2023 ENVIROTHON
AQUATICS AND SOILS OVERVIEW

AQUATICS CATEGORY

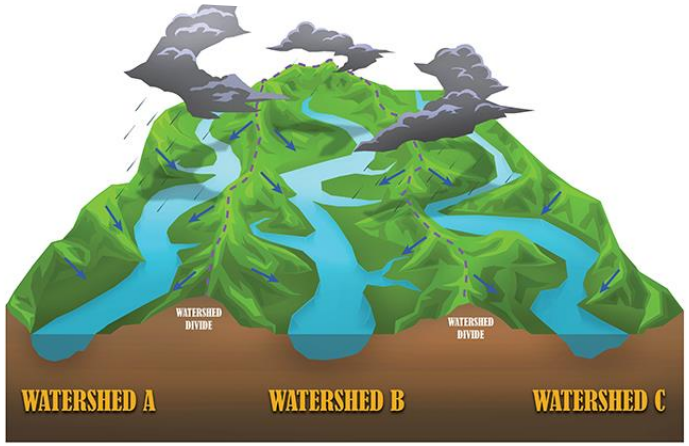
Put together by the PA Fish and Boat Commission.

FRESH WATER AQUATIC ZONES

- Each Zone has a unique ecosystem associated with it that supports aquatic life on different levels.
- Limnetic Zone- Very open area of water, lots of sunlight, good for organisms like plankton.
- Profundal Zone- Very deep area in lake, too deep for sunlight, typically means little to no vegetation.
- Littoral Zone- Not too deep, light is able to reach bottom.
- Benthic Zone- Bottom of a lake, habitat is ideal for tiny organisms like macroinvertebrates.
- Riparian Zone- Vegetated area along stream banks, good habitat for amphibians like salamanders.

WATERSHEDS

- WATERSHED:
  ANY AREA OF LAND DEFINED BY TOPOGRAPHY WHICH COLLECTS PRECIPITATION CREATING A DRAINAGE BASIN.
- Continuum- Transition of water from headwaters to larger bodies of water like rivers.
- Aquifers- Underground geological feature, acts as storage for ground water.
- Dissolved Oxygen-Oxygen present in water, crucial for aquatic life Colder water tends to have a HIGHER concentration of Dissolved Oxygen



WATERSHEDS

- Acidity: A measure of acidity in water, any PH below 7.
- Buffering Capacity: Water's resistance to change via added acidity or bases. Ability to maintain stable pH.
- Alkalinity: A measure of waters buffering capacity.
- Transparency: The amount and clarity of light that passes through water.
- Organic Matter: Debris from once living organisms.
- Carbonates: Matter coming from limestone, and other rocks dissolved in water.
- Turbidity: Measure of cloudiness or suspended particles in water.

AQUATIC FEATURES

- Thalweg- Deepest part of a stream.
- Perennial Stream- Water is supplied year-round by water table.
- Ephemeral Stream- Water is not present year-round. Above water table and precipitation dependent.
- Bankful Width- Average measure of distance from stream bank to stream bank.

VERNAL POOLS

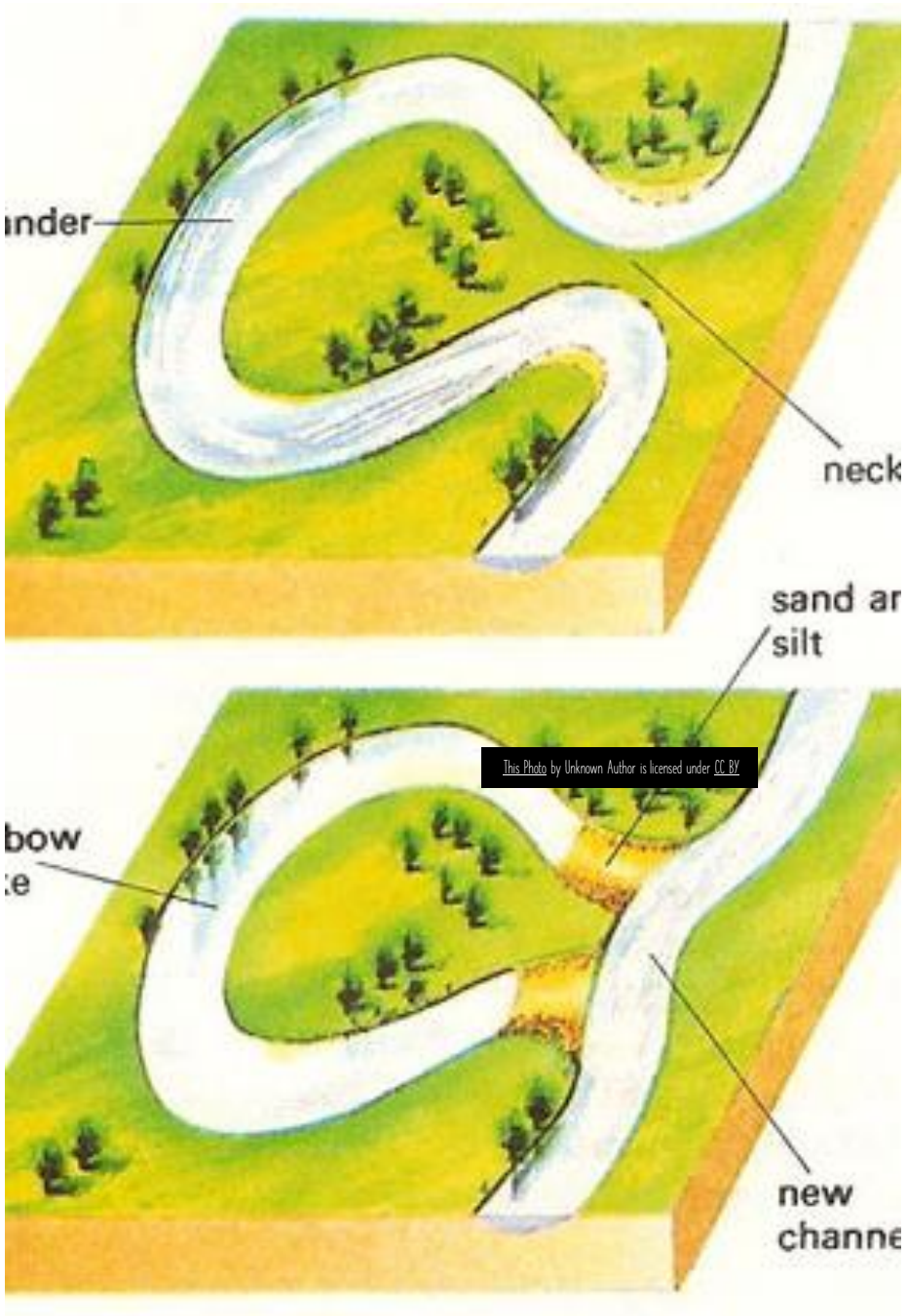
- Small seasonal pools of water.
- Important habitat feature in dryer climates.
- Important habitat and breeding grounds for of amphibian and reptiles.

RIPARIAN ZONES

- Vegetative buffer along stream banks.
- Act as important filters for sediment and other pollutants before directly discharging to streams.
- Provide crucial shade for cold water species such as brook trout.
- Decaying matter provided nutrients for aquatic species.
- Important in agriculture to separate manure, fertilizers, and sediment from local waterways.

OXBOW LAKES

- When streams meander, sometimes they leave behind sections that get cut off during major high flow events.
- When these meanders are left behind, they become known as "Oxbow lakes"
- Similar habitat benefits to vernal pools.



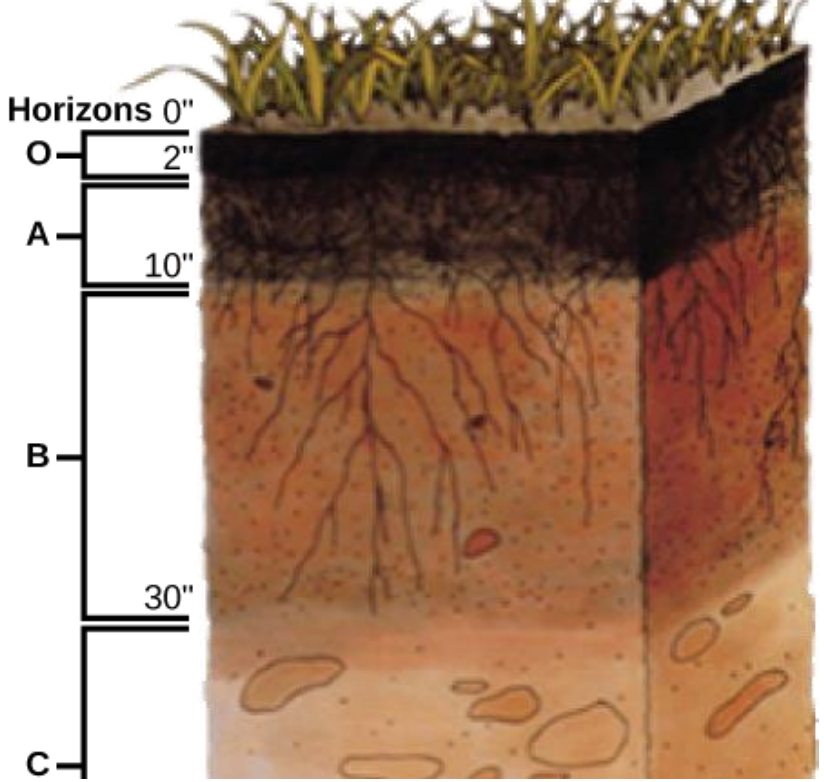

SOILS CATEGORY

WHY WE STUDY SOILS

- Studying at soils helps us understand a plethora of important environmental indicators from the ground up.
- We use soil studies to aid in agriculture, forest management, wetland management, urban land use, waste disposal, and in many more ways.
- Does the ground need stabilized for building, do you need to add certain nutrients for growing, is the ground suitable for development, how do we prevent soil loss, Ext.

SOILS LAYERS

- We view soil layers in Horizons. This is how we study the layers formed over time.
- We look at soil Horizons to determine things like
  - Fertility-dark soil indicated presence of organic matter
  - Parent material- where does the soil come from
  - Aging soils/ climate studies
  - Acidity of soils
  - Determining root zones
  - Color indicates exposure to certain elements



PARENT MATERIALS

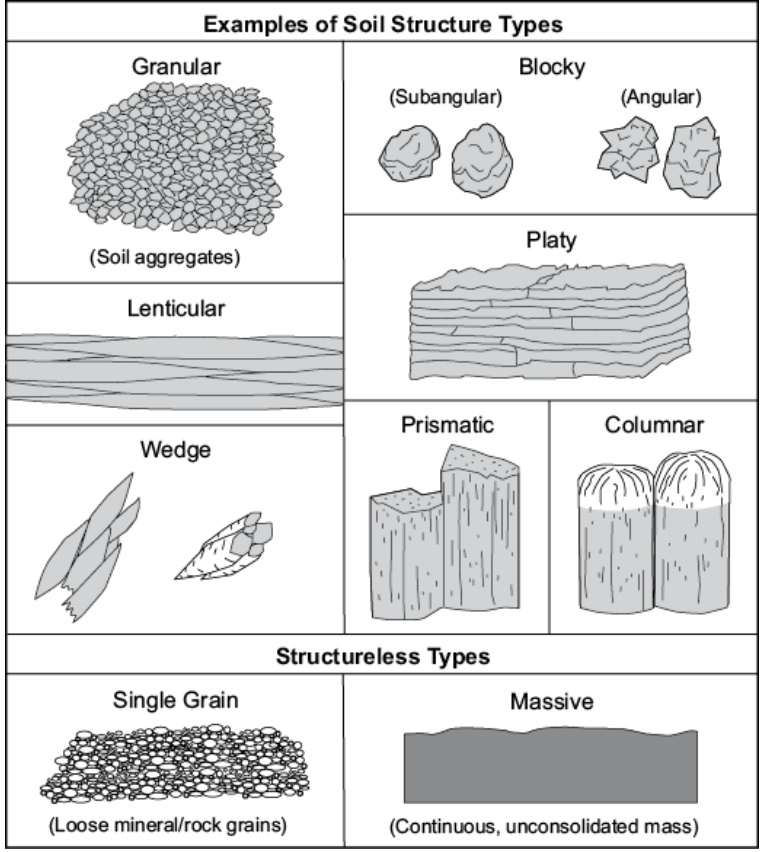
- The geological foundation of current soil forms. Over time weathering causes materials to breakdown into soil, the material being broken down is your "Parent Material" it can be
  - Bed Rock
  - Glacial till
  - Alluvial fans
  - Sands
  - Over washes
  - Stone deposits
  - Organic Materials
  - Old Construction
  - Banana peels

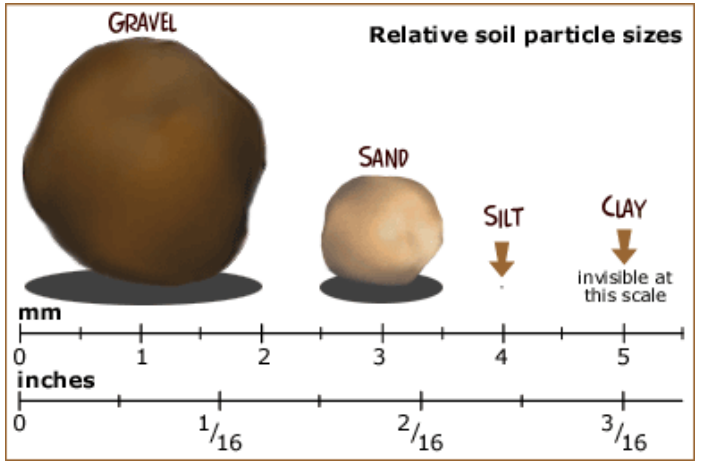
HOW DOES SOIL FORM?

- Soil is a result of weathering and decomposition of organic materials. The type of soil you have is based on factors in that area, factors such as
  - Time- How long has the soil been developed.
  - Living organisms- How much organic matter is available over time for decomposition.
  - Landscape Position- Different landscape positions create different weathering scenarios and microclimates. EX mountains vs river basin.
  - Climate- Every climate is reflected differently in soils, hot wet climates have hydric soils, hot dry climates may have dusty sandy soils.
  - Parent Materials- As mentioned parent material is your base for soils that will be created.

SOIL TEXTURE AND STRUCTURE

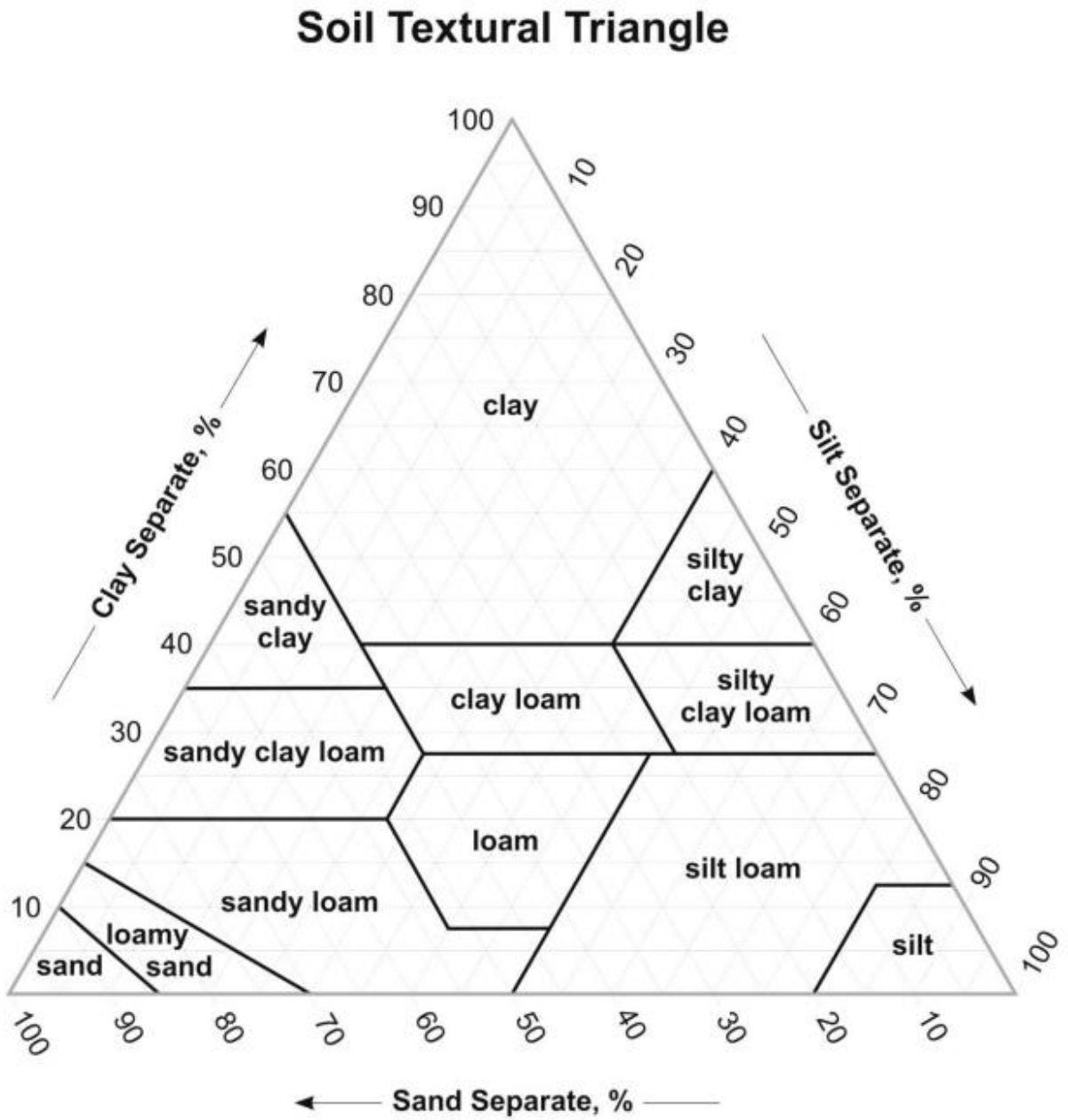
- Soil texture describes the particle size, Main texture types
  - Sand- Biggest-0.05-2.0 mm
  - Silt- Medium- 0.002mm-0.05mm
  - Clay- smallest- Less than 0.002 mm
- Soil textures and structures can be used to identify soil type in order to plan for development.
- Soil Structure is defined by how the particles are assembled.





PRACTICE

- 50% sand 25% silt 25% clay ?
- 30% clay 20% silt 50% sand ?
- 10% sand 70% clay 20% silt ?



HOW DOES SOIL ERODE?

- Soil itself is aided in development by erosion, but a major issue facing soil science is soil erosion.
- Soil loss is devastating in the agricultural industry, farmers not only lose soil but erosion deposits soil to water ways clouding aquatic resources and burying habitat.
- Soil erosion can be
  - Wind- easily blows dry surface soils away.
  - Sheet- shallow layer of water can carry sheets of soils away.
  - Rill- water can form gullies or trenches that carry away soil and grow larger and larger over time.
  - Gully- like "rill" water can become so concentrated that small channels become large erosional channels focusing and carrying more water and soil.
  - Stream bank- human manipulated stream banks can lose natural armoring and typical flow, smashing into stream banks and eroding soil at unnatural intervals.


THANK YOU!