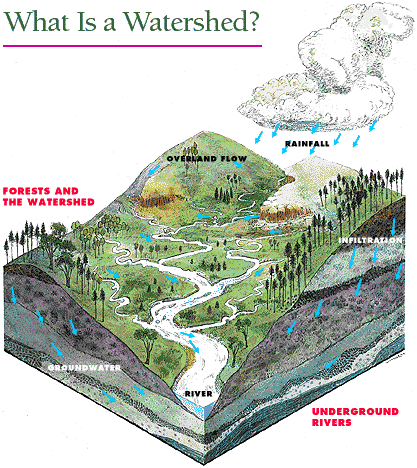
NAME\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Envirothon Unit 1A-Abiotic Influences of Water-Mrs. Weimer

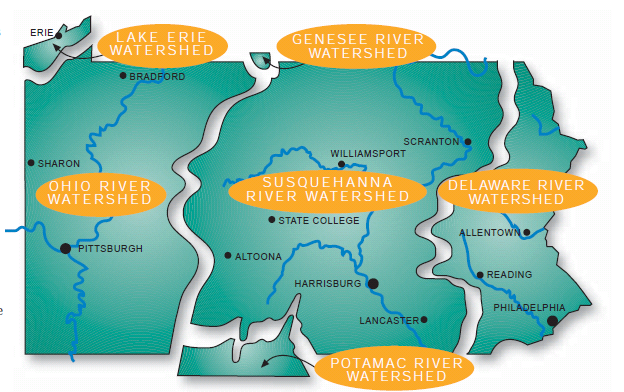
Water statistics

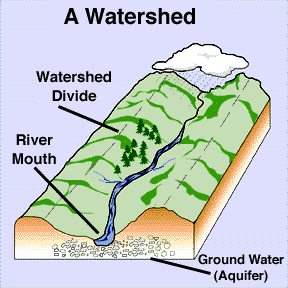
* Covers 75% of Earth’s surface
  + \_\_\_\_\_\_\_ oceans
  + \_\_\_\_\_\_\_ freshwater
    - 2% (of Total) in ice caps and glaciers
    - 1% in lakes, underground, or in atmosphere (usable by humans)
* Makes up 70% of the human body
  + 92% of blood plasma
  + 80% of muscle tissues
  + 60% of red blood cells
* Physical properties
  + Is clear, colorless, odorless, and tasteless
  + \* Colors, tastes and odors are caused by substances dissolved in the water.
  + Boils at \_\_\_\_\_\_\_\_\_\_\_\_\_
  + Freezes at \_\_\_\_\_\_\_\_\_\_
  + Density = \_\_\_\_\_g/mL (at 4°C)
  + Water is a \_\_\_\_\_\_\_ Molecule
* Draw the structure of the water molecule and label it:
* Forms this kind of bond\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* POLAR MOLECULE
  + A molecule that \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ areas.
  + Also called a polar substance or polar compound.
* NON-POLAR SUBSTANCES
  + Non-polar substances do not have charged ends
* Draw water as a polar molecule:
* POLAR MOLECULE
  + THE PROPERTIES OF:
    - Cohesion, adhesion, specific heat, universal solvent, capillary action, surface tension
    - ALL HAPPEN BECAUSE WATER IS A POLAR SUBSTANCE!
  + CAPILLARY ACTION
    - The combined force of attraction among water molecules and with the molecules of the surrounding material.
    - Cohesion + Adhesion
      * Capillary Action (draw it)
  + SURFACE TENSION
    - The tightness across the surface of water that is caused by the polar molecules pulling on one another.
    - Makes the surface act like a solid
    - Surface Tension (draw it)
  + UNIVERSAL SOLVENT
    - This is a nickname given to water.
    - Water dissolves LOTS of things.
    - Remember:
      * \_\_\_\_\_\_\_\_\_\_\_ = the thing doing the dissolving
      * \_\_\_\_\_\_\_\_\_\_\_ = the thing that dissolves away
      * Other polar molecules can be dissolved by water.
  + NON-POLAR SUBSTANCES
    - Non-polar substances \_\_\_\_\_\_\_\_\_\_\_ dissolve in water.
    - Can you think of some examples of non-polar substances?
  + Universal Solvent
    - Why is water so good at dissolving things?
      * Because water is a polar molecule and is shaped like a \_\_\_\_\_\_\_\_\_, it is able to break up substances into smaller pieces (dissolve).
  + COHESION
    - Because water is a polar molecule, it is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - **Cohesion** – is the attractive force between water molecules.
    - Draw Cohesion
  + ADHESION
    - Because water is a polar molecule, it is attracted to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - **Adhesion** – occurs when molecules of water are attracted to other substances.
    - Draw Cohesion
  + SPECIFIC HEAT
    - Specific Heat = the amount of energy needed to increase the temperature of something 1 degree C.
    - Water has a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ specific heat
    - That means it takes a lot of \_\_\_\_\_\_\_\_\_\_\_\_\_\_ for water to increase its temperature.
    - This is because of the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ between water molecules.
    - It’s POLAR!
  + Freezing
    - Density of ice (at 0°C) is \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, so ice floats in water.
    - Most liquids become more dense as you cool them. However, when water freezes, a large expansion occurs.

Pennsylvania Watershed (Unit 1 Part 2)

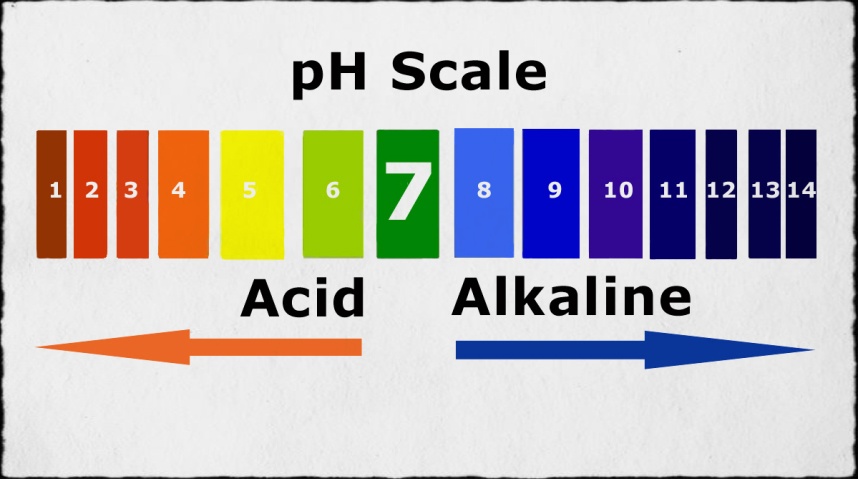
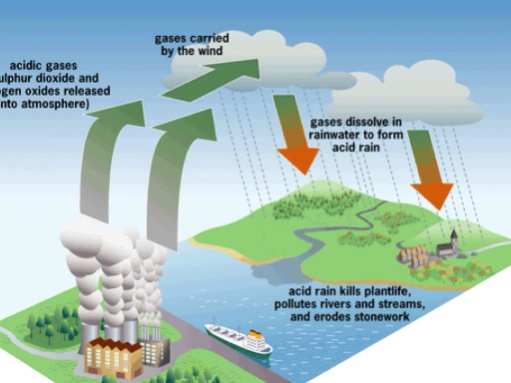
* A watershed is the land area from which \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ drains into a stream, lake, reservoir or other body of water.
* A basin is the large land area that is made up of many \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_that are drained by a river system.
* Pennsylvania Watersheds:

SODPEG S= Susquehanna O= Ohio D= Delaware P= Potomac E= Lake Erie G= Genesee





* Watersheds are surrounded by topographic highs called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Within all watersheds, small streams
  + (1) join together to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + (2) and larger streams join together to form \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + (3). Rivers eventually empty into \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
  + (4) where the water may stay for some time or evaporate and form precipitation. Some of this precipitation falls on the land and the process repeats itself endlessly**.**
* Draw how water moves through one of our watersheds:
* Pennsylvania has more miles of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ than any other state, excluding Alaska!
* If you floated a boat down the Youghiogheny River it could end up in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_!
* All the stream water in PA eventually ends up in the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Forest watersheds supply over \_\_\_\_\_\_\_\_\_of our drinking water!
* If you floated a toy boat down the Laurel Hill it could end up in the Gulf of Mexico
* If you went to an area on the other side of the continental divide (on the way to Frostburg) a toy would float to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
* Pennsylvania State Water Plan organizes the state’s freshwater systems into \_\_\_\_\_\_\_\_\_\_watersheds
* Characteristics
  + All contain water
  + Have a divide
  + Contain land
  + Drains to a body of water
  + Water eventually drains to an ocean

* ABIOTIC FACTORS
  + DISSOLVED OXYGEN
    - * Organisms that live in water require oxygen to survive, just like land organisms do.
      * The amount of dissolved oxygen in water determines what kind of fish and other organisms live in the water.
      * In estuaries like the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, the amount of dissolved oxygen in the water varies with the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * Must be greater than \_\_\_\_\_\_\_\_\_\_\_ mg/1 for fish and aquatic organisms to survive
  + WATER TEMPERATURE
    - The temperature of water can change greatly in a watershed over thecourse of a year depending on the seasons.
    - Water temperature affects the types of organisms that can live and reproduce in areas of the watershed.
    - For example, fish that need cooler water temperatures may \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ to cooler waters in summer months.
    - Toleerance levels range from \_\_\_\_\_\_\_\_\_\_\_\_ degrees
  + pH
    - pH is a measurement of the acidity or alkalinity (base) of a solution.
    - When substances dissolve in water they produce charged molecules called \_\_\_\_\_\_\_\_\_\_\_\_
    - Acidic water contains extra hydrogen ions (H+) and basic water contains extra hydroxyl (OH-) ions.
    - pH is measured on a scale of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
    - Neutral water has a pH of \_\_\_\_.
    - Acidic water has pH values less than 7, with 0 being the most acidic.
    - Likewise, basic water has values greater than 7, with 14 being the most basic.
  + Acid Rain
    - Acid rain is anything below 7 on the pH scale
    - Three ways it can harm fish
      * Eggs
      * Gills
      * Body Chemistry
    - AVERAGE pH rainfall in PA is \_\_\_\_\_\_\_\_\_\_
    - Some of the most acid in the country
    - Most aquatic animals and plants have adapted to life in water with a specific pH and may suffer from even a slight change.
    - Even moderately acidic water (low pH) may reduce the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of fish eggs, irritate fish and aquatic insect \_\_\_\_\_\_, and \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.
    - Water with extremely high or low pH is deadly.
    - A pH below 4 or above 10 will kill most fish and very few animals can tolerate waters with a pH below \_\_\_or above \_\_\_.
    - Amphibians are particularly vulnerable to low pH, likely because their skin is so sensitive to pollutants.
    - Some scientists believe the recent drop in amphibian numbers around the world is due to low pH levels caused by acid rain.
    - Aquatic invertebrates
      * Have external skeletons
      * Shells made from \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * Extra sensitive to pH change
    - Acid Rain
      * Derived from
      * Power stations, factories and cars all burn fuels and therefore they all produce polluting gases.
      * Some of these gases (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_) react with the tiny droplets of water in clouds to form sulphuric and nitric acids.
      * The rain from these clouds then falls as very weak acid - which is why it is known as "acid rain".
    - Clean Air Act
      * 1990
      * Congress passed an ammendment to reduce \_\_\_\_\_\_\_\_\_\_\_\_\_\_ emissions
  + Water Pollution
    - 1/5 of PA streams and ½ of PA lakes are impaired or polluted
    - Come from 2 sources
      * Agriculture runoff
      * Abandoned mine drainage
    - Agriculture runoff
      * When runoff from rain or snow carries soil, pesticides and fertilizers from fields to water
      * Soil=can be suspended in the river
        + Makes \_\_\_\_\_\_\_\_
        + Can damage \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        + Can absorb more sunlight and make temps \_\_\_\_\_\_\_\_\_\_\_
        + Silt that settles into sediment make it difficult for fish to find food on the bottom
        + Can kill invertebrates by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
      * Fertilizer on the field makes plants grow and does the same for aquatic plants
        + Make aquatic plants a nuisance
        + Decomposing plants comsume \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
        + This leads to :

Brook trout, mayflies, caddisfly and stone flies=die

Small mouth bass, rock bass, and catfish=more tolerant and will stay

* + - Abandoned Mine Drainage
      * Pollutes almost 1/2 of PA waters
      * Lowers the \_\_\_
      * Below \_\_\_algae and plants die
      * can make the stream waters and bottom appear yellow (\_\_\_\_\_\_\_), white (\_\_\_\_\_\_\_\_\_\_\_\_\_\_), and black (\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_)