



Stormwater Pollution Classroom Activity: Teacher's Guide

Grade Level: K-12

Curriculum Connections: Fine Arts, Language Arts, Science, Technology

Class Time: 60 to 90 minutes

Objectives:

1. Students will gain an understanding of sources of water pollution, with a focus on stormwater pollution, affecting the Town of North Hempstead community.
2. Students will learn about the Town's "Only Rain in the Drain" educational campaign.
3. Students will be able to identify the effects of stormwater pollution on local waterbodies and ways to prevent water pollution in their community.
4. Students will explore their school grounds to understand how stormwater moves throughout the various areas that make up the property.
5. Students will create posters to put around their school with the theme "Only Rain in the Drain!"

Materials:

1. Computer to help with visualizing of videos and pictures, research, and creation of posters
2. Computer paper, oak tag or poster board for creation of posters
3. Colored pencils, crayons, or markers for creation of posters

Initial Classroom Discussion (to provide background information):

Vocabulary (in bold): runoff, impervious, pervious, storm drain, aquifer, stormwater pollution, pesticide, fertilizer, sediment, erosion, water quality control, decompose, septic system, cesspool, pathogen, organism, microplastic, rain garden, rain barrel, native plant, drip irrigation, soaker hose, compost

1. Ask your students to think about rainwater and where it goes after it falls from the sky.
 - a. Into the soil
 - b. Gets taken up by plants
 - c. Evaporates
 - d. Moves underground into Long Island's **aquifers** which store all of our drinking water
 - e. Runs off of streets, driveways, sidewalks and roofs and goes into storm drains
 - f. If you think about your own neighborhood, most of what we live on is paved surfaces and water cannot flow through them, which causes the water to flow over the surface, causing what is known as **runoff**
 - g. These surfaces in which water cannot absorb are known as **impervious** surfaces; **pervious** surfaces would be ones where water can pass through like soil, vegetation, sand
2. Ask your students if they know what a **storm drain** is, what one looks like
 - a. Show a picture of one on the computer for any that are unfamiliar and then ask students if and where they have seen them around their neighborhoods

- b. Explain how they work- most have pipes that lead straight to local waterways like streams, harbors, bays etc.
 - c. Many people believe that the water from our streets is treated before it enters our local water bodies- but this isn't true!
3. Discuss with your students what effects **stormwater pollution** can have?
- a. Discuss that rainwater can pick up pollutants like oil, heavy metals (from cars), **pesticides**, **fertilizer**, salt (from snow removal), **sediment** (from **erosion** of soil), animal waste and garbage that can flow into these storm drains and end up in our bays and harbors.
 - b. Toxins like oil, heavy metals, and pesticides in stormwater can have many adverse effects on plants, fish, animals and people.
 - c. Sediment can cloud the water and make it difficult or impossible for aquatic plants to grow, and can also kill them. It can also smother the eggs of fish and other aquatic animals.
 - d. Too much fertilizer in stormwater leads to an overgrowth of algae, which can cause a loss of oxygen in the water. This will suffocate plants and animals that live there.
 - e. Litter, such as plastic bags, six-pack rings, bottles and cigarette butts, washed into water bodies can choke, suffocate or disable aquatic life, including aquatic mammals, fish, turtles and birds.
 - f. Salt can be carried into storm drains from snow melt on treated roads and can have a negative impact on many plants and animals that live in freshwater habitats that cannot tolerate an increase in salinity.
4. Discuss the Town's educational campaign, "Only Rain in the Drain"
- a. What does it mean? It is very important that we only allow rainwater to go into our storm drains to help prevent pollutants from getting into our local waterbodies
 - b. To reinforce stormwater pollution principles show your students the "Stormwater Police" video created by the Town of North Hempstead
https://www.youtube.com/watch?v=ZZ_jt1_BBKo&t=32s

Student Activities:

1. OBSERVE THE STORMWATER SYSTEM AROUND YOUR SCHOOL

- a. Walk with your students around the school grounds and observe the features of the grounds.
 - You will see buildings, sidewalks, parking lot, grass/lawn, trees, other vegetation, athletic fields, playgrounds
- b. As you walk around and identify each feature ask your students, which surfaces are pervious (lawn, areas with vegetation, trees, bare soil, sand) and which are impervious (sidewalk, building roofs, streets).
- c. Look at each impervious feature and try to determine the path that stormwater would take.
 - Do gutters from buildings point toward a specific area?
 - Where might water flow? Into the street? Is there a nearby storm drain? Is there a slope anywhere? Water would flow from higher elevation to lower elevation due to gravity
 - What pollutants might be picked up from each of these areas? Bird/animal droppings from roofs, parking lots; heavy metals and oil from cars in parking lots; garbage, salt from snow/ice removal
- d. Now look at the pervious features.
 - Do you see any bare soil? What problems might this cause when rainwater hits it? Erosion, sediment picked up by stormwater

- Do you see grass or turf? What pollutants may come from these areas? Fertilizers, pesticides; also grass has very short roots and does not absorb water very well, therefore if there is a lot of rain, water can still runoff this pervious surface
- e. Do you notice any **water quality controls** or things that can prevent pollutants from getting into stormwater? These would include:
- Signs saying not to dump waste into drains
 - **Rain gardens**- these help to capture stormwater from gutters or areas where runoff occurs and therefore prevent pollutants from getting into storm drains (see next section for more information)
 - **Rain Barrels**- these are containers that capture rainwater from the roofs of buildings, which can be used for irrigation and prevent stormwater pollution (see next section for more information)
- f. Back in the classroom (or outside if weather permits) discuss some ways students can prevent stormwater pollution at school and at home
- *Pet Waste*
 - Pick up after dogs and never throw pet waste down storm drains!
 - As pet waste **decomposes** (breaks down), it takes up a lot of oxygen from the water. This can suffocate fish and plant life by reducing the amount of oxygen available to them. Pet waste also contains nutrients that encourage weed and algae growth as well as bacteria that can harm humans and wildlife.
 - *Septic Systems and Cesspools*
 - Some homes in North Hempstead still rely on a **septic system** or **cesspool**. This means that everything that goes down the drain goes right into the ground. Leaking and poorly maintained septic systems/cesspools release harmful nutrients and **pathogens** (bacteria and viruses) that can be picked up by stormwater.
 - Ask you parents to have your system inspected every three years and pump your tank as necessary (every three to five years is recommended).
 - Don't flush prescription drugs down the toilet! Ever!
 - *Swimming Pools*
 - Swimming pools are chlorinated to keep mold and fungus from growing in your pool- but chlorine kills marine life too! Your pool should always be de-chlorinated before you empty it.
 - Whenever possible, drain you pool into the sanitary sewer system or direct the water to a vegetated section of your lawn. **DO NOT** drain into the street, where it can flow into nearby storm drains and waterways.
 - Properly store pool and spa chemicals to prevent leaks and spills.
 - *Household Chemicals*
 - Properly dispose of household hazardous waste, such as insecticides, pesticides, paint, solvents, used motor oil and other auto fluids, through the Town's S.T.O.P (Stop Throwing Out Pollutants) program.
 - Household hazardous wastes can poison aquatic life and people can become sick from eating diseased fish and shellfish or ingesting chemically polluted water.
 - Use low-phosphate or phosphate-free detergents since phosphates can cause algae blooms and loss of oxygen in aquatic habitats.

- DO NOT pour household hazardous wastes into sinks, toilets, the ground, or storm drains.
- *Litter*
 - Don't litter! If you see litter, pick it up and put it in a trash receptacle.
 - Don't use plastic bags, which can easily blow away. Instead, ask your parents to use re-usable shopping bags and re-usable glass food containers.
 - Plastic bags and other plastic litter (like bottle caps, toothbrushes, plastic wrappers) can fill up the stomachs of birds, fish, whales and other aquatic animals, causing them to starve.
 - Often plastic sinks and covers the sea floor, smothering the **organisms** (living things) that live there.
 - Scientists are finding **microplastics** (tiny fragments of plastic that have broken off of larger pieces, or tiny plastic scrubbers from toothpaste and face washes) in the world's oceans, and they are found in the cells of shellfish, birds, fish, and marine mammals.
- *Yard and Garden*
 - Plant **native plants** instead of lawns. Native plants, or plants that are historically from a certain geographic area and climate, have extensive, deep root systems and can absorb a lot more water than short rooted lawn grasses can. They are also tolerant of our climate and don't require much watering or fertilizer for growth.
 - Build a rain garden! These bowl shaped gardens absorb stormwater and filter out pollutants by using native plants.
 - Install a rain barrel. These containers capture stormwater from roofs of buildings and this water can be used for watering lawns and gardens.
 - Vegetate bare soil areas to prevent erosion and sediment from being carried by stormwater.
 - Use **drip irrigation** or a **soaker hose** to water your plants instead of sprinklers. Drip irrigation uses pipes with holes in them that allow water to drip out slowly right into the soil, where it is needed. Soaker hoses are hoses with holes that allow water to drip out. Sprinklers often waste water and cause runoff when they spray water in the air.
 - **Compost** yard and kitchen waste to create a natural fertilizer for your plants, which will cut down on synthetic fertilizer use.
 - If you use fertilizers and pesticides, use organic or natural ones and follow the manufacturer's directions to avoid using excessive amounts that may be picked up by stormwater runoff.
 - Store fertilizers and pesticides in a proper place to prevent spills.
 - Don't over water plants, which can cause water to runoff your property.
- You or your parents can report any sources of stormwater pollution that lead to discharges into storm drains to 311!
- Help spread the word! Tell your parents, friends and family about "Only Rain in the Drain" and how they can help prevent stormwater pollution!

2. DESIGN POSTERS TO SPREAD THE WORD ABOUT WATER POLLUTION

- Ask students in small groups or individually to design a poster to put around your school that will educate staff, teachers and students on the Town's "Only Rain in the Drain" campaign or about stormwater/water pollution in general

- They can use whatever materials you have on hand like computer paper or for a larger impact poster board or oak tag
- Students should be encouraged to be creative and can use any of the information that was discussed during the lesson or they can research more information online or in books
- Students can use a computer to print their posters or they can make them using crayons, colored pencils or markers

Please contact 311 or email sustain@northhempsteadny.gov if you have any questions or comments about this lesson plan!