Manon Legendre
Fall 2015
Assignment 2

Assignment 3: Detailed Outlines

Title: Down to the ground: Soil Dynamics and Composition
Grades Targeted: 7 & 8
Standards of Learning:

- Make students aware of the characterizing factors of the composition and structure of the planet and show the variation from its center to the highest reaches of its atmosphere.
- Present the students the Earth as a complex and dynamic entity.

End Objectives: Students will be able to:

- Identify different textures of soil
- Identify the different components of the Earth's system
- Define soil
- Understand the makings of soil

Cultural References:

- Soil, climate and topography of Quebec

Introduction: (**5 minutes or less**)

i. Myself and why I am here
   a. Student at McGill University – Soil and water resource management
   b. PINEMAP: research and education fellowship (http://www.pinemap.org/)
ii. What I will be talking about
   a. The Earth and its various spheres → General characteristics of the Earth focusing on the surface (Lithosphere, hydrosphere, atmosphere, biosphere and how this affects soil composition and dynamics)

Body: (**30-40 minutes**)

I. How the Earth is structured – quick overview:
   a. Lithosphere
      i. What is underneath the earths crust: *What is the earths crust?* The crust is the outer most shell of the earth/ terrestrial planet.
      ii. Types of rocks –
         a. Sedimentary rock (deposits of material –mineral or organic)
         b. Igneous rock (cooling of magma)
         c. Metamorphic (changes with the environment it is located in)
         d. Definition of rock: mineral matter of different composition, assembled in masses or considerable quantities in nature
      iii. The concept of parent material – rock that does not change much over time. Source material from which soil comes from.
      iv. Erosion/topography:

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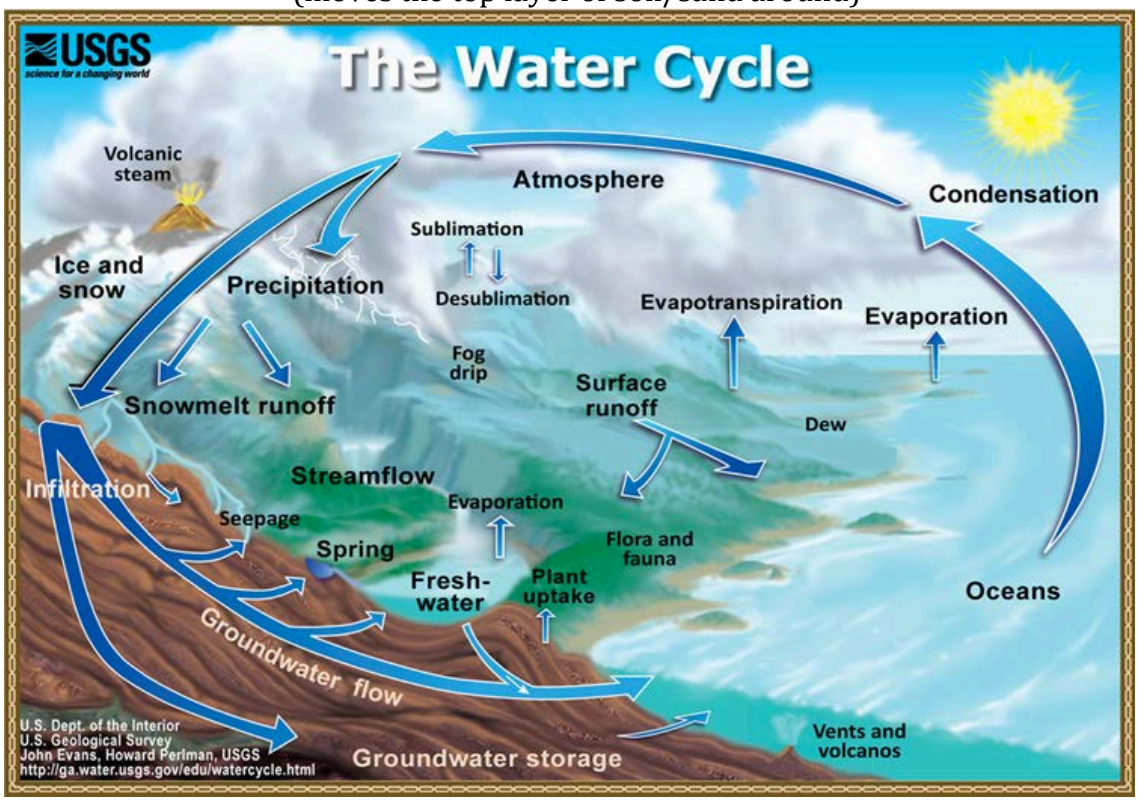
a. *What is erosion?* Gradual destruction by water, wind or other natural phenomena. Movement of the top layer of the crust.
b. *Where do you think has the most erosion occurs – <u>use local region as an example</u>: mountains, plains, and coasts? What about areas of human activity?*

b. Hydrosphere
   i. Water cycle: quick look at the cycle – surface run off – erosion (moves the top layer of soil/sand around)



   ii. Water distribution - *Where does it rain the most? And the least?* Deserts/rain forests

c. Atmosphere - *What is the atmosphere?*
   i. The envelope gases surrounding the earth
   ii. Ion/nutrient exchange between the different levels of lithosphere/hydrosphere/atmosphere

d. Biosphere – living organisms: *What are some types of living organisms present on the earths surface?*
   i. Plants
   ii. Animals/insects
   iii. Micro-organisms (bacteria…)
   iv. Key role played by soil – basis/home for many different organisms. Organisms both dead and alive create some aspects of soil – eg. Aerated

e. Summary – visual of the different spheres

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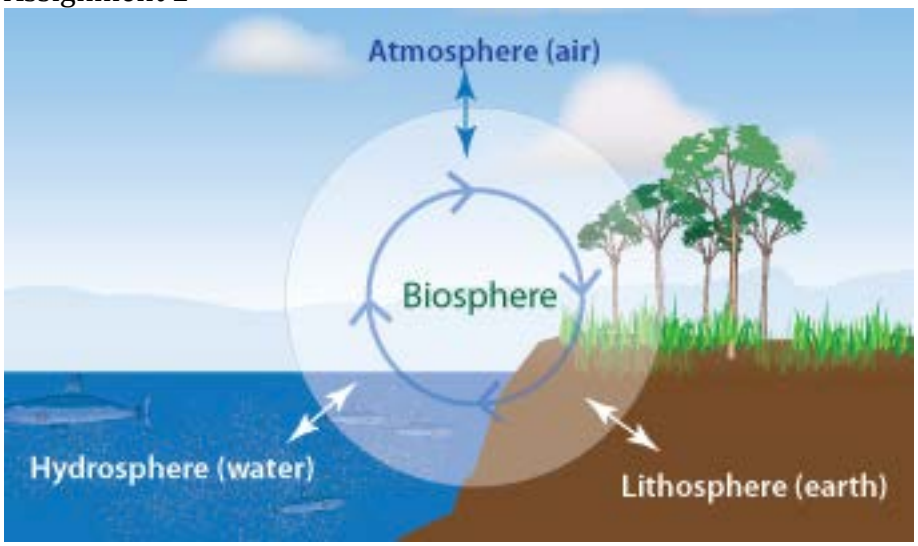

II. Soil: How is it made (composition and dynamics)
   a. 5 factors: *How do we get from this (limestone/pm) to this (soil)?*
      i. Climate - climate as a factor in soil development is in part due to the hydrosphere.
         a. Cold, hot, humid, dry
      ii. Topography – flat, hills, mountains
      iii. Time – 1cm in 200-400 years
      iv. Organisms – below ground biosphere mixes and aerates the soil, above ground adds organic matter and tramples it into the ground
      v. Parent Material (rocks) – the original form of the soil. Basically where the soil came from.
   b. Types of soil
      i. Soil composition
         a. Soil is composed of Air 25%, Water 25%, Minerals 45% and Organic matter 5%
         b. Organic matter – why it is important to soil → give food to the below ground biosphere (all living things)
      ii. Importance of texture/structure and organic content
         a. Water holding capacity of the different types of soil
         b. What is soil texture? Sand-good drainage/poor water holding capacity, silt-hold water/ can be hard to drain, clay-waterlogged/excellent water holding capacity
         c. What holds soil together? Organic matter, roots, water
         d. Color of soil – darker the more organic matter, the lighter the less organic matter/more minerals
      iii. Soils found around the world
         a. Hotter vs. colder climates: *which do you think is the more fertile of the two?*
         b. Rain, organic matter, amount of usage on that soil
      iv. Soils of Quebec:

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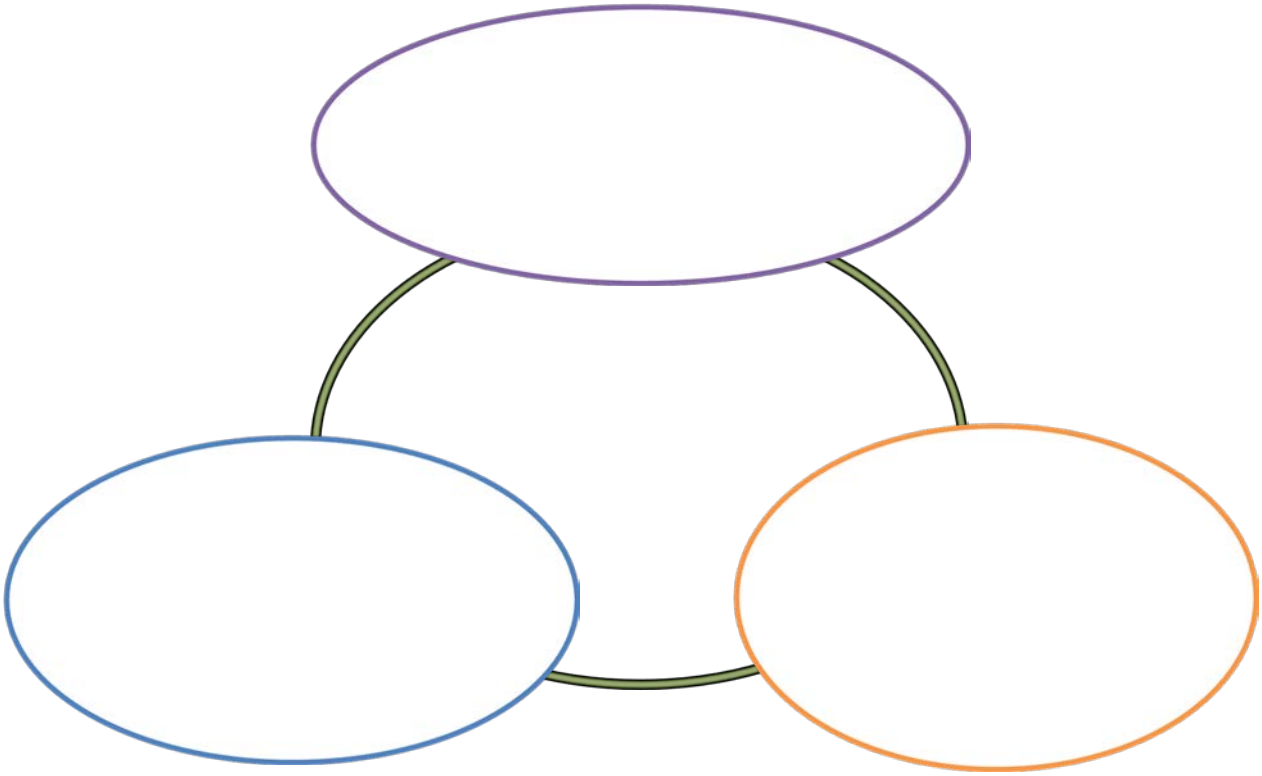
a. Different types north vs. south
    1. North: really cold, freezes in the winters, long time to thaw, relatively colder summer/wet/humid
    2. South: freezes in the winter, thaws earlier in the spring/summer, warmer/wetter summer
b. Forest vs. plowed/ agriculture **ACTIVITY** - *From touching these what can you tell me on the different texture of soils? Drainage, color*
    1. Arboretum soil – touch it [clay loam]
    2. Mac Farm soil – touch it [sandy loam]
    3. Other soil – touch it [loam]

Conclusion: (**10 minutes or less**)

i. Orally give a definition of soil based on what they understood of the lecture and activity.
ii. Small MCQ/Quiz to evaluate the learning goals set for the class.

MCQ/Quiz Ideas:
1. Where are the respective spheres? Hydrosphere, Biosphere, Lithosphere, Atmosphere



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2. What is organic matter?
    a. Leaves, twigs, wood…
    b. Rocks
    c. Any living thing that decomposes in the soil
    d. Bacteria, worms, insects…

3. What are 5 factors that make a soil?
    a. Climate, time, parent material, topography, and organisms
    b. Time, topography, climate, organic matter, erosion
    c. Parent material, organisms, time, water, and organic matter

4. Soil composition
    a. Air, water, minerals, organic matter
    b. Water, sand, silt, clay
    c. Organic matter, minerals, water

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