

UNIT A: PRINCIPLES OF SOIL

Lesson 3: Horizons of Soil

Important Terms

- ▣ Additions
- ▣ Eluviation
- ▣ Illuviation
- ▣ Losses
- ▣ Soil Profile
- ▣ Solum
- ▣ Subsoil
- ▣ Substratum
- ▣ Topsoil
- ▣ Transformation
- ▣ Translocations



Soil Profile 1



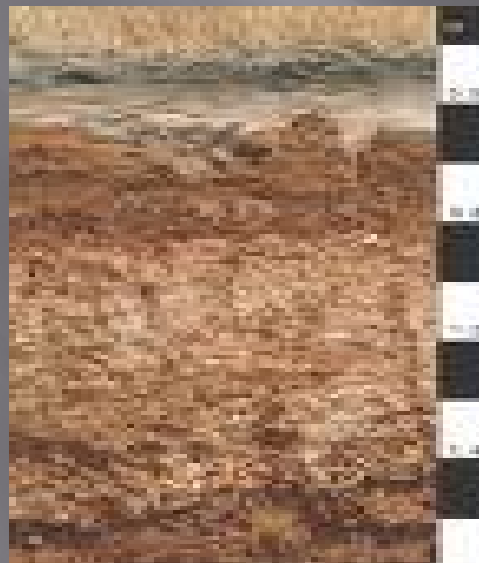
Soil Profile 2



Soil Profile 3



Soil Profile 4

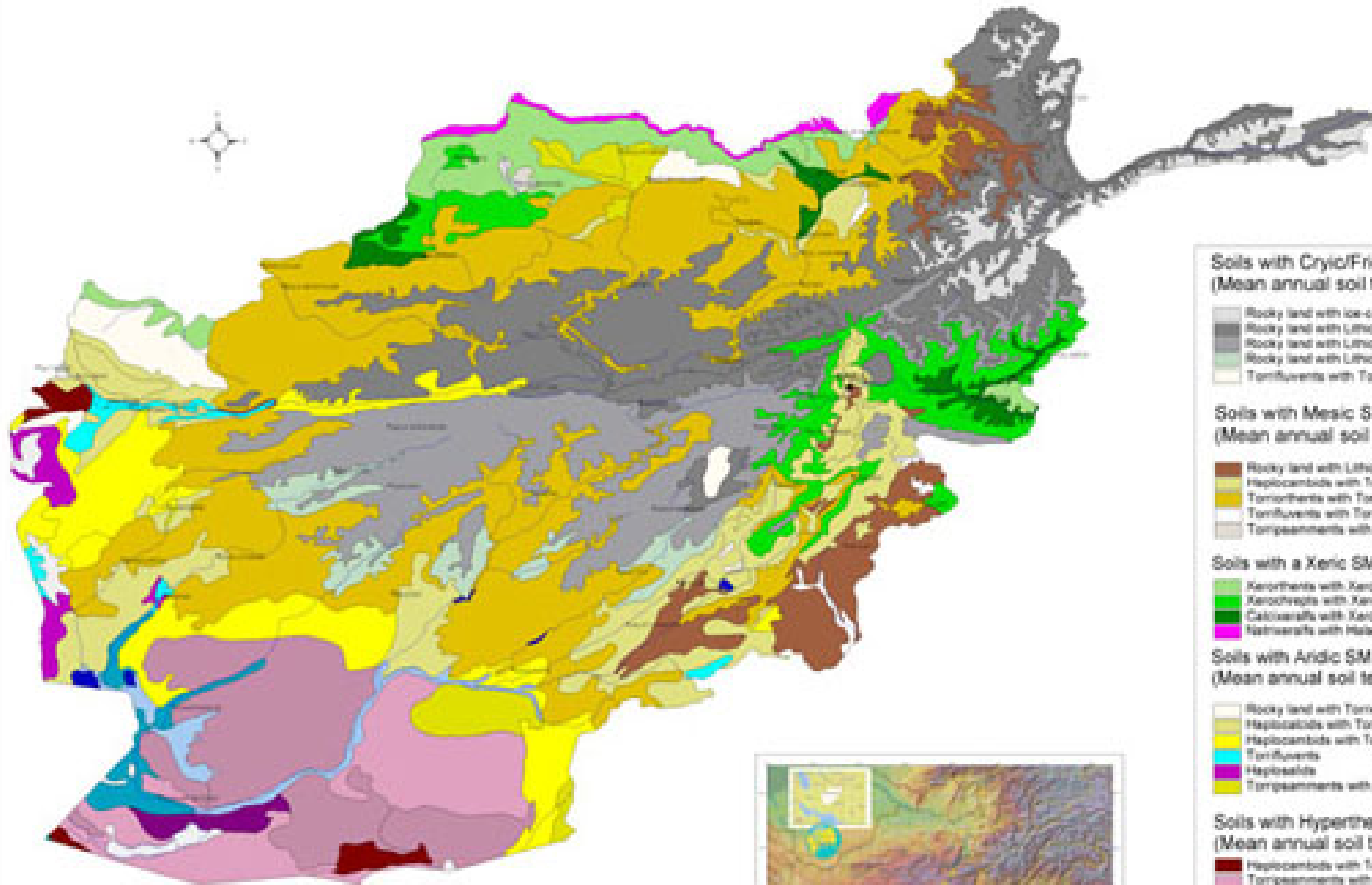


Soil Profile 5



Soil Profile 6

Soil Regions of Afghanistan



- Soils with Cryic/Frigid or colder STR**
(Mean annual soil temp. $< -8 \text{ deg. C}$)
- Rocky land with ice-capped bare rock
 - Rocky land with Lithic Cryorthents
 - Rocky land with Lithic Haploxydols
 - Rocky land with Lithic Haplocambids
 - Torrifluvents with Torripsamments
- Soils with Mesic STR**
(Mean annual soil temp. 8-15 deg. C)
- Rocky land with Lithic Haplocambids
 - Haplocambids with Torriorthents
 - Torriorthents with Torrifuvents
 - Torrifuvents with Torripsamments
 - Torripsamments with Dunes
- Soils with a Xeric SMR and Mesic STR**
- Xeroorthents with Xeroripsamments
 - Xerochrepts with Xeroorthents
 - Calcixerolls with Xerochrepts
 - Heterixerolls with Heterochrepts
- Soils with Aridic SMR and Thermic STR**
(Mean annual soil temp. 15-22 deg. C)
- Rocky land with Torriorthents
 - Haplocambids with Torriorthents
 - Haplocambids with Torrifuvents
 - Torrifuvents
 - Haploxydols
 - Torripsamments with Dunes
- Soils with Hyperthermic STR**
(Mean annual soil temp. $>22 \text{ deg. C}$)
- Haplocambids with Torripsamments
 - Torripsamments with Torriorthents
 - Torrifuvents with Haploxydols
 - Torrifuvents with Haploxydols
 - Aquixdols with Torrifuvents
- Dunes
- Salt Flats
- Lakes
- Rivers

Soil Regions of Afghanistan
 Prepared by the International Geosphere and Biosphere Programme
 and the International Geosphere and Biosphere Programme
 in cooperation with the International Geosphere and Biosphere Programme
 and the International Geosphere and Biosphere Programme

Original Scale 1:1,000,000



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.
 - 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-the original source of most soils is rock – the solid, unweathered materials of the earth's crust. Solid rock breaks into smaller particles, which are called the parent materials of soil.
 - ▣ Slope- the rise and fall of the land over a certain area
 - ▣ Native vegetation-plants that naturally grow without human interaction
 - ▣ Weathering (time)-the breakdown of rock and other material due to freezing and thawing, and rainfall over time.
 - ▣ Climate- The average weather for a specific area over a large span of time
- ▣ A soil profile is usually studied to a depth of 3 to 5 feet

Explain how soils within the profile change over time

- ▣ Soils change over time in response to their environment. The environment is influenced by the soil-forming factors.
- ▣ The causes of these changes can be classified into 4 processes:

Explain how soils within the profile change over time

- ▣ *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.
- ▣ *Translocations*. Materials may be moved within the soil. This can occur with deeper leaching into the soil or upward movement caused by evaporating water.

Explain how soils within the profile change over time

- ▣ *Transformations.* Materials may be altered in the soil. Examples include organic matter decay, weathering of minerals to smaller particles, or chemical reactions.
- ▣ Each of these processes occurs differently at various depths. As a soil ages, horizontal layers develop and changes result.

Distinguish between the major horizons of a soil profile

- ▣ There are 3 primary soil horizons called master horizons. They are A, B, and C. These are part of a system for naming soil horizons in which each layer is identified by a code: O, A, E, B, C, and R. They will be discussed as follows:

Distinguish between the major horizons of a soil profile

- ▣ “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.
- ▣ “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.

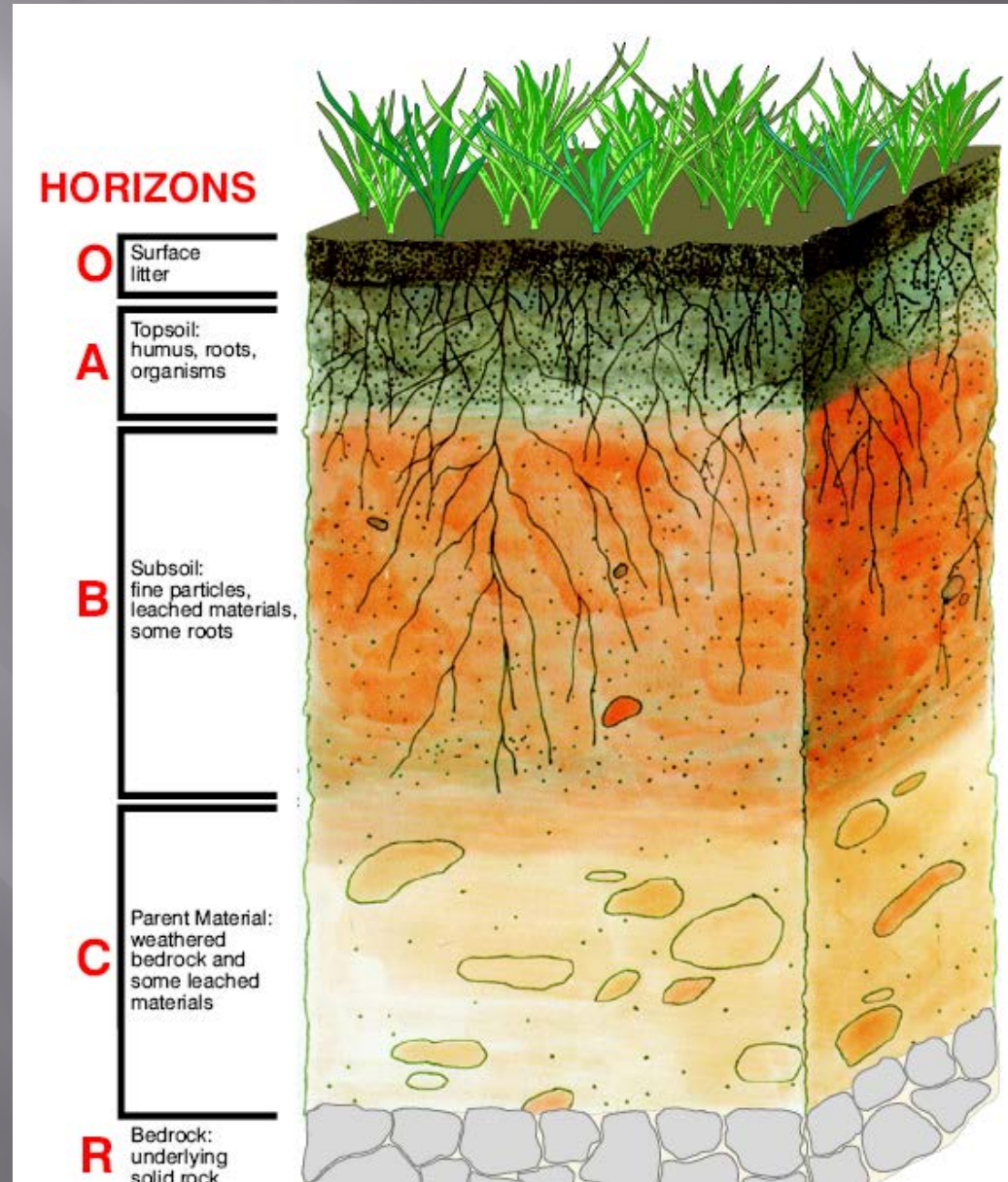
Distinguish between the major horizons of a soil profile

- ▣ “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. 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.

Distinguish between the major horizons of a soil profile

- ▣ “C” horizon. This horizon is referred to as the *substratum or parent material*. 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
- ▣ “R” horizon. This is the underlying bedrock, such as limestone, sandstone, or granite. It is found beneath the C horizon.

Primary Layers of a Soil Profile



Review/Summary

1. What are the definitions for each of the key terms mentioned in this lesson?
2. What are the two key terms that describe changing of the soil.
3. What are the differences between additions, losses, transformations, and translocations?
4. What is a soil profile?
5. What are the primary layers of a soil profile?