Wetlands and Soil.

What is a wetland?

- Any area of land which permanently or seasonally has a presence of "Hydric soils".
- <u>Hydric soils</u>: Permanently or seasonally saturated with water. Creating **Anerobic** conditions.

Hydric Soils:

- Wetland soils are typically saturated yearround.
- The soils adapt and become sponge like.
- Due to its ability to retain water soils will often be packable.
- Scientist use soil samples in order to delineate wetland boundaries.





Why are wetlands important.

- Wetlands are key ecosystems for all sorts of life.
- There is long term ability to retain water makes them critical to dryer ecosystems.
- Vernal Pools: Areas of wetland soil which collect water seasonally. Provide important water source for wildlife.



Why are wetlands important.

- Wetlands are amazing natural filters.
- The ability to act like a sponge helps capture pollutants in water.
 - The immense organic matter and natural anerobic digestion breaks down and treats a wide variety of human generated pollutants.



Wetland Mitigation



- To develop on wetland, you must replicate that wetland within its watershed.
- This is known as "Mitigation".
- Disney owns an abundance of acreage in Florida to mitigate for their park.
- With every expansion they must **Mitigate** elsewhere in the watershed.
- Alternatively, you can create wetlands and earn credits in a "Bank based system"



Figure 2: Multi-cell wetland system collecting parking lot runoff.

Constructed Wetlands with Purpose

- Man made wetlands are used everyday all over the world.
- Wetlands are great controls for parking lots.
- The lot drainage empties into the constructed wetland where water can settle and filter out potential pollutants.



Constructed wetlands

- Wetlands can also be used as flood controls.
- Like parking lot use, municpalities will construct wetlands to capture overflow in common flood areas.

Soils!

- Many Envirothon topics center around soil.
- Soil science is a wide spanning and diverse subject.
- Understanding soil, means understanding best land use practices.
- EX: Well drained soils better for row crops. Compacted poorly drained soil better for livestock.







WHAT IS A SOIL PROFILE?

- Cross section of soil layers revealing all soil horizons
- <u>O Horizon</u> = organic material (humus)
- A Horizon = <u>topsoil</u>
- B Horizon = subsoil
- <u>C Horizon</u> = partially weathered parent material
- R Horizon = <u>bedrock</u>



Soil Formation Factors

- Parent Material
- Landscape
- Climate
- Organisms
- Time

Parent Material Soils Origin material

- Formation is influence by its parent material. This material broken down over time, creating soil layers for future use.
- EX, exposed bedrock, weathered and deposited by wind is know as Loess
- Examples of parent material would be bedrock such as
 - Sandstone
 - Siltstone
 - Limestone
 - Shale
 - Granite
 - Ext



Landscape

- Topography.
- Steeper slope means greater erosion potential. Weathered parent material follows slope and dictates its deposition.
 - Example: Beaches
- TOPO LINES, the closer the lines are, the steeper the landscape is
- "V" Shaped lives typically indicate drainage or stream valley



Climate

- Climate may perhaps play the most crucial role in soil development.
- Season changes vs no seasonal changes.
- Dry climates equal dry soil.
- Wet climates equal wet soil.
- Heavy rain, more compaction.





Organisms

- Micro-organisms play a large role and converting organic matter to useable soil.
- The organisms present will depict your new soil production.
- Even living organisms in the area will die and become organic matter for soil conversion.





Time

- Time plays an important role as well.
- The length soils is exposed to certain conditions will dictate the composition of that soil.
- Given the other factors, how long has soil been exposed to them?
- We can study climate change by assessing ancient soil layers.



- Much of the United States and the world has been surveyed for soil content.
- Land developers use this information to make accurate blueprints based on soil properties.
- Agriculture has become a high-tech industry thanks to our modern understanding of soil science.

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
At	Atkins silt loam, 0 to 3 percent slopes, frequently flooded	3.2	3.8%
ErB	Ernest silt loam, 3 to 8 percent slopes	24.7	29.3%
GIB	Gilpin channery silt loam, 3 to 8 percent slopes	3.9	4.6%
GIC	Gilpin channery silt loam, 8 to 15 percent slopes	16.7	19.8%
RbF	Rayne channery silt loam, 25 to 65 percent slopes	7.7	9.1%
RcD	Rayne-Gilpin complex, 15 to 25 percent	18.3	21.7%



Soil Texture

- Soil can be classified by texture. Often field scientist will form "Ribbons" to identify soils by texture.
 - Sand is large and course.
 - Silt is smooth and non-sticky.
 - Clay is smooth and sticky.



Texture Triangle

- Percentages of different soil types are categorized using the Triangle.
- 30% Clay, 40% Sand would be?
- 30% Silt, 70% Sand Would be?
- 10% Clay, 70% silt, 20% Sand, Would be?



Soil Erosion Categories

- Soil is constantly fighting erosion, but different battles are fought.
- Wind Erosion: Loose, dry soil. Easily moved by wind, causes abrasion and deposition.
- **Rill Erosion:** The Removal of Soil by small channels caused by runoff.
- **Gully Erosion**: Caused by concentrated flow of some kind.
- Sheet Erosion: The loss of a thin layer of soil due to rain or runoff.



Bulk Density

- Bulk Density in soil is used to indicate compaction.
- It's the weight of DRY soil per unit volume.
- Typically, in Grams per cubic cm g/cm3
- Glacial Till Soils typically have high bulk density, making them poor for crops.
- However, they are suitable for livestock due to strong compaction.

Why we assess soil and wetlands in development and Agriculture

- Minimize Disturbance.
- Maximize Biodiversity.
- Maximize soil cover.
- Maximize Presence of root systems.
- Regulate water (Rain, Snowmelt, Parking lot runoff, irrigation)
- Sustain plant and animal life.
- Filter Pollutants.
- Cycle nutrients.
- Provide stability and sustainability.