Water Pollution

Mrs. Byers and Miss Knight

What do you think of when you think of *polluted water*?

- Where would you find it?
- What would it look like?
- What would it smell like?
- How does it get that way?

Take a minute to write down your thoughts and then we will discuss your ideas as a class…

Water Pollution Defined

- Water pollution is the introduction of **chemical, physical or biological** agents into water that degrade (lower) water quality and adversely (negatively) affect the organisms that depend on the water. (Holt 2006)
- The two underlying causes of water pollution are **industrialization** and **rapid human population growth**.

Where Does Water Pollution Come From?

Point-Source Pollution- pollution discharged from a **single** source.	**Nonpoint Pollution-** pollution that comes from **many different sources** that are often difficult to identify.
♦Leaking septic-tank systems ♦Leaking storage lagoons for polluted waters ♦Unlined landfills ♦Leaking underground storage tanks that contain chemicals or fuels such as gasoline ♦Polluted water from abandoned and active coal mines ♦Water discharged by industries ♦Public and industrial waste-water treatment plants	♦Chemicals added to road surfaces (salt & other de-icing agents) ♦Water runoff from city and suburban streets that may contain oil, gasoline, animal feces and litter ♦Pesticides, herbicides, and fertilizer from residential lawns, golf courses and farmland ♦Feces and agricultural chemicals from livestock feedlots ♦Precipitation containing air pollutants ♦Soil runoff from farms and construction sites ♦Oil and gasoline from personal watercrafts (boats, jet-skis, etc.)

Pollutant Types and Sources		
Type of pollutant	**Agent**	**Major sources**
Pathogens	disease-causing organisms, such as bacteria, viruses, protozoa, and parasitic worms	mostly nonpoint sources; sewage or animal feces, livestock feedlots, and poultry farms; sewage from overburdened wastewater treatment plants
Organic matter	animal and plant matter remains, feces, food waste, and debris from food-processing plants	mostly nonpoint sources
Organic chemicals	pesticides, fertilizers, plastics, detergents, gasoline and oil, and other materials made from petroleum	mostly nonpoint sources; farms, lawns, golf courses, roads, wastewater, unlined landfills, and leaking underground storage tanks
Inorganic chemicals	acids, bases, salts, and industrial chemicals	point sources and nonpoint sources; industrial waste, road surfaces, wastewater, and polluted precipitation
Heavy metals	lead, mercury, cadmium, and arsenic	point sources and nonpoint sources; industrial discharge, unlined landfills, some household chemicals, and mining processes; heavy metals also occur naturally in some groundwater
Physical agents	heat and suspended solids	point sources and nonpoint sources; heat from industrial processes and suspended solids from soil erosion

Questions to Think About…

Where does water go when it flows down the drain in the sink or when toilets are flushed?

Can all of the harmful substances in wastewater be removed?

Take a minute to write down your thoughts…

Wastewater Defined

Wastewater is water that contains waste from homes or industry. **Most** wastewater from homes contains biodegradable materials that can be broken down by living organisms (animal and plant waste, paper, soap). Some toxic substances **cannot** be removed by the standard treatment methods.

Wastewater Treatment

Primary Treatment

1. **Filtration-** Wastewater is passed through a large screen to remove solid objects.
2. **First Settling Tank-** Wastewater is sent into a large tank, where smaller particles sink to the bottom and form **sewage sludge**. The sludge is removed from the water.
   - If the sludge has a dangerous toxicity, it must be disposed of as hazardous waste.
   - If the toxicity of the sludge is at a safe level, it can be used as fertilizer or in making bricks.

Wastewater Treatment

Secondary Treatment

3. **Aeration Tank-** Wastewater is mixed with oxygen and bacteria. The bacteria use the oxygen and feed on the wastes.
4. **Second Settling Tank-** Bacteria grown in the aeration tank, as well as other solid wastes, are removed in the form of sludge.
5. **Chlorination-** Chlorine is added to disinfect the water before it is released into a stream, lake or ocean.

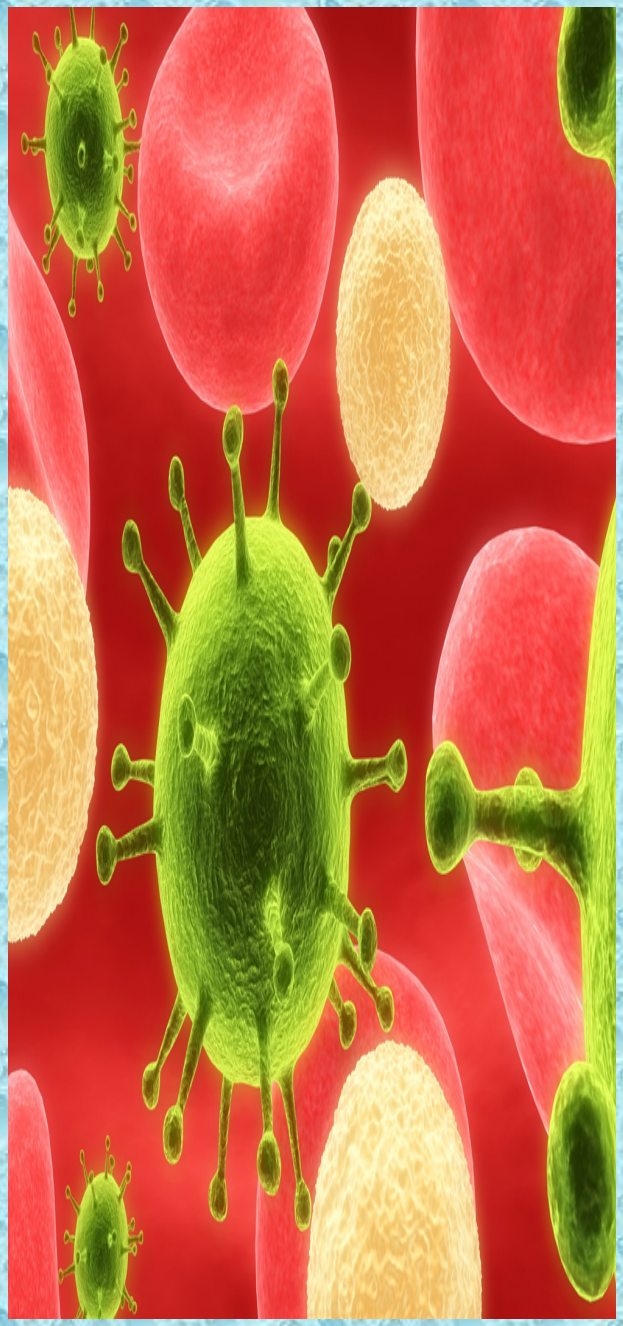
Wastewater Treatment Process

Pathogens

Disease causing organisms such as **bacteria, viruses and parasitic worms** that can enter water supplies in untreated wastewater or animal feces.

Cholera, hepatitis and typhoid are among the many diseases that people can catch by drinking polluted waters.

Testing for E. Coli is the most common method of testing used to check for pathogens in water. This test is called a fecal coliform test.



Biomagnification

Biomagnification is the accumulation of pollutants at successive levels of the food chain.

What do you remember about this?

Think about an eagle eating several fish that contains a small amount of pollutant…

Eutrophication

Eutrophication-when lakes and streams naturally contain an abundance of nutrients, e.g. nitrogen and phosphorus.

Artificial Eutrophication- eutrophication caused or accelerated by humans.

- Fertilizers from farms, lawns and gardens is the largest cause of this.
- Phosphates in some soaps and detergents are another major cause.

Bottle or Tap Water??

Take a minute to talk with a partner about which you think is better and why…