

Water and Water Pollution

I.) Water Properties

- A.) Distribution
 - 97% ocean
 - 2% Ice on continents
 - 0.5% Groundwater
 - 0.003% Lakes, Rivers, Atmosphere
- B.) Phases
 - 3 phases present on earth
- C.) Density
 - Ice less than liquid water
 - Hydrogen Bonding
- D.) Solvent Properties
 - Everything dissolves in water
- E.) Large Heat Capacity

II.) Hydrological Cycle

- A.) Surface water
 - Watershed, precipitation, runoff
- B.) Evaporation
 - 60-80% of irrigation
- C.) Groundwater
 - Recharge area
 - Water Table
 - Artesian Wells
 - Moves 1 m/yr
- D.) Ocean → Glaciation

III.) Distribution

- A.) Uneven—excess withdrawal in some places, urbanization
0.024% available to humans
- B.) Methods to increase supply
 - Transport (LA Aqueduct)
 - Dams (Colorado River, Columbia River)
 - Groundwater (US withdrawals 4 times replacement rates)
 - Desalination—Expensive (San Diego is doing it)
 - Increase efficiency
 - 50% waste in US could be 15%
 - Lawns are 80% of use
 - Better irrigation systems
 - Gray water systems
 - Cisterns
- C.) Too much water
 - Deforestation leads to flooding
- D.) Contamination of groundwater supplies

IV.) Pollutants

- A.) Pathogens—cause disease—coliforms
- B.) Low oxygen (BOD used in 5 days at 20C)
 Little can live below 4 ppm (Mississippi River)
- C.) Inorganics—toxic metals
- D.) Nutrients—Nitrate, Phosphate
- E.) Organic chemicals—oil, PCBs, detergents,
- F.) Radioactive substances
- G.) Thermal pollution
- H.) Genetic pollution—exotic species

V.) Problems

- A.) Oxygen sags in streams—changes species downstream of effluent
- B.) eutrophication—excess nutrients increase algae, fast growing, choke out clear, slow growing and benthic species.
- C.) Biomagnification—in long food chains, POPs concentrate in fats
- D.) Acid Rain—acid resistant species preferred, indicator fish die
- E.) Oil Spills
- F.) non-point source pollution