

Chapter 14 Water Pollution

Name _____

I. Prevention vs. Cleanup

Pollutant Sources - Water pollution can come from a single source or from a variety of dispersed sources.

Point sources discharge pollutants at specific locations through drain pipes, ditches, or sewer lines into bodies of surface water. These sources are easy to identify, monitor, and regulate.

Non-point sources are scattered and diffuse and can't be traced to any single site of discharge. Such things as runoff from croplands, livestock feedlots, etc., are non-point sources. It is difficult and expensive to identify and control these discharges from diffuse sources.

1. Water pollution is generally defined as the _____ of streams, rivers, lakes, groundwater, or oceans with substances produced through _____ and that negatively affect _____.
2. Point sources are _____ locations such as a particular _____ that pumps its waste into a nearby stream or a sewage treatment plant that _____ its wastewater from a pipe into the ocean.
3. _____ are more diffuse areas such as an entire farming region, A _____ with many lawns and septic systems, storm _____ from streets and parking lots.

WordBank:

contamination

discharges

distinct

factory

human activities

nonpoint sources

organisms

runoff

suburban community

II. Common Pollutant -----> Human Wastewater

- ✓ Human wastewater is introduced as sewage from toilets and grey water from bathing and washing clothes and dishes.
- ✓ Human wastewater and other mammalian (livestock) species can carry a variety of illnesses such as viruses, bacteria, and parasites.
- ✓ When a body of water has too many nutrients, such as nitrogen (nitrates) and phosphorous (phosphates), the water may become eutrophic.
- ✓ Wastes can limit the amount of oxygen in the water by creating a high biological oxygen demand.

1. ___ Wastewater	a. A species that may indicate whether or not disease-causing pathogens are likely to be present.
2. ___ Biological/ biochemical oxygen demand	b. A phenomenon in which a body of water becomes rich in nutrients.
3. ___ Dead zones	c. Waste produced by human activities including sewage from toilets and grey water from bathing and washing clothes and dishes.
4. ___ Eutrophication	d. In a body of water, areas with extremely low oxygen concentration and very little life.
5. ___ Cultural eutrophication	e. A group of microorganisms in the human (mammalian) intestines that can serve as an indicator species for potentially harmful microorganisms associated with sewage contamination.
6. ___ Indicator species	f. An increase in fertility in a body of water, the result of anthropogenic (manmade) inputs of nutrients.
7. ___ Fecal coliform bacteria	g. The amount of oxygen a quantity of water uses over a period of time at specific temperatures.

Diagram: an oxygen sag curve with labels explaining what is happening.

III. Wastewater Treatment

- ✓ Human wastewater can be treated on a small scale using septic systems (individual households) or on a large scale using sewage treatment plants (communities).
- ✓ Animal feedlots can produce large amounts of waste and can contaminate waterways with fecal coliform bacteria and excess nitrates.

1. Septic system	a. Human-made ponds lined with rubber and built to handle large quantities of manure produced by livestock.
2. Septic tank	b. Second step in most waste treatment systems in which aerobic bacteria decompose up to 90% of degradable, oxygen-demanding organic wastes in wastewater. This usually involves bringing sewage and bacteria together in trickling filters or in the activated sludge process.
3. Sludge	c. Solid waste material from wastewater. Goopy mixture of toxic chemicals, infectious agents, and settled solids removed from wastewater at a sewage treatment plant.
4. Septage	d. A large container that receives wastewater from a house as part of a septic system. Underground tank for treating wastewater from a home in rural and suburban areas. Bacteria in the tank decompose organic wastes, and the sludge settles to the bottom of the tank.
5. Leach field	e. A layer of fairly clear water found in the middle of a septic tank.
6. Manure lagoons	f. Specialized chemical and physical processes that reduce the amount of specific pollutants left in wastewater after primary and secondary sewage treatment. This type of treatment usually is expensive.
7. primary sewage treatment	g. A relatively small and simple sewage treatment system, made up of a septic tank and a leach field, often used for homes in rural areas.
8. secondary sewage treatment	h. A component of a septic system, made up of underground pipes laid out below the surface of the ground. The effluent flows out of the tank into the ground through a field of drainpipes
9. tertiary sewage treatment/ advanced sewage treatment	i. Mechanical sewage treatment in which large solids are filtered out by screens and suspended solids settle out as sludge in a sedimentation tank.

IV. Other Environmental Threats

- ✓ Heavy metals such as lead, mercury, and arsenic can contaminate drinking water and harm human and environmental health.
- ✓ Acid deposition from coal burning power plants can fall as rain, snow, gases, and particles. Plants, soil, water, and physical structures can all be harmed.
- ✓ Pesticides, pharmaceuticals and other manmade compounds are pollutants found in water.

1. Acid deposition is when acids deposited on _____ as _____ and _____ or as gases and _____ attach to the surfaces of plants, soil, and water.

2. Polychlorinated biphenols or _____, represent one group of industrial _____ that has caused man _____ problems.

3. While PCBs have long been a _____, there is a growing _____ over compounds known as PBDEs (polybrominated diphenyl ethers).

Wordbank:

compounds

concern

rain

earth

particles

snow

environmental

PCBs

uneasiness

V. Oil Pollution

- ✓ Oil can have catastrophic environmental impacts.
- ✓ Various leaks, such as oil spills from tankers and oil platforms, can harm the ocean and coastal environment.
- ✓ Oil can be cleaned up by using containment booms, oil vacuums, chemical dispersants, and genetically modified bacteria to consume the oil.

VI. Nonchemical Pollutants

Solid waste, sediment, thermal (heat), and noise can be pollutants.

1. Thermal pollution occurs when _____ _____ cause a substantial change in the _____ of the _____.

2. A dramatic change in _____ temperature resulting in the harm/death of organisms is known as _____ _____.

3. Excessive _____ can cause increased turbulence in the flow of a river resulting in a higher _____ measurement.

Wordbank:

human activities

temperature

water

runoff

thermal shock

suspended solid

water

VI. Water Laws

Describe the following laws.

Clean Water Act

Safe Drinking Water Act

VII. CALCUATIONS

1. If an animal produces 60 L of manure each day and the average number of animals on a feedlot is 460 cattle, how much manure is produced each day? How much is produced in a year?

Short Answer Questions

1. Define point and nonpoint source pollutants and give examples of each.

2. What are the three reasons that environmental scientists are concerned about human wastewater as a pollutant?

3. Summarize the steps in a sewage treatment plant.

4. What are some sources of lead, arsenic, and mercury?

5. Explain how DDT worked its way up the food chain and affected nonpest species.

6. How can thermal pollution harm aquatic species?