



Unit E: Basic Principles of Soil Science

Lesson 5: Explaining a Soil Profile

Important Terms

- Additions
 - Eluviation
 - Illuviation
 - Losses
 - Soil profile
 - Solum
 - Subsoil
 - Substratum
 - Topsoil
 - Transformations
 - Translocations
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What is a soil profile?

- A soil profile is a vertical cross-section of the soil.
 - When exposed, various layers of soil should be apparent.

What is a soil profile?

- Each layer of soil may be different from the rest in a physical or chemical way.
 - The differences are developed from the interaction of such soil-forming factors as:
 - Parent material
 - Slope
 - Weathering (time)
 - Climate
 - Native vegetation
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What is a soil profile?

- A soil profile is usually studied to a depth of .9 to 1.5 meters.

Primary Layers of a Soil Profile

HORIZONS

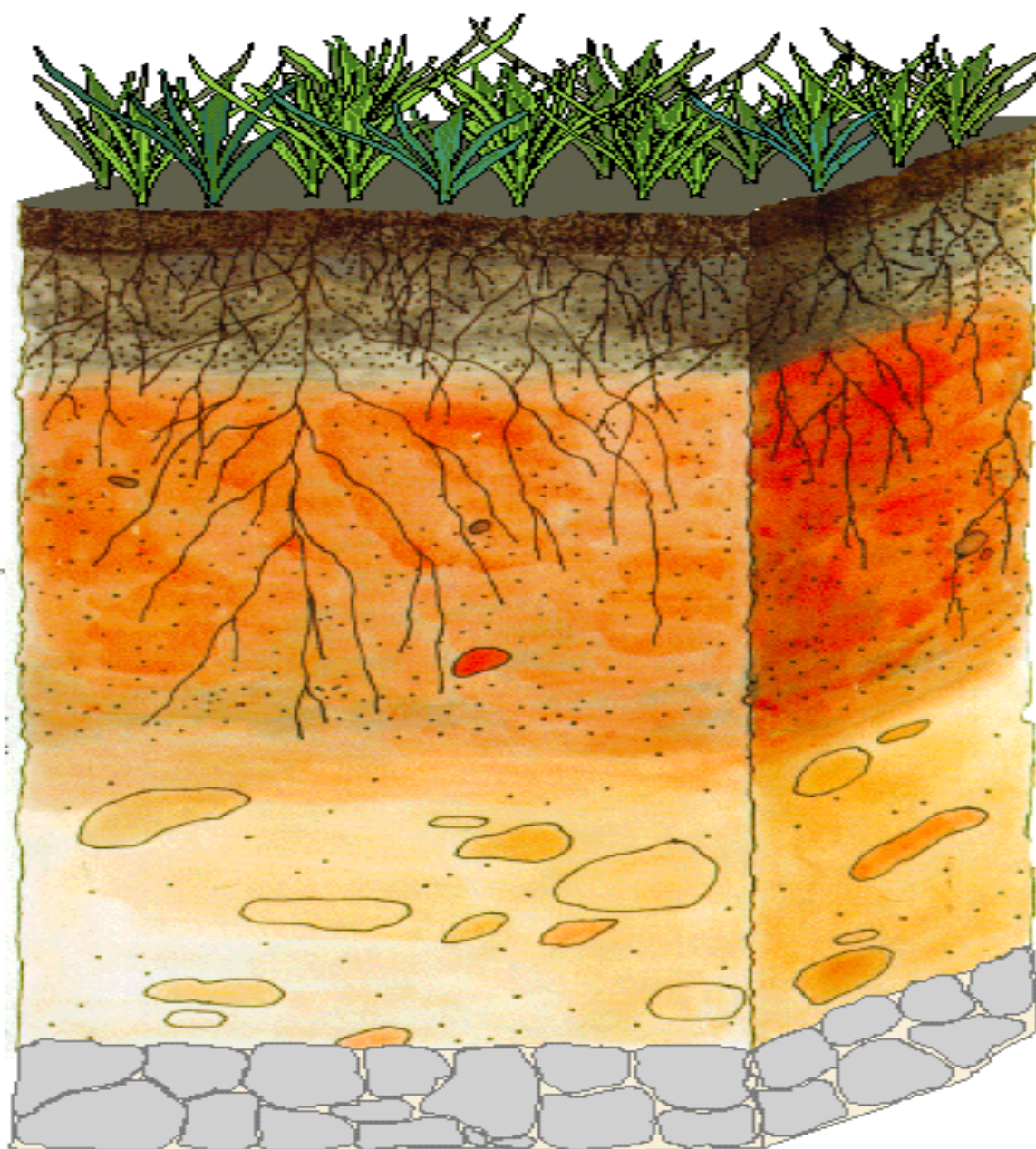
O Surface litter

A Topsoil: humus, roots, organisms

B Subsoil: fine particles, leached materials, some roots

C Parent Material: weathered bedrock and some leached materials

R Bedrock: underlying solid rock



How do soils within a soil profile change over time?

- Soils change over time in response to their environment.
- The environment is influenced by the soil-forming factors.

How do soils within a soil profile change over time?

- The causes of these changes can be classified into 4 processes:
 - Additions. Materials such as fallen leaves, wind-blown dust, or chemicals from air pollution that may be added to the soil.
 - Losses. Materials may be lost from the soil as a result of deep leaching or erosion from the surface.

How do soils within a soil profile change over time?

- The causes of these changes can be classified into 4 processes:
 - Translocations. Materials may be moved within the soil.
 - This can occur with deeper leaching into the soil or upward movement caused by evaporating water.
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How do soils within a soil profile change over time?

- The causes of these changes can be classified into 4 processes:
 - Transformations. Materials may be altered in the soil.
 - Examples include organic matter decay, weathering of minerals to smaller particles, or chemical reactions.
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How do soils within a soil profile change over time?

- Each of these processes occurs differently at various depths.
- As a soil ages, horizontal layers develop and changes result.

Causes of Changes Within a Soil Profile

- 1. Additions — fallen leaves, dust, chemicals**
- 2. Losses — materials lost due to erosion or leaching**
- 3. Translocation — materials moved within the soil**
- 4. Transformation — materials being altered in the soil**

What are the major horizons of a soil profile and how do they differ?

- There are 3 primary soil horizons called master horizons.
 - A Horizon
 - B Horizon
 - C Horizon
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What are the major horizons of a soil profile and how do they differ?

■ O Horizon.

- This is an organic layer made up of partially decayed plant and animal debris.
 - It generally occurs in undisturbed soil such as in a forest.
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What are the major horizons of a soil profile and how do they differ?

- A Horizon. This is often referred to as topsoil and is the surface layer where organic matter accumulates.
 - Over time, this layer loses clay, iron, and other materials due to leaching.
 - This is called eluviation.
 - The A horizon provides the best environment for the growth of plant roots, microorganisms, and other life.

What are the major horizons of a soil profile and how do they differ?

- E Horizon. This is the zone of greatest eluviation.
 - Because the clay, chemicals, and organic matter are very leached, the color of the E horizon is very light.
 - It usually occurs in sandy forest soils with high amounts of rainfall.
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What are the major horizons of a soil profile and how do they differ?

- B Horizon. This horizon is referred to as the subsoil.
- It is often called the “zone of accumulation” since chemicals leached from the A and E horizons accumulate here.

B Horizon

- This accumulation is called illuviation. The B horizon will have less organic matter and more clay than the A horizon.
 - Together, the A, E, and B horizons are known as the solum.
 - This is where most of the plant roots grow.
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What are the major horizons of a soil profile and how do they differ?

- C horizon. This horizon is referred to as the substratum.
 - It lacks the properties of the A and B horizons since it is influenced less by the soil forming processes.
 - It is usually the parent material of the soil.
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What are the major horizons of a soil profile and how do they differ?

- R Horizon.
- This is the underlying bedrock, such as limestone, sandstone, or granite.
 - It is found beneath the C horizon.

Soil Monolith



Soil Profile Horizons

- O Horizon organic layer of leaves, roots, and decaying material
- A Horizon Topsoil
- B Horizon Subsoil
- C Horizon Substratum
- R Horizon Bedrock or solid rock below the C Horizon

Primary Layers of a Soil Profile

HORIZONS

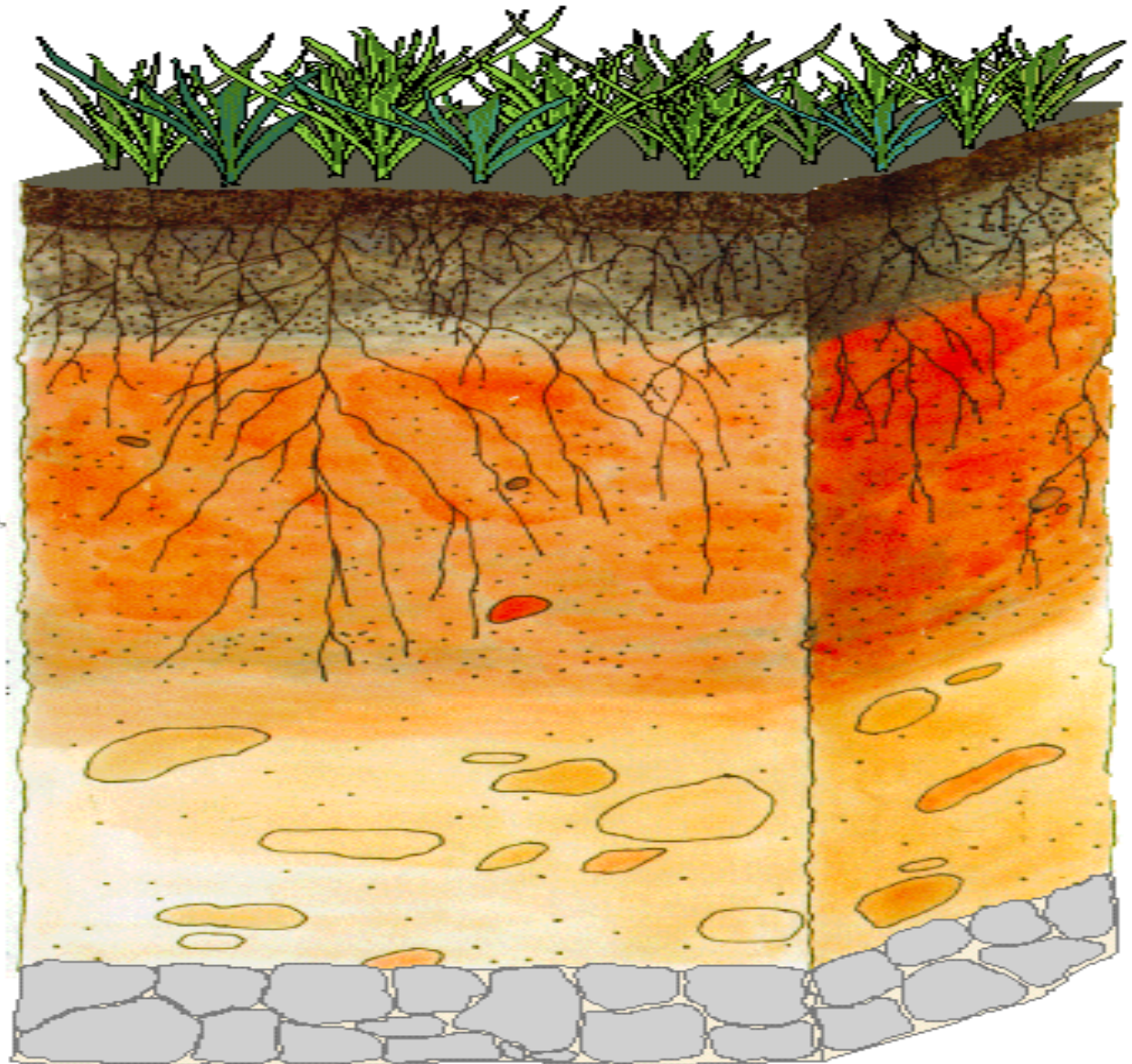
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Review / Summary

- Explain the soil profile.
 - Explain how soils within the profile change over time.
 - Distinguish between the major horizons of a soil profile.
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