems. Ecoregions are areas of land defined by the climate, geography, plants, and animals that are supported in that area.

• There are many maps defining different ecoregions of Texas, some are more specific than others. We will use one that defines the broader ecoregions of Texas.
Panhandle Plains

- High elevation
- Generally flat
- High winds
- Little precipitation
- High evaporation rate
Big Bend

- Mountainous
- Little precipitation
- Temperature varies
- High evaporation rate
- Chihuahuan Desert
Gulf Coast

- High rates of precipitation
- Low evaporation rate
- Warm temperatures
- Low elevation
- Beaches
Hill Country

- Edwards Plateau
- Caves
- Low evaporation rate
- Many streams and springs
Pineywoods

- Dense woods
- High rates of precipitation
- Little erosion
Prairies and Lakes

- Rolling to level ground
- Many lakes
- Temperatures vary
- Moderate to high winds
- Farmland
South Texas Plains

- Rolling to level ground
- High winds
- Woody plants have replaced grasses over time
- Many streams and thorny brush
- Low to moderate precipitation