Weathering, Erosion, and Deposition in the Texas Ecoregions:

Weathering, erosion, and deposition shape the topography and soil characteristics of Earth’s surface. For example, in Texas, these processes have formed a variety of landforms (beaches, plateaus, mountains, and canyons) as well as soil types (fertile soil, clay rich soil, and sandy soil). The combination of topography, soil, and climatic (precipitation and temperature) conditions in an area determines the types of ecosystems the area can support; this is critical to defining ecoregions. In Texas, there are ten different ecoregions including: 1) East Texas Pineywoods, 2) Gulf Coast Prairies and Marshes, 3) Oak Woods and Prairies, 4) Blackland Prairie, 5) Crosstimbers and Prairies, 6) Rolling Plains, 7) High Plains, 8) Trans-Pecos, 9) South Texas Plains (Brush Country), and 10) Edwards Plateau. (Also Llano Uplift which can be included with Edwards Plateau.) These ecoregions are named after the major ecosystem types (for example, East Texas Pineywoods) or topographical features (for example, Edwards Plateau) present in their areas. Each of these ecoregions is impacted differently by weathering, erosion, and deposition.

Water is an agent of weathering and erosion. Generally, the precipitation trend goes from wet to dry when moving from the east part of Texas to the west part. Starting in the east, and moving west are the ecoregions of East Texas Pineywoods and Gulf Coast Prairies and Marshes, and then moving generally to the west are the Oak Woods and Prairies, Blackland Prairie, Crosstimbers and Prairies, South Texas Plains (Brush Country), Edwards Plateau, Rolling Plains, High Plains, and ending in the far west is the Trans-Pecos ecoregion.

The East Texas Pineywoods ecoregion has topography that is fairly flat and fertile, with elevations between 200-800 ft. and with sandy soils. It is one of the wettest regions in Texas, receiving between 35-50 inches of precipitation annually. These conditions support pine and hardwood ecosystems. Periodic forest fires allow pine trees to maintain their status as the dominant ecosystem. The presence of plants and trees helps to prevent soil erosion during rainfall events, which occur in this ecoregion. If there are no plants and the soil is exposed to water and wind, it is easily eroded.

The Gulf Coast Prairies and Marshes ecoregion is found along the southeast coast of Texas and consists primarily of flat plains with low elevations (less than 150 ft.). Average rainfall ranges between 30-50 inches and soils are clay or sand-rich in various locations. The dominant plant species are tall grasses, live oak trees, and mesquite. Along the Gulf Coast, waves can erode beaches in one area and redeposit the sand in a different location along the coast. The sand may also redeposit to form sandbars. Strong storms and hurricanes in this area can increase beach erosion. This erosion can destroy habitats for animals such as turtles, seagulls, and pelicans. The cities of Houston and Galveston fall within this ecoregion.

The Oak Woods and Prairies and Blackland Prairie ecoregions lie just west of the Gulf Coast Prairies and Marshes ecoregion and the East Texas Pineywoods ecoregion, with the Blackland Prairies located further west than the Post Oak Savannas. These two ecoregions are very similar in topography, climate, and soil type. They receive less precipitation than the Pineywoods or Gulf Coast Prairies (only 35-45 inches), and have elevations ranging from 300-800 ft. The topography consists of hills and the soil ranges from clay-rich to sandy. The Oak Woods and Prairies ecoregion is defined by the oak woodland and grassland ecosystems. The Blackland Prairie ecoregion is dominated by tall grasses and gets its name from its black, fertile soils. If these ecosystems experience clear cutting of their trees and grasses, their soils become easily eroded by wind and water. Plowing farmland in order to plant crops also increases soil erosion. Because of its rich soil, most of the Blackland Prairie has been converted to farmland.

The Crosstimbers and Prairies ecoregion and the Rolling Plains ecoregion lie west of the Blackland Prairies. Both ecoregions receive similar amounts of precipitation (20-30 inches), but differ slightly in topography, soil, and elevation. These differences lead to subtle differences in their ecosystem types. The Crosstimbers and...
Prairies ecoregion has elevations ranging from 350-1500 ft. and topography ranging from lowlands (similar to the Blacklands) to limestone uplands. It has rolling hills and dark clay soils that are well drained. Well draining soils allow rainfall to quickly infiltrate the soil and become groundwater, rather than to become runoff, which can lead to erosion. The limestone in this region is vulnerable to chemical weathering, so limestone land features are constantly changing. The Crosstimbers and Prairies ecoregion is a transitional ecosystem consisting of tall and shortgrass prairies, savannahs, and woodlands. The Rolling Plains ecoregion lies west of the Crosstimbers and is even higher in elevation (900-4000 ft.). The Rolling Plains is a part of the central United States Great Plains system. Like the Crosstimbers ecoregion, it has rolling hills. These topographical features are due to the several rivers that flow through this ecoregion. These rivers weather and erode the land, forming several canyons in this area. The material eroded by rivers can be deposited on the outer banks of the rivers, changing their shape. The material may also be deposited at the mouths of the rivers in the Gulf of Mexico, which extends the shoreline. These soils have high fertility so it is not unusual for the natural vegetation of grasses, shrubs, and some trees to be removed in order to allow farming.

Located west of the Rolling Plains, the High Plains ecoregion occupies the area we call the Texas Panhandle. This ecoregion is a level plateau that ranges in elevation from 3000 to 4500 ft. Because this area is so flat, it experiences some of the highest winds in the United States. The Palo Duro Canyon is located in this ecoregion and was formed by the weathering and erosion of rock by the waters flowing through the Red River. It is a very dry ecoregion, prone to drought, and on average receives only 15 to 22 inches of rain annually. These dry conditions can lead to wind erosion in areas with little vegetation. For the most part, the High Plains consists of short-grass prairies.

The Trans-Pecos ecoregion occupies the westernmost portion of Texas. It includes the Chihuahuan Desert, the Guadalupe Mountains, the Davis Mountains, and Big Bend National Park. This ecoregion ranges in elevation from 2,500 ft. to 8,749 ft. and receives on average less than 12 inches of rainfall a year, but this varies with elevation. The majority of plants in this ecoregion are mesquites, cacti, juniper, and other desert species. Deposition after the weathering and erosion of the Guadalupe and Davis Mountains has formed the soil in this ecoregion. In the Chihuahuan Desert, wind acts as the main erosion agent, creating sand dunes. When this ecoregion does receive rain, it can lead to flashfloods, which can weather and erode the rocks and sediment.

The southernmost ecoregion in Texas is the South Texas Plains (Brush Country). This ecoregion has elevations of 300-1100 ft., receives only 20 inches of rain a year, and has very flat topography. Several major rivers, including the Rio Grande, run through it. Historically, the grasslands in this area were used to graze livestock, which led to exposed soil and erosion. This left behind soil more suitable to supporting shrubs and short trees. This area is better known as “Brush County.”

In central Texas, in the area known as the Texas Hill Country, is the Edwards Plateau ecoregion and Llano Uplift ecoregion. This high plateau ranges from 600-3000 ft. in elevation and receives 23-35 inches of rain annually. Short grasses and woodlands dominate this ecoregion. In recent years, it has been discovered that the soils and hill slopes are ideal for wineries to grow grapes. One prominent feature in the Edwards Plateau ecoregion is Enchanted Rock. This is a large dome of granite that is physically weathered through exfoliation, where sheets of rock peel away from the rock surface. The Edward Plateau has large amounts of limestone rock formations, which are vulnerable to chemical weathering, which has led to the formation of a large cave system underground.

In all of the ecoregions, wind and rain can weather and erode the landforms and soil. Rivers are also powerful weathering and erosion agents. They can cut into rock and form canyons. When rivers deposit eroded material, they change their shape or extend the shoreline. When waves along coastlines deposit sediment, they extend beaches; when they wash sediment away, the waves erode beaches. Rivers, rock formations, soils, topography, and precipitation in an ecoregion will determine how the processes of weathering, erosion, and deposition work to reshape it.

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