Grade 8 Science – Water Systems

Pollutant Sources and Effects on Aquatic Ecosystems

Name:_____ Class:_____

Read over this list of water pollutants and their effects. Highlight information that is new to you and then answer the questions at the end.

Pollutant	Source	Effects
Detergents	Washing cars in the driveway Dumping wash water onto the street Washing siding or windows	Can strip away the protective mucous coating on a fish – without this protective coating, fish will absorb more chemicals and are more susceptible to disease. High concentrations can kill fish eggs and adult fish. Phosphorous In detergents encourages the growth of algae. When the algae dies it uses up a lot of oxygen. This means that there is less oxygen available for other plants and animals. Many types of fish cannot survive in water with low oxygen levels.

Pollutant	Source	Effects
Garbage	Litter from people, houses, parks, industrial areas and construction sites	Can cause unsightly debris and bad odours. When ingested by an animal, litter can be dangerous, often causing death. Sharp litter can harm people or animals (e.g. glass). Animals can become entangled and strangled by litter, which is dangerous and can cause death (e.g. beer plastic rings and plastic bags).

Pollutant	Source	Effects
Heat	Even heat can be a pollutant! Because the storm drain water is coming from runoff over land and roads, storm drain outfall is usually warmer than the local water body.	Increased temperatures can affect certain species of fish, invertebrates and plants, which are adapted to living in a certain range of temperatures. Fish are particularly sensitive to temperature changes during spawning. Warmer water holds less dissolved oxygen, which can be a problem for species that require a certain oxygen level in the water. Coldwater fish, such as trout, prefer waters that are cooler than 14°C.

Pollutant	Source	Effects
Heavy Metals	Industrial sites Washing cars in the driveway Metal corrosion (e.g. from cars and pipes) Pesticides and herbicides	The levels of heavy metals found in water are generally low, however, due to bioaccumulation, higher concentrations can be found in wildlife. Bioaccumulation is an increase in the concentration of a chemical in an organism over time. As an organism drinks and eats contaminated sources, it will accumulate chemicals in its body over time.

Pollutant	Source	Effects
Nitrates and Phosphates	□ Nitrates come mainly from fertilizers, and some from animal waste □ Phosphates are found in detergents	□ Can cause eutrophication or algal bloom. □ Nitrates and phosphates are nutrients that plants need for growth. Algae will grow very quickly if there is a high concentration of these nutrients in the water, causing algal blooms. □ Too much algae in the water leads to less oxygen for other organisms, less light reaching other plants and can clog the gills of fish.

Pollutant	Source	Effects
Oil and Grease (Hydrocarbons)	□ Leakage of oil and other lubricating agents from cars and other motorized machines	□ There is a wide array of hydrocarbon compounds, some of which are known to be toxic to aquatic life. □ More oil comes from storm drain pollution than from oil tanker spills!

Pollutant	Source	Effects
Pathogens (disease causing organisms)	□ Can be found in pet and livestock wastes and can move into the water system as a result of run off from lawns and farm fields. □ Can get into the water system as a result of faulty septic systems.	□ Pathogens include bacteria like E. coli and Salmonella, protozoan parasites like Giardia lamblia (beaver fever), and viruses like Norwalk. □ They can cause illnesses in humans and wildlife.

Pollutant	Source	Effects
Pesticides	□ Excess herbicides and insecticides from residential and agricultural lands	□ Can harm plants, wildlife and humans through chronic low concentration or sudden high concentration exposures. □ Effects include: loss in production, changes in growth, development and/or behaviour and death of species. □ Cancer, endocrine disruption.

Pollutant	Source	Effects
Salts	□ Sidewalk and roadway application □ Irrigation practices	□ Salt dissolves very easily in runoff and can increase the salinity of the local waterbody. In some places, spring runoff can cause the salinity of the local waterbody to reach ocean salinity levels! □ Freshwater species of plants and animals are not adapted to the high level of salinity, like saltwater species are, and can be adversely affected. □ The dissolved salts are difficult and expensive to remove. □ High salinity water may also be corrosive to piping systems.

Pollutant	Source	Effects
Sediments	Includes organic debris, silt and sand from roadways, improperly managed construction sites, crop and forest lands and eroding stream banks	Can increase turbidity, or the cloudiness of the water, which can clog fish gills, decrease the amount of dissolved oxygen in the water and suffocate trout and other organisms' eggs. Added sediments can change the course of a river or a stream and damage habitat – it doesn't take much sediment to do this!

What can we do?

We can help improve storm water management in a number of ways:

 Reduce fertilizer, pesticide and insecticide use on gardens and lawns

 Don't dispose of used oil or grease down storm water drains, and clean up spilled brake fluid, oil, grease and antifreeze, i.e. do not hose them into the street where they can eventually reach local streams and lakes.

 Don't wash your car where the detergent water can run into the storm water drains

 Keep litter, pet wastes, leaves and debris out of the street gutters and storm drains

 Control soil erosion on your property by planting ground cover and stabilizing erosion-prone areas

1. What are words that you did not know? Find a definition of them.

   _____ -

   _____ -

   _____ -

   _____ -

   _____ -

2. Of all of the pollutants, which one surprised you the most since you had not considered it before? Explain.

3. Which pollutant do you think is the easiest for you, as a Grade 8 student, to control and why? Refer to the list of things you can do and the pollutants too.

4. What can you do as you grow up to influence other pollutants. Think jobs, organizations that work to protect water quality and also political means. Try to come up with 3 or 4 different things. Be creative but realistic.

5. Laws are created to protect us from people and companies who are polluters. If it was up to you, what law would you make in order to protect our water? Try to be reasonable and as specific as possible – remember to list who is responsible for enforcing it and what the punishment and reward if for complying with your law.