Water Pollution

* Primary treatment = removes suspended solid waste
* Secondary treatment = catches dissolved organic matter missed in primary treatment; removes up to 85% of solids
* Tertiary treatment = removes phosphorous or nitrogen; removes 99% of contaminants but is expensive
* Reverse Osmosis process = removes contaminants and recycles water ( CNN “from toilet to tap”)
* EPA says there are no sewage treatments specifically engineered to remove pharmaceuticals
  + # of prescriptions rose 12% to 3.7 billion, nonprescription is 3.3 billion (IMS Health and The Nielsen Co.)
* Increasing amount of pharmaceuticals found in “clean” water
  + Tends to be chloride resistant
  + Includes: anti-epileptic, anti-anxiety, sex hormones, antibiotics, mental illness, asthma, heart problems, 63 different pharmaceuticals in Philadelphia watershed
  + What happens when you are exposed to drugs that your body does not need?
* Dirty water threatens quality of life and public health
  + Many water resources lack basic protections which make them vulnerable to contamination from farms, industrial plants, activities like fracking
  + Examples: pesticides, nitrogen, phosphorous
* Climate change = seas level rises, saltwater intrusion, harm to fisheries, more intense/frequent storms (more than 1/3 countries in lower 48 states)
* Bottled and filtered water
  + Bottlers tend to repackage tap water, do not treat or test for pharmaceuticals
* Pharmaceuticals permeate aquifers = 40% nations water supply
* Filter example
  + Obtain rocks, sugar, and sand
  + Go through the three levels of sanitation filtration
    - Primary removes rocks
    - Secondary removes sand
    - Tertiary would remove sugar but emphasize how difficult it is based on the sugar being dissolved in the water. Segway into how drugs and such are polluting the water supply and we can’t physically see them
* Sources
  + <http://epi.yale.edu/case-study/primary-vs-secondary-types-wastewater-treatment>
  + <http://www.nrdc.org/water/>
* Interactive Sites
  + <http://kidsenvirohealth.nlm.nih.gov/generic/2/games> (Water, air, and chemical topics)
  + <http://www.kidsciencechallenge.com/archiveyearone-0809/archiveyearone.php?linkTo=2c>
  + Lamotte pH testing strips (would need to be ordered)
  + <http://thewaterproject.org/community/student-resources/water-related-education-materials-for-high-school/>