

### Deeper Dive into Soil

As you go exploring across the regions of the United States, look around you and look down. The soil will be different, based on a number of factors.

A helpful way to understand the nature of soil is by considering five things: **Climate (C)**, **Organisms (O)**, **Relief (R)**, **Parent Material (P)**, and **Time (T)**. Another word for “relief” is topography. We can put all these words together and call it *CIORPT*!

In the table below, you will find additional detail about each region’s soil by considering its *CIORPT*.

Region	Factors contributing to soil formation: <i>CIORPT</i>
Northwest	<p><b>C</b>: Cool to cold, with most precipitation coming as snow in winter. Most of the area in the north and west is wet, with drier, semiarid areas in the southeast.</p> <p><b>O</b>: Evergreen forests on the uplands with grassland meadows.</p> <p><b>R</b>: Complex landscapes due to mountains, wind and water erosion.</p> <p><b>P</b>: Volcanic eruptions created layers of ash and igneous rock formations. Erosion deposited these materials across the region, creating sedimentary rocks, which were weathered and eroded</p> <p><b>T</b>: The soils are related to the age of the landscape in which they form. Most are relatively young and fertile.</p>
West	<p><b>C</b>: The climate is a dry and hot desert on the east side of the coastal mountain range. Evaporation is much greater than precipitation, and the soil is dry most of the year. Along the coast, the summer is dry and warm, the precipitation comes in the winter.</p> <p><b>O</b>: Sparse vegetation grows in the desert, while shrubs and grasslands grow along the coast. Forests grow in the mountains.</p> <p><b>R</b>: West of the coastal mountain range, the area slopes gently to the coast. The rest of the area has scattered mountain ranges with basins among them.</p> <p><b>P</b>: The basins and valleys are filled with sediments eroded from the mountains. Salts accumulated in the basins as ancient lakes dried up in interglacial periods.</p>

	<p><b>T:</b> The intermountain basin landscapes are old, and have been stable through several glacial periods, during which most of the soil formation occurred. Sediment deposition along the coast results in a younger stable landscape.</p>
Rockies & Plains	<p><b>Cl:</b> The region is cold in the north and at high elevations and warmer in the south and at lower elevations. Most of the region receives most of its precipitation in the summer, while the north and high elevations may get substantial winter snow. On the plains, precipitation generally increases from west to east. The temperature can drop dramatically within 24 hours, and frosts that kill or damage growing plants are common in the fall and spring.</p> <p><b>O:</b> The plains and intermountain basins are grasslands, while forests grow in the mountains.</p> <p><b>R:</b> The plains and basins are flat to generally sloping, while the mountains have steep, complex landscapes.</p> <p><b>P:</b> Weathering, erosion, and deposition in the mountains, glacial deposits, wind-deposited sediments provided parent materials for the soil. The soil is fertile with a lot of organic matter and nutrients and the ability to retain water.</p> <p><b>T:</b> Due to erosion, soils in the mountains are young. Soils in the basins and east of the mountains are older.</p>
Southwest	<p><b>Cl:</b> This region is dominated by cool deserts in the north and hot deserts in the south. Evaporation is much greater than precipitation, and the soil is dry most of the year. Precipitation increases and temperature decreases with elevation in the mountains.</p> <p><b>O:</b> Sparse shrubs and grass grow in the basins, while forests grow in the mountains, and short grasses grow on the eastern plains.</p> <p><b>R:</b> The mountains have steep, complex landscapes. The basins are generally flat and transition to highly eroded Canyonlands. The eastern plains are flat to gently rolling.</p> <p><b>P:</b> The basins contain ancient marine deposits and sediments eroded from the mountains. Wind-deposited sediments are common in the basins and eastern plains. Some parts of the Arizona, Utah and New Mexico are covered with volcanic deposits.</p> <p><b>T:</b> Soils in the mountains are young. Soils on the eastern plains are older than the mountain soils, but younger than the soils in the basins.</p> <p>Most soils contain salts and high levels of CaCO<sub>3</sub> (calcium carbonate) alkaline. Soils in the eastern plains are generally more fertile than the desert soils because the grasses contributed more organic matter to the soils on the plains.</p>
Midwest	<p><b>Cl:</b> This region has a warm in the south to cool in the north. The region is humid, and precipitation increases slightly from west to east. There is enough precipitation to wash nutrients and salts (leaching) below plant roots and out of the soil. Such leaching created slightly acidic soils in much of the region. Historic climate change caused glaciers to advance and recede.</p>

	<p><b>O:</b> The western part of the regions was dominated by tall-grass prairies. Deciduous forests were common in the east with some evergreen forests in the northeast. Decomposing tree leaves contribute to formation of acidic soils.</p> <p><b>R:</b> Most of the region is a gently rolling plain with common streams and rivers.</p> <p><b>P:</b> Soils are forming in sediments deposited by glaciers, ancient glacial lakes, or wind-deposited sediments over the glacial sediments.</p> <p><b>T:</b> Soils in the southern part of the regions are forming in wind-deposited sediments deposited during the last ice age. Some of these sediments were deposited on top of existing soils. Soils in the north generally are younger, forming in sediments deposited as the glaciers melted.</p>
South	<p><b>Cl:</b> The region is warm in the northwest and hot in the south. The western part is semiarid, and precipitation increases until the east is a humid region. In the humid parts, there is enough precipitation to wash nutrients and salts (leaching) below plant roots and out of the soil. Such leaching created slightly acidic soils in much of the region.</p> <p><b>O:</b> Short and mixed grasses and savannah are in the west, changing to forests in the east as precipitation increases. Decomposing tree leaves contribute to formation of acidic soils.</p> <p><b>R:</b> Most of the region is dominated by flat to gently rolling plains, but has some hills and valleys.</p> <p><b>P:</b> The parent materials range from wind-deposited sediments to materials weathering from ancient marine sediments and rocks, to river-deposited sediments many miles on either side of major rivers to materials weathering from ancient mountain ranges to coastal marine sediments.</p> <p><b>T:</b> The age of these soils is as diverse as the parent materials in which they formed. The youngest soils are forming in sediments deposited by wind and rivers, while the oldest soils are forming in valleys and basins in materials weathering from ancient mountain ranges.</p> <p>Weathering and erosion have played a significant role in the development of the parent materials. This region contains a diverse mix of soil types ranging from semiarid in the west, rich fertile soil in the North and older soils in the East, which are nearly depleted of nutrients.</p>
Northeast	<p><b>Cl:</b> This is a cold to cool, humid region. Because it is near the Atlantic Ocean, it is not as cold as similar latitudes in Minnesota or the Dakotas. There is enough precipitation to wash nutrients and salts (leaching) below plant roots and out of the soil. Such leaching created slightly acidic soils in much of the region.</p> <p><b>O:</b> Evergreen and deciduous forests dominate, with some tall-grass meadows. Decomposing tree leaves contribute to formation of acidic soils.</p> <p><b>R:</b> Most of the area is dominated by mountains and valleys with gently rolling coastal plains dissected by rivers and</p>

	<p>streams.</p> <p><b>P:</b> There are only small areas of glacial deposits since glaciers in the continental ice-sheets parted around the Appalachian and Adirondack mountains. These mountains are very old, and composed of many types of crystalline minerals of varying ages, weathering from igneous and metamorphic rocks. Many of these minerals weather into acidic parent materials in which the soils form. The coastal plains soils are forming in marine sediments and materials weathering from sedimentary rocks.</p> <p><b>T:</b> The region contains soils forming on some of the oldest parent materials and landscapes in the U.S. But old landscapes and old parent materials do not mean the soils are old. Erosion on mountain slopes often exceeds formation, leaving thin soils on the slopes and thicker soils near the bottom of the slope and in the valleys. The older soils are on the flatter, more stable landscapes along the coastal plains.</p>
Mid-Atlantic	<p><b>Cl:</b> All the area is humid. The temperatures are cool in the north and warm in the south. There is enough precipitation to wash nutrients and salts (leaching) below plant roots and out of the soil. Such leaching created acidic soils in much of the region.</p> <p><b>O:</b> Deciduous and evergreen forests are the dominant vegetation. There are some meadows and river valleys with tall grasses. Decomposing tree leaves contribute to formation of acidic soils.</p> <p><b>R:</b> The western area is dominated by mountains and valleys, the central area by low hills and narrow valleys, and the east by gently rolling coastal plains.</p> <p><b>P:</b> The Appalachian mountains are very old, and composed of many types of crystalline minerals varying ages, weathering from igneous and metamorphic rocks. Parent materials in old landscapes often have been leached of nutrients and contribute to development of acidic soils. The coastal plains formed over many thousands of years as sea levels rose and receded, and as continental landmasses were formed and changed due to weathering and erosion. The soils there are forming in marine sediments and materials weathering from sedimentary rocks.</p> <p><b>T:</b> The region contains soils forming on some of the oldest parent materials and landscapes in the U.S. But old landscapes and old parent materials do not mean the soils are old. Erosion on mountain slopes often exceeds formation, leaving thin soils on the slopes and thicker soils near the bottom of the slope and in the valleys. The older soils are on the flatter, more stable landscapes of the Piedmont, followed by those in the coastal plains.</p>
Southeast	<p><b>Cl:</b> This is a hot, humid region. There is enough precipitation to wash nutrients and salts (leaching) below plant roots and out of the soil. Such leaching created slightly acidic soils in much of the region.</p>



**O:** Deciduous and evergreen forests are the dominant vegetation. There are some meadows and river valleys with tall grasses. Decomposing tree leaves contribute to formation of acidic soils.

**R:** The western area is dominated by mountains and valleys, the central area by low hills and narrow valleys, and the east and south by gently rolling to flat coastal plains. Much of Florida is dominated by flat lands with high water tables in the soil creating swamps.

**P:** The Appalachian mountains are very old and composed of many types of crystalline minerals varying ages, weathering from igneous and metamorphic rocks. Parent materials in old landscapes often have been leached of nutrients and contribute to development of acidic soils. The coastal plains soils are forming in marine sediments and materials weathering from sedimentary rocks which may be covered by loose sediments eroded from the Appalachian Mountains. In some areas a thick layer of organic matter covers the other sediments.

**T:** The region contains soils forming on some of the oldest parent materials and landscapes in the U.S. But old landscapes and old parent materials do not mean the soils are old. Erosion on mountain slopes often exceeds formation, leaving thin soils on the slopes and thicker soils near the bottom of the slope and in the valleys. The older soils are on the flatter, more stable landscapes on the Piedmont, followed by those along the coastal plains.

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