Introduction to Soils

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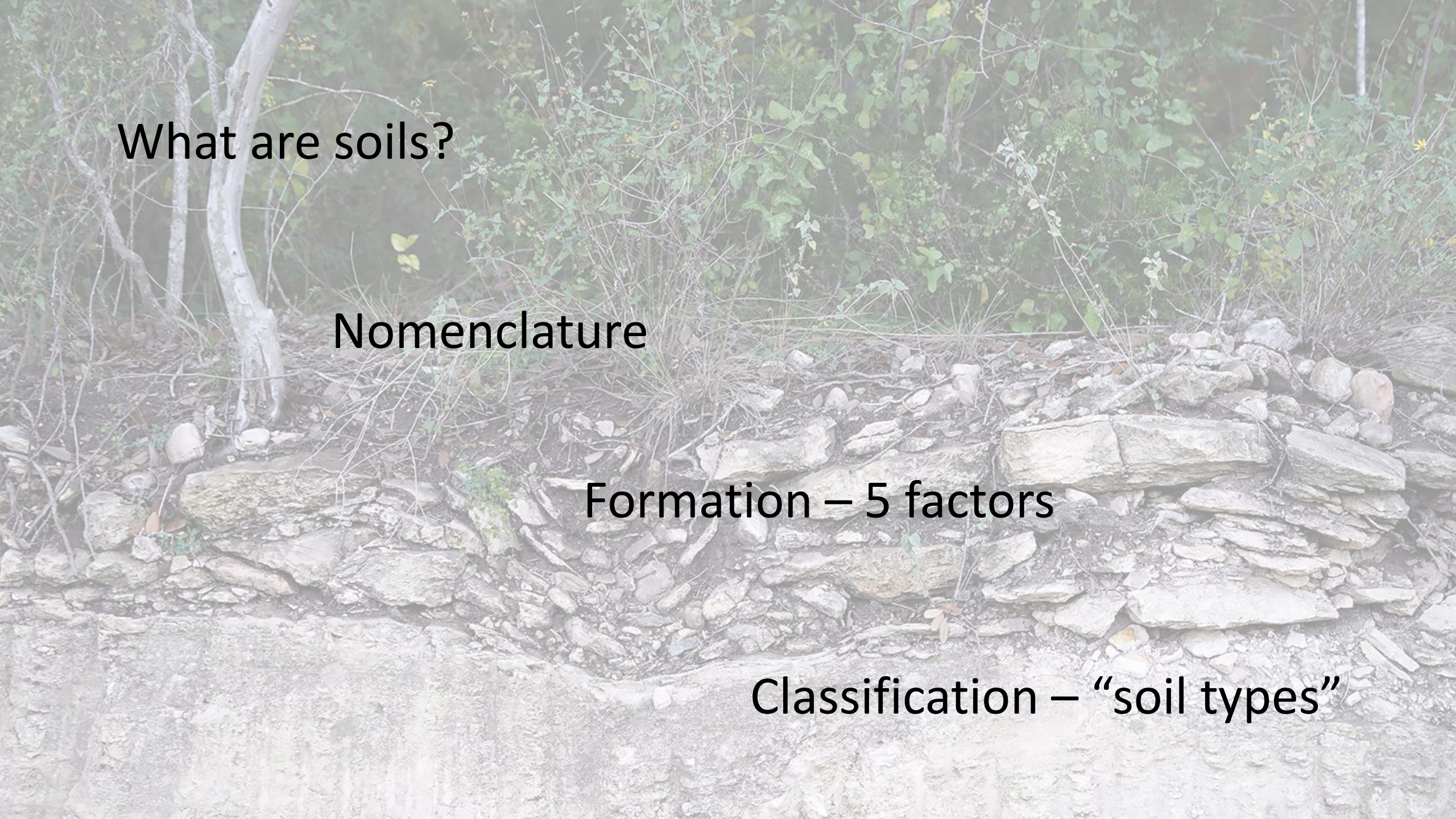


What are soils?

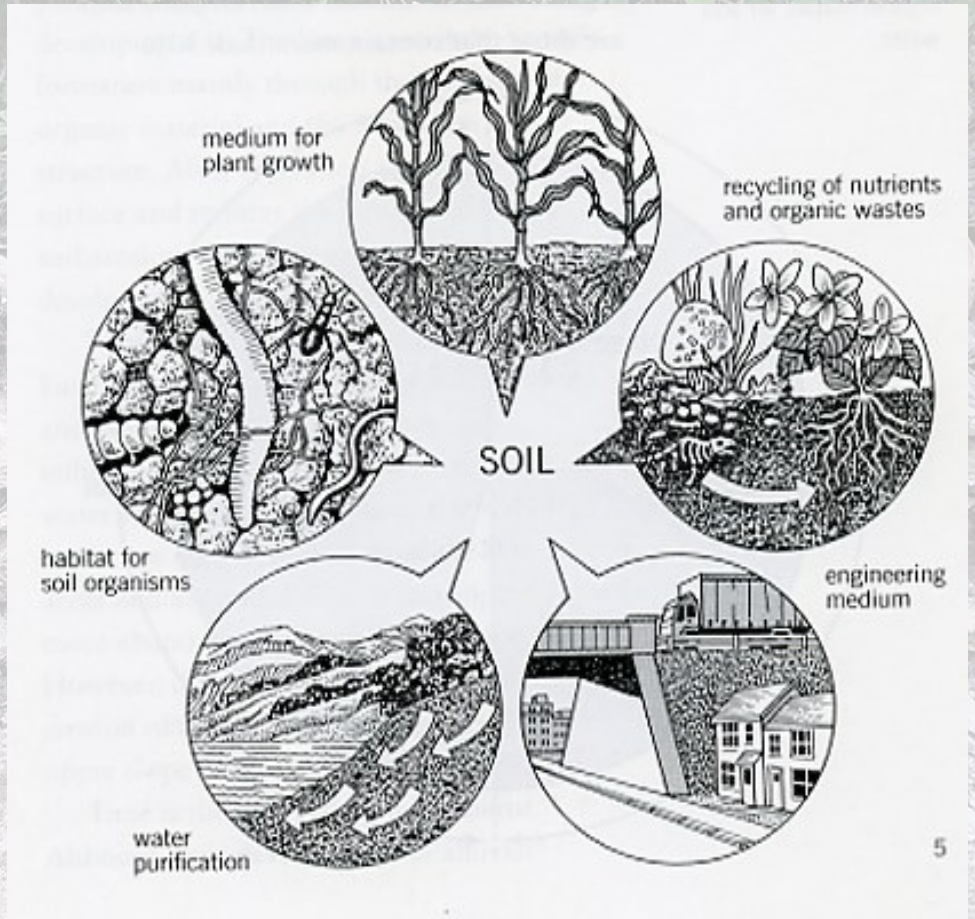
Nomenclature

Formation – 5 factors

Classification – “soil types”

Soil – “the unconsolidated mineral or organic material on the immediate surface of the Earth that serves as a natural medium for the growth of land plants.”

Soil Science Society of America

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Soils – the lingo

Soil

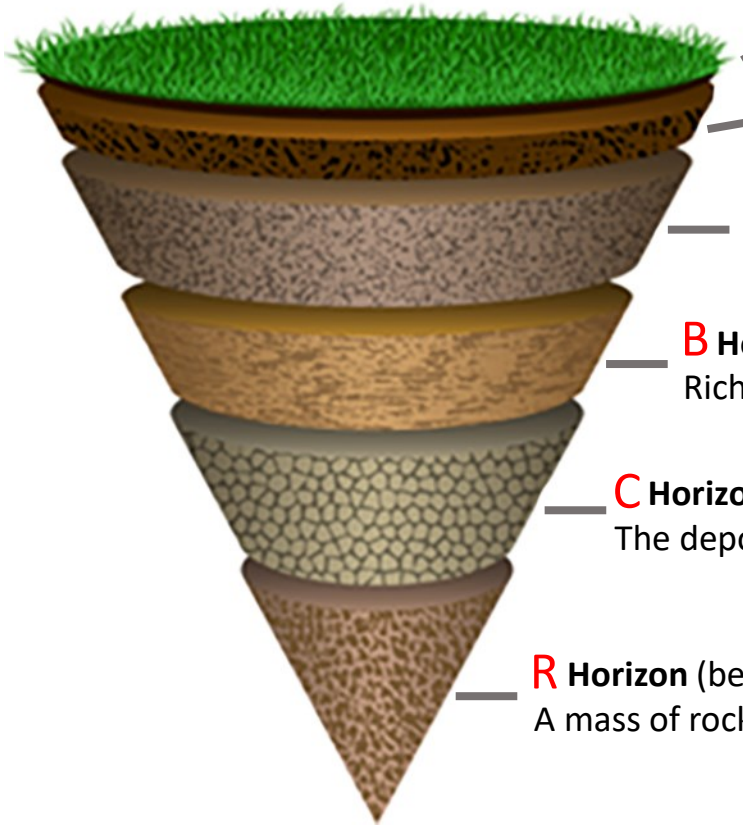
Profile

Horizon

Texture

Structure

Soil Profile



O Horizon (organic)
Organic matter such as decaying leaves

A Horizon ("topsoil")
Minerals from parent material with a little organic matter

E Horizon (eluviated horizon)
Light colored and leached of clay, minerals, and organic matter

B Horizon (subsoil)
Rich in minerals that moved down from A or E horizons

C Horizon (parent material)
The deposit at the earth's surface from which the soil developed

R Horizon (bedrock)
A mass of rock that weathers to form the parent material for some soils

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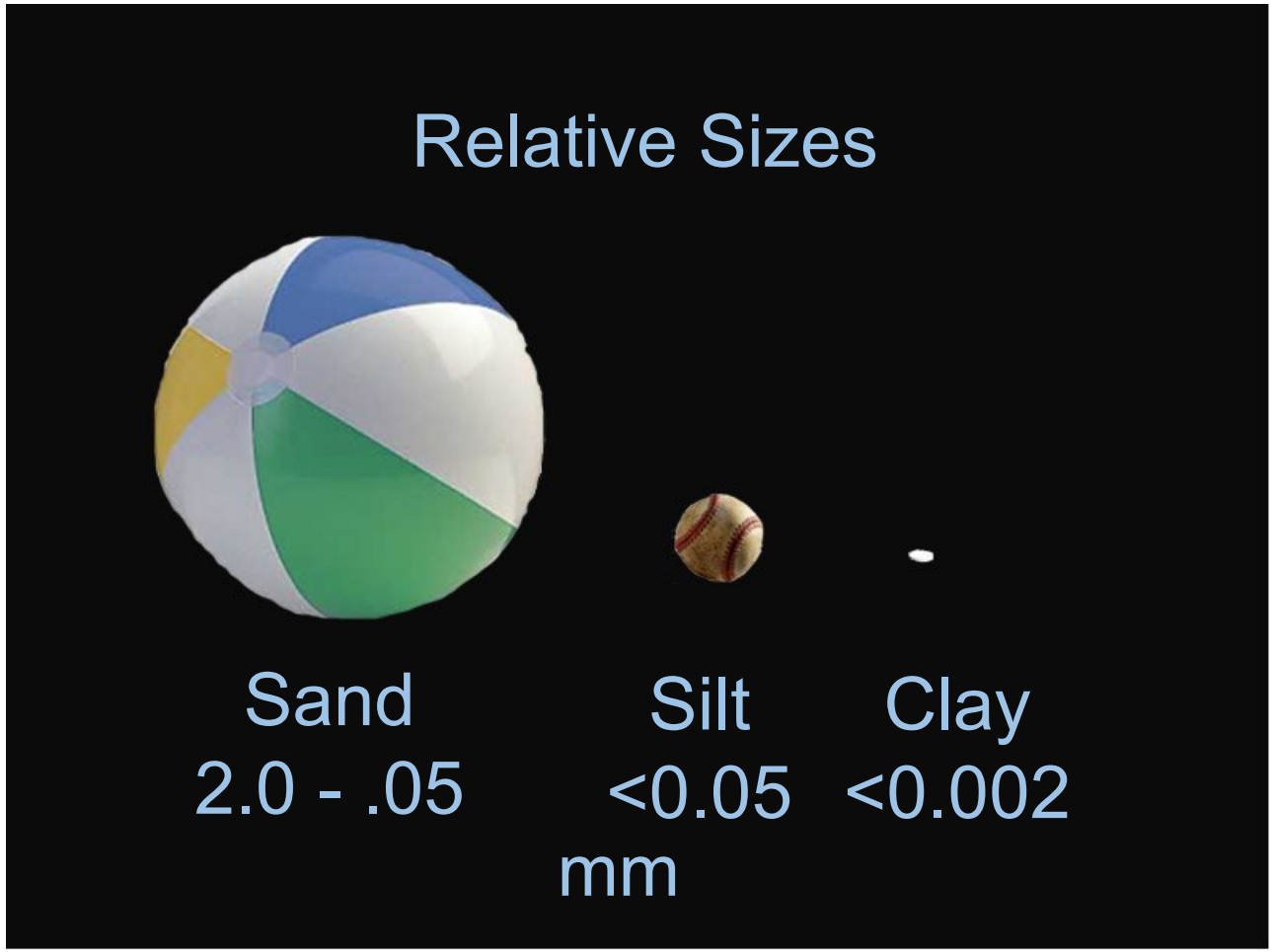
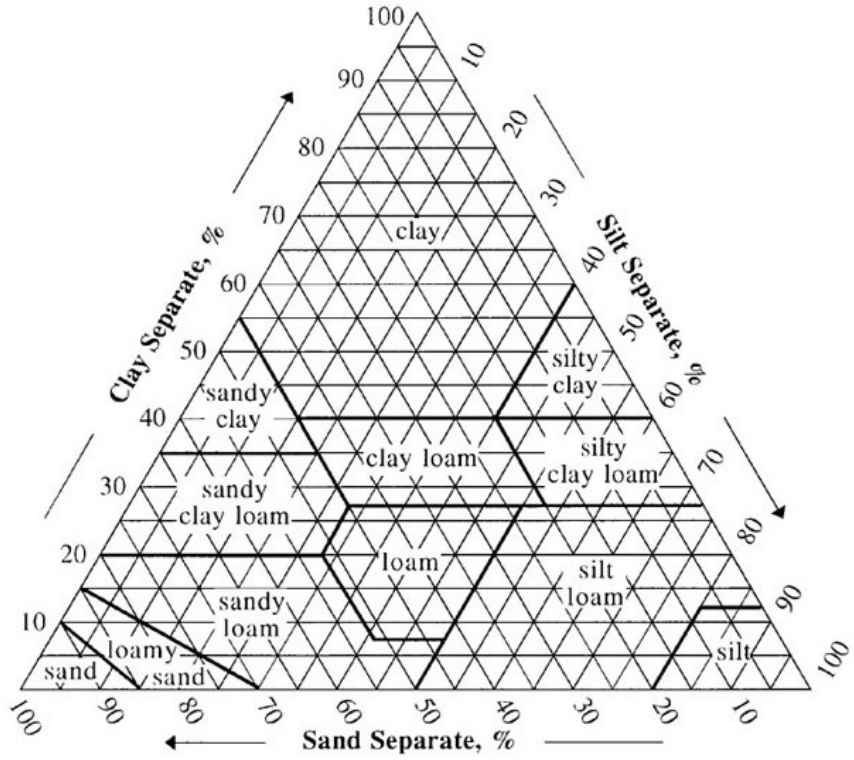
Texture: proportions of sand, silt, and clay particles



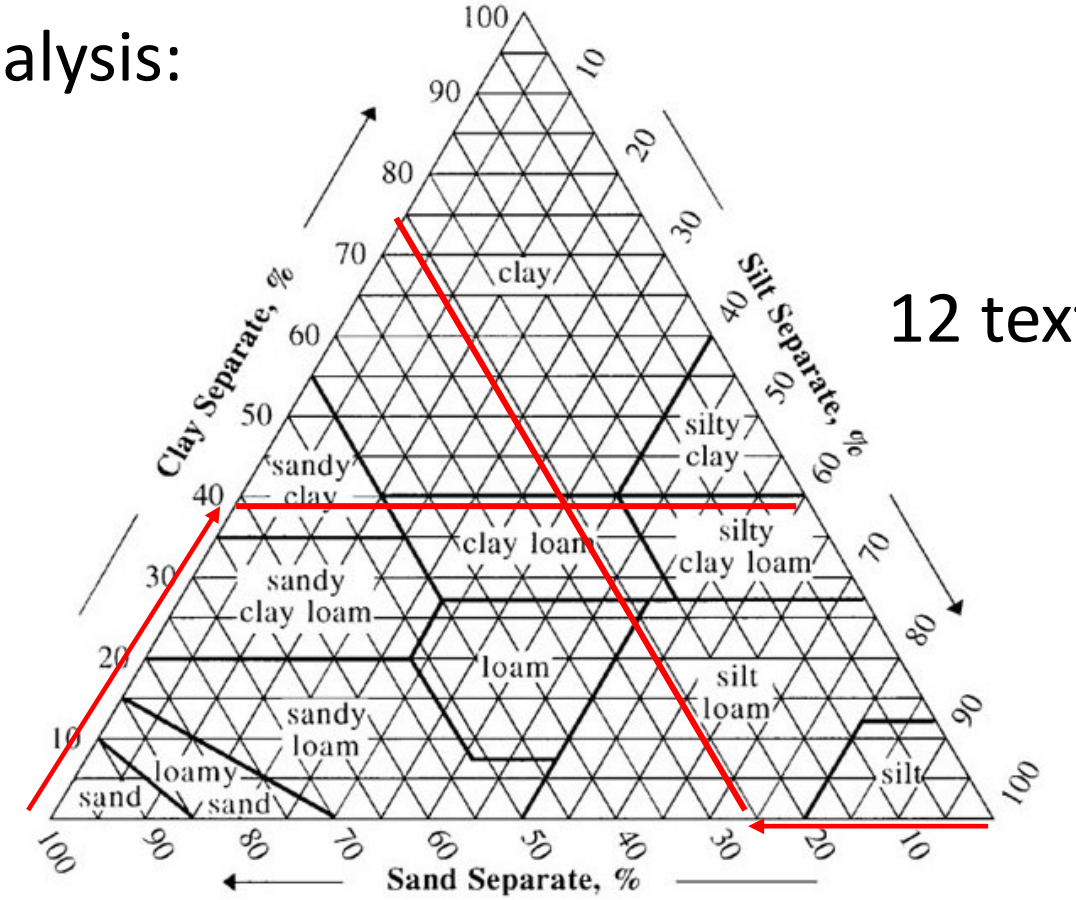


Texture

Particle Size Analysis:

- 26% sand
- 38% clay
- 36% silt

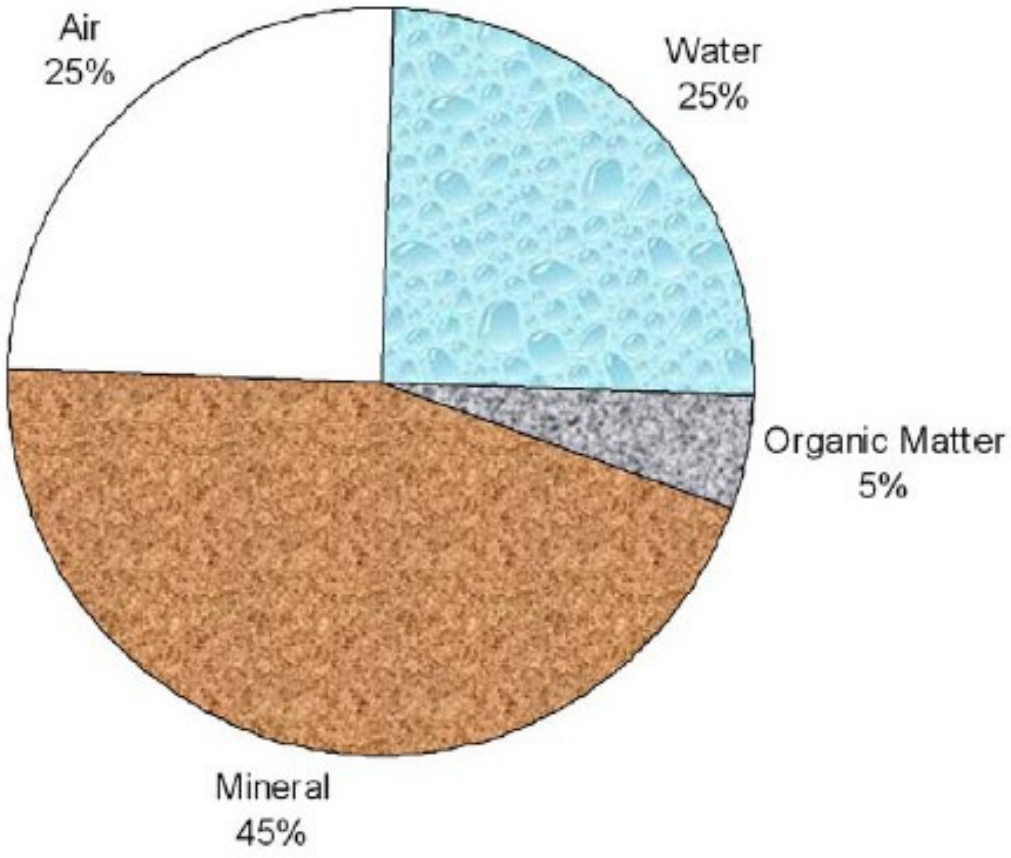
Clay loam



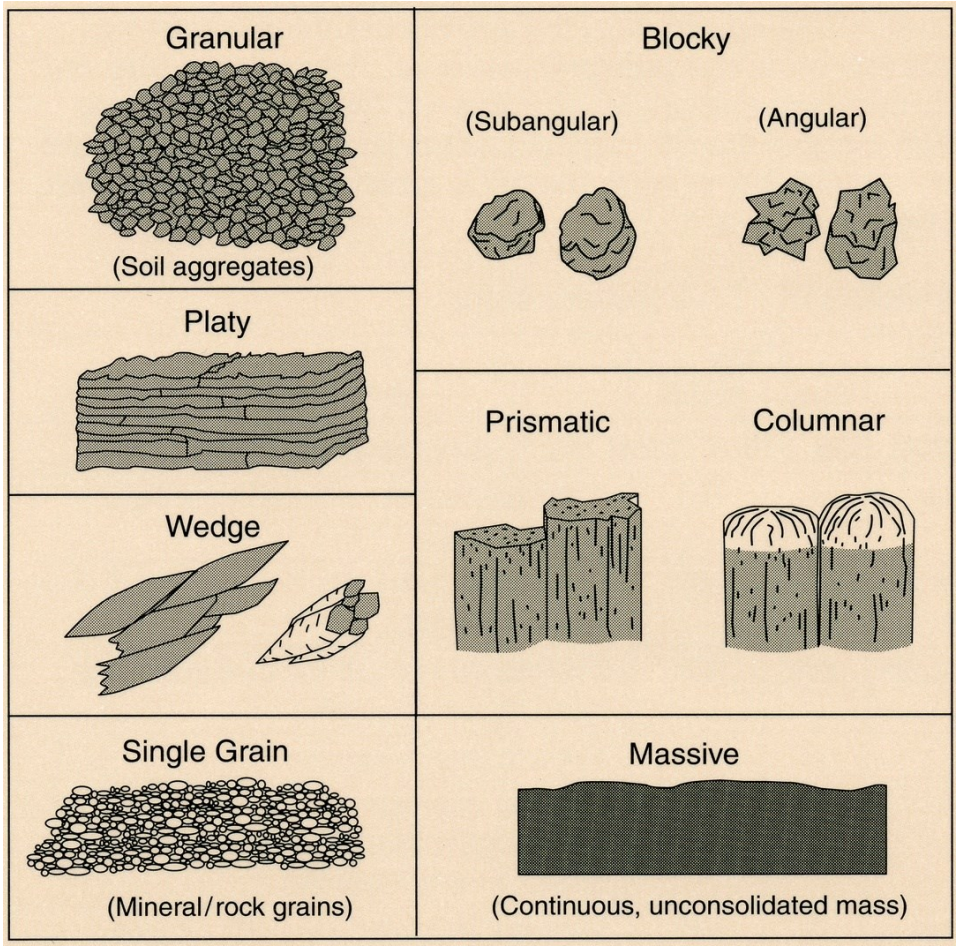
12 texture classes

Soil Composition

- Solids
- Pore space

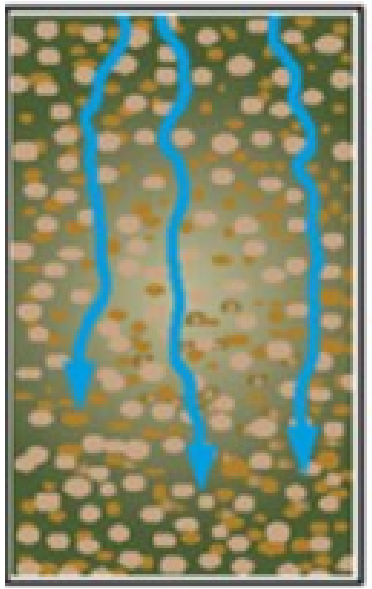


Soil Structure

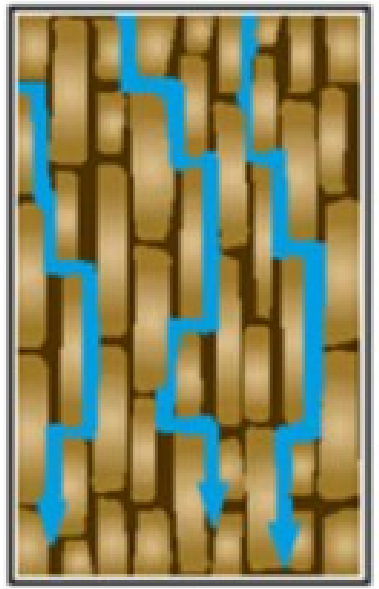


Effects of Soil Characteristics

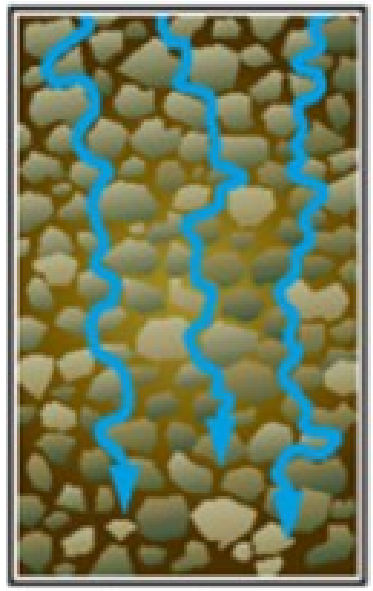
- Water flow through different soil structures
- Which of these soil structures will allow water to move fastest through the soil?



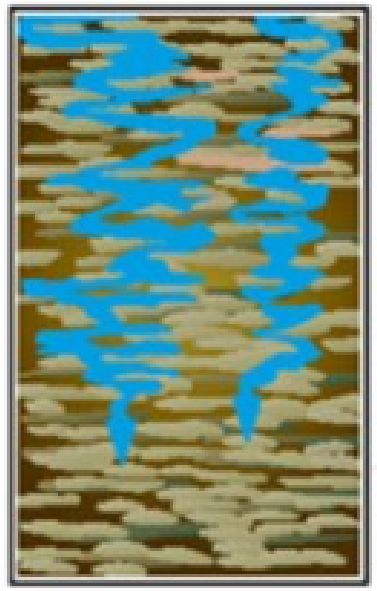
Granular



Prismatic



Subangular Blocky



Platy

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Image Credit: USDA-NRCS

CLORPT | 5 factors of soil formation

CL—Temperature and moisture influence the speed of chemical reactions, which in turn help control how fast rocks weather and dead organisms decompose. Soils develop fastest in warm, moist climates and slowest in cold or arid (dry) ones.

O—Plant roots spread, animals burrow, and bacteria eat. These and other soil organisms speed up the breakdown of large soil particles into smaller ones. Roots are a powerful soil-forming force, cracking rocks as they grow. And roots produce carbon dioxide that mixes with water, forming an acid that wears away rock.

R—The shape of the land and the direction it faces make a difference in how much sunlight a soil gets and how much water it holds. Deeper soils form at the bottom of a hill than at the top because gravity and water move soil particles down the slope.

P—Just like you inherited characteristics from your parents, every soil inherits traits from the materials in which it forms. Soils that formed from limestone bedrock, for example, are rich in calcium. Soils that formed from materials at the bottom of lakes are high in clay.

T—Older soils differ from younger soils because they have had longer to develop. In the northern US, soils tend to be young because glaciers covered the surface during the last Ice Age. In the southern US, there were no glaciers, so the soils have been exposed for a longer time, making them more weathered.

https://www.soils4teachers.org/posters


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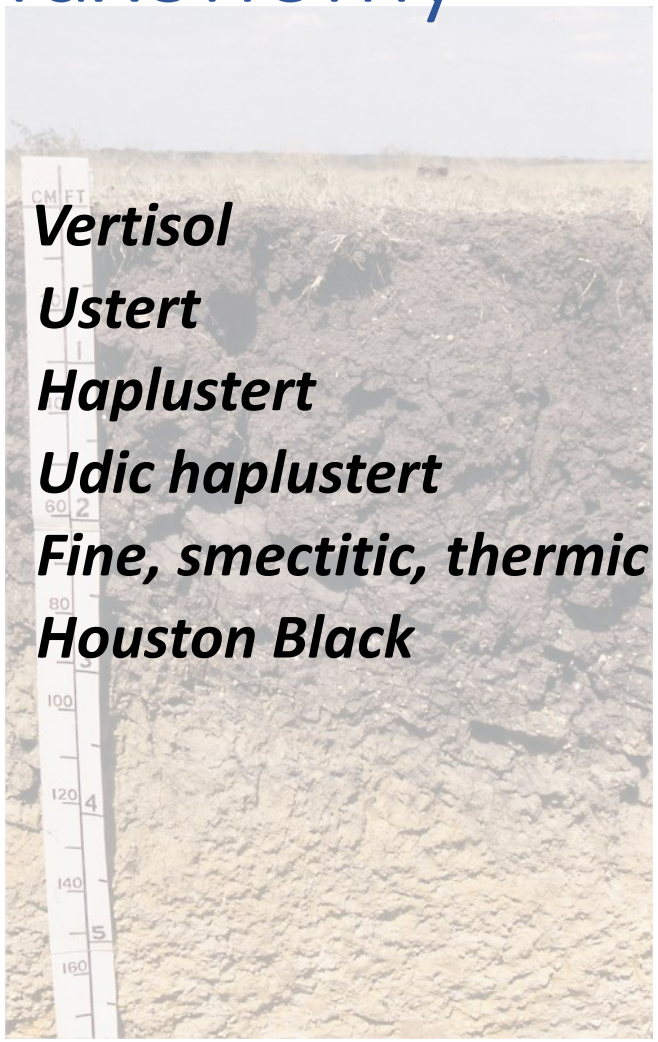
Classification / Taxonomy

- Biology and Soils – hierarchical systems
- Biology example:
  - ***Kingdom*** — ***Plantae***
  - ***Division**** — ***Magnoliophyta (flowering)***
  - ***Class*** — ***Magnoliopsida (dicots)***
  - ***Order*** — ***Violales***
  - ***Family*** — ***Passifloraceae***
  - ***Genus*** — ***Passiflora***
  - ***Species*** — ***incarnata***

* ***Phylum*** in the Animal kingdom

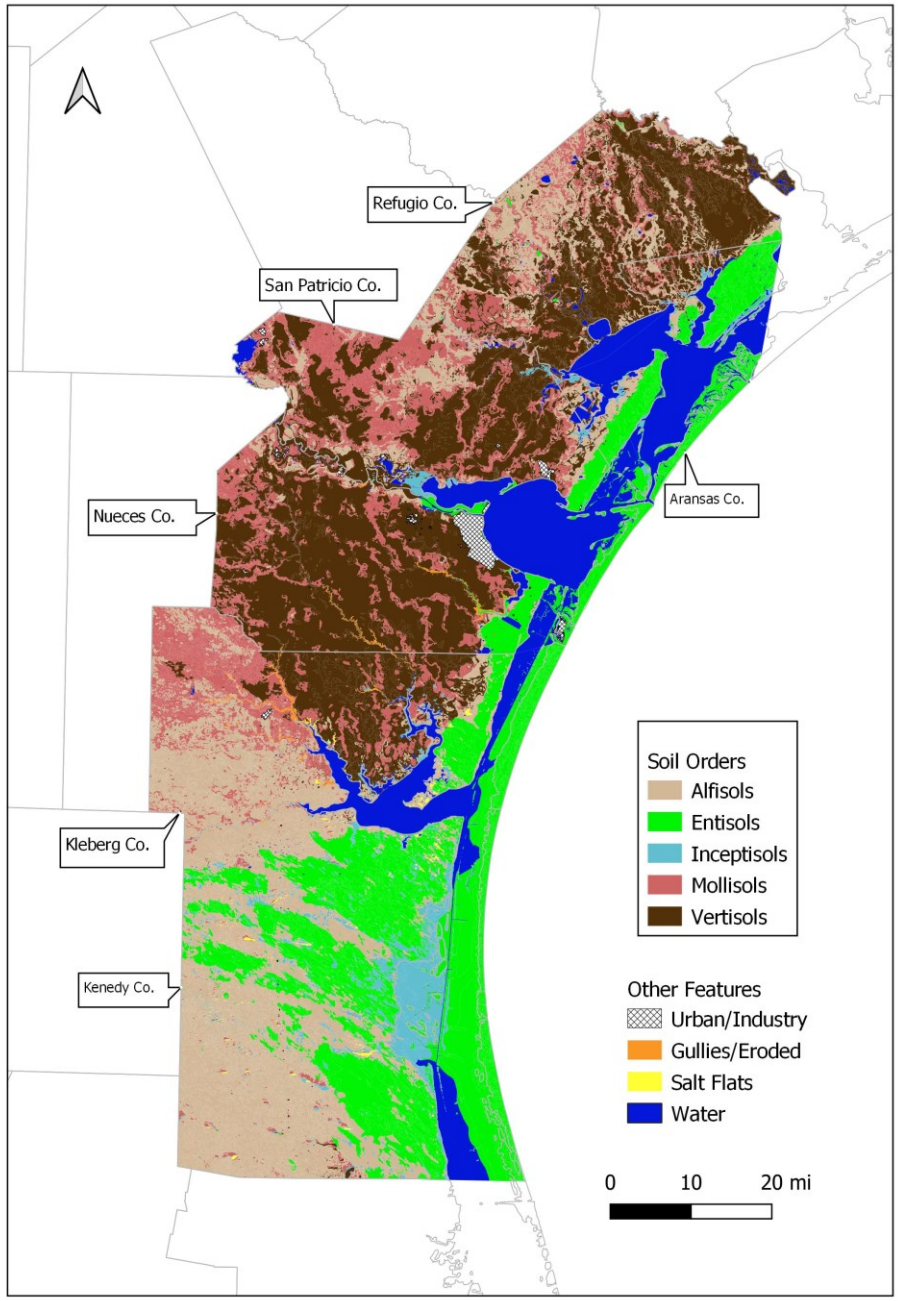
Classification / Taxonomy

- Soils example
  - ***Order***
  - ***Suborder***
  - ***Great group***
  - ***Subgroup***
  - ***Family***
  - ***Series****



* More than 1,300 series in Texas

12 Orders of Soil Taxonomy



Soil Orders in South Texas

Alfisols (***Al*** & ***F***e) – clay enriched subsoil
Entisols (Rec***ent***) – unaltered parent material, no diagnostic horizons
Inceptisols (Latin: ***Incept***um, beginning) – some alteration of parent material
Mollisols (Latin: ***Moll***is, soft) – "prairie soils", dark
Vertisols (Latin: ***Verto***, turn) – clayey, shrink/swell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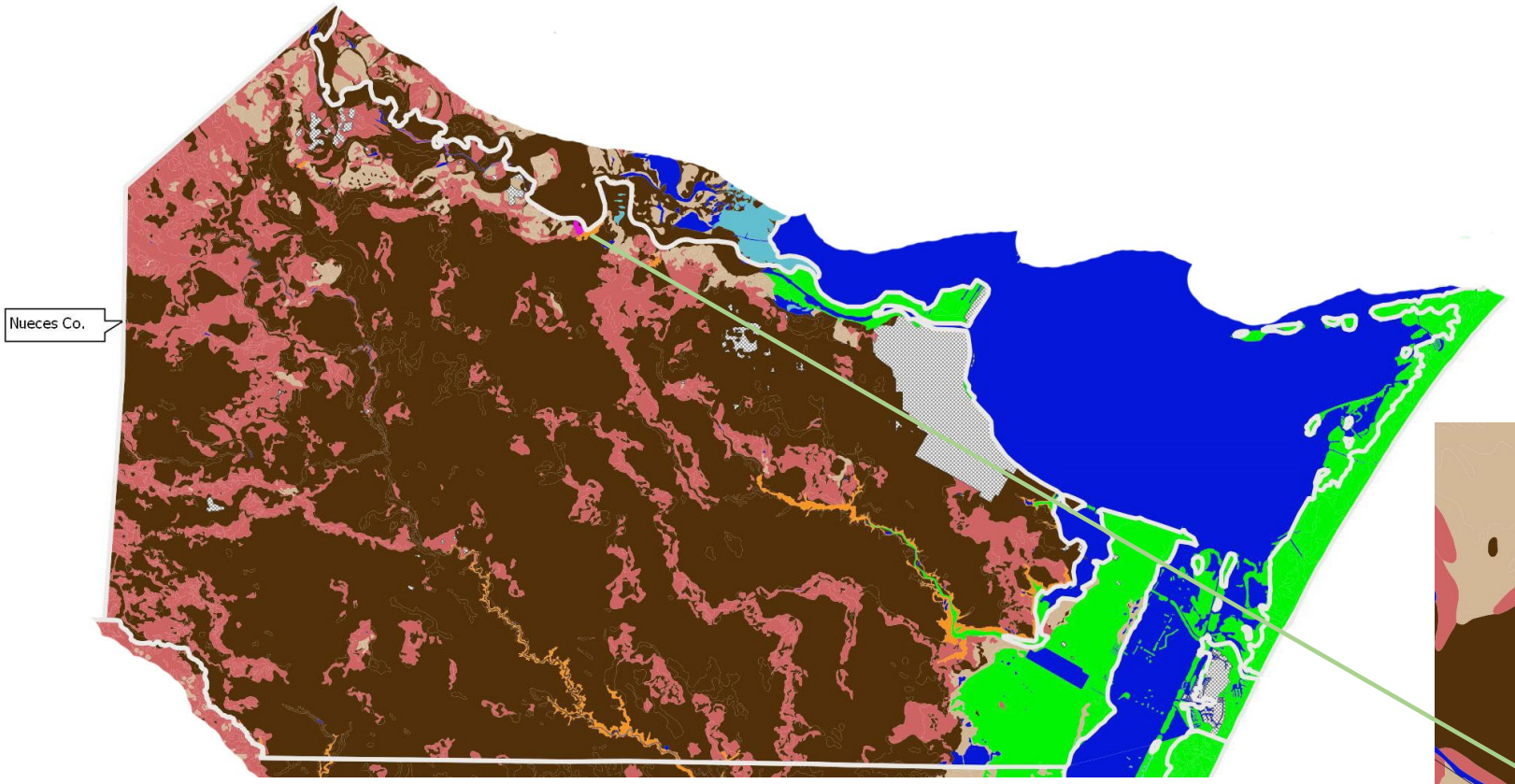
Class Objectives on Saturday:

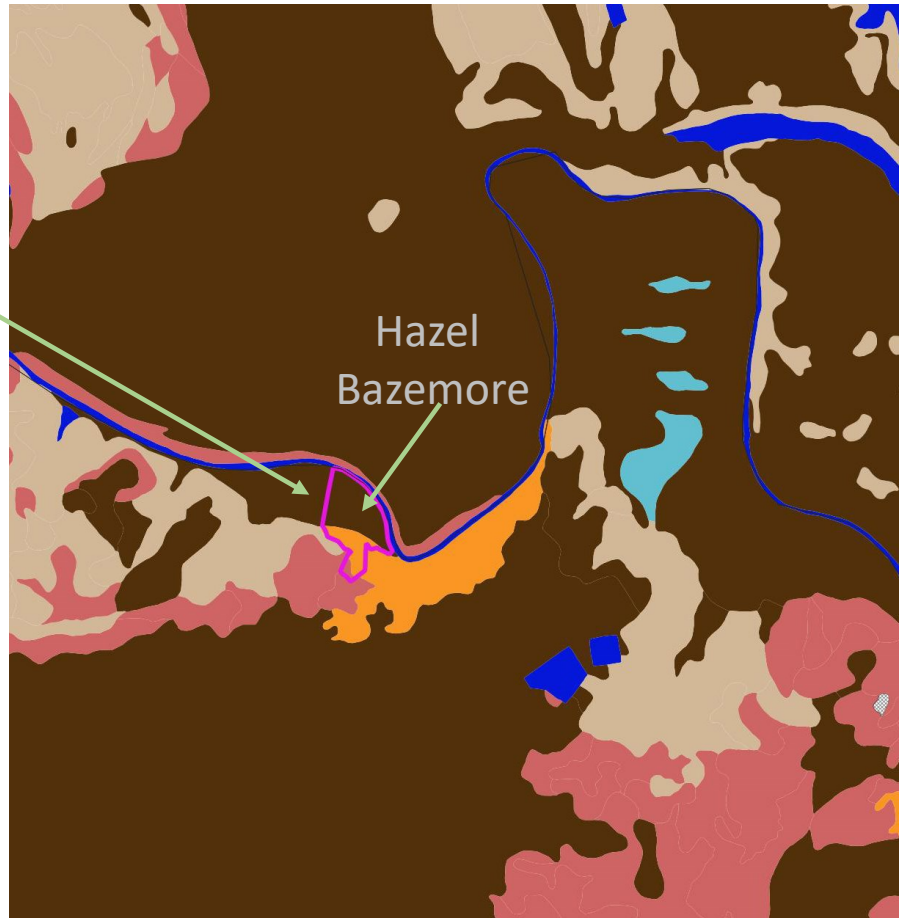
- Short walk with observations
- Soil Physical Properties
- Soil Biology

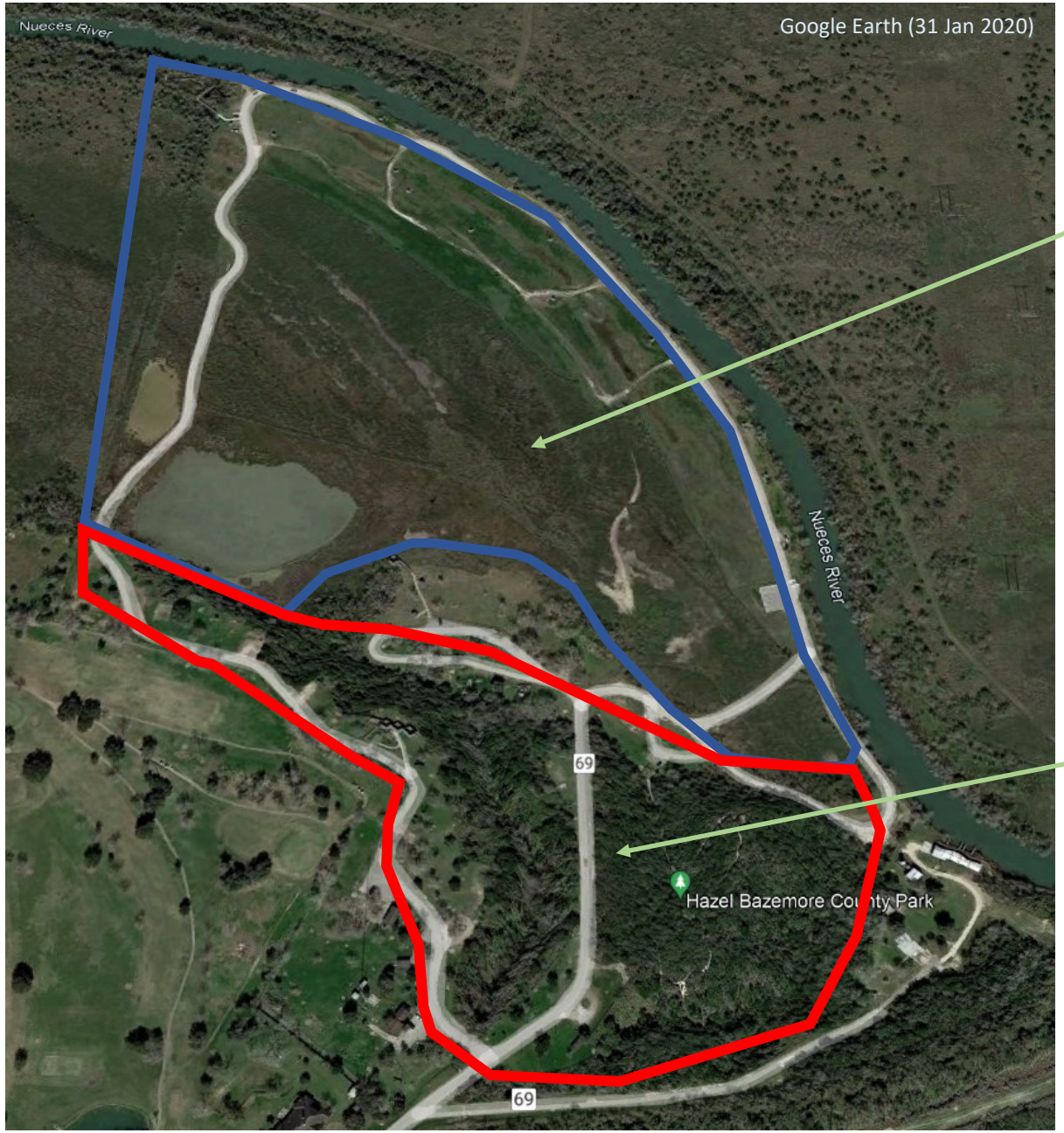
Soil Orders in Nueces County



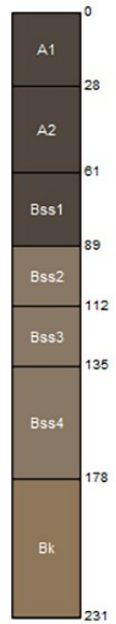
Soil Orders
- Alfisols
- Entisols
- Inceptisols
- Mollisols
- Vertisols

Other Features
- Urban/Industry
- Gullies/Eroded
- Salt Flats
- Water



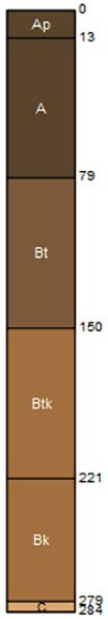


Bottomland Area

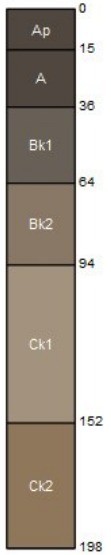


(Vertisol)

Upland Area



(Alfisol)



(Mollisol)