Water Water Everywhere- Video Notes

- *Hypersea* – concept coined by biologist Lynn Margulis – water cycles not just through evaporation-condensation-precipitation, but through biological processes
    - living matrix of water moves above the sea through organisms - transformation
- Water's properties allow it to be easily transported, created, cleaned, purified – therefore prospects of water wars, shortages, other conflicts, are not warranted
    - The key is to ensure smart water usage, purification, and recycling

Reading Notes

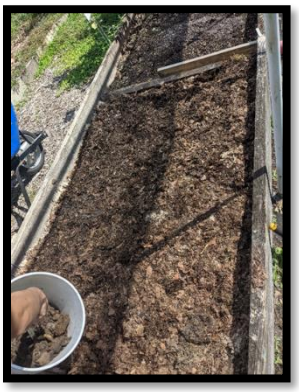
Food, energy, and water: the chemistry connection, Chapter 17: The Need for Water Reuse

- Agriculture is largest consumer of water – operations, irrigation, feed production, animal water needs, food processing, other factors
    - Animal protein production, especially at large-scale factory farming operations, is not sustainable regarding water usage and gas emissions
    - Other water impacts from ag. include: groundwater supply/ recharge disruption, water quality, water availability for needs outside of ag., changes in runoff
- Water usage in the energy sector includes production, cooling, extraction, transportation, and processing
    - Nuclear power requires ~2.5x water usage per unit of electricity than gas & 25% more than coal – more susceptible to water restrictions
    - Thermoelectricity recycles water at a higher rate than ag operations
- Desalination is a technology proved to work but may be inefficient in certain scenarios – for example, irrigation needed in the US Midwest needs to be transported from shore requiring substantial amounts of energy
- Amount of water required for fuel production is typically less for traditional fossil fuels as compared to certain biomass fuels like corn and soy

Daily or personal notes and observations

- During a Systems Thinking class meeting to the Rosebud Continuum education center, Dr. Ghebremichael explained how a DIY water filtration system works. It was not until this demonstration that I realized truly how easy it is to purify and recycle water that is safe for consumption.
    - A plastic barrel or bucket is filled with layers of sand, gravel, and charcoal, in that order of fine to coarse substrate, where the water will travel through for purification. A thin barrier separates the gravel from the spigot and the filtered water can then be collected.
    - After going through the system, the water should be clean. The professor did recommend a final step of boiling to ensure safety prior to consumption.
- As discussed, irrigation is one of the largest consumers of water in agriculture. Much of irrigation water is lost through evapotranspiration. During a class project, my partner and I experimented with the substrate layering of a raised bed garden and found that we did not need to water any of the crops we grew as frequently as was thought including radishes, onions, spinach, cilantro, dill, and arugula.

- We chose to use a bottom layer of sand, followed by mixed organic material including leaf and bark mulch, manure, food compost, and more sand. Here are some photos of the progress:

- The bottom photo shows we used a top layer of mulch on the left side of the bed, while we did not use a mulch-only top layer on the right side of the bed. The moisture retention compared side by side was only noticeable within the top inch or so where the left side was moister to the touch.
- One way to implement a similar and profitable strategy for larger scaled operations is through the use of cover crops that can promote water retention and soil conservation.