***Note: This lesson requires students to first complete the “Build a Watershed” lesson so that their model watersheds are ready to use***

* Title
  + Pollution in a Watershed
* Objectives
  + Students will be able to visualize and understand point-source and nonpoint-source pollution in a watershed
* Vocabulary
  + Point-source pollution
  + Nonpoint-source pollution
  + Contaminant
  + Watershed
* Materials
  + Enough for one container per group of:
    - Brown sprinkles
    - Cocoa powder
    - Green sprinkles
    - Red food coloring
    - Vegetable oil
    - Dish soap
    - Spray bottle
* Introduction
  + Every single thing that humans do has the potential to release pollution into our environment. There are two main types of pollution: Point-source and nonpoint-source pollution. One is typically easier to envision than the other:
    - Point-source pollution is pollution that enters the environment from an easily identified or confined place. Some examples include smokestacks, factories, and wastewater treatment plants.
      * Smokestacks release harmful chemicals into the air
      * Factories that use water as part of their manufacturing processes can contaminate water that is then sent back into rivers, lakes, etc.
      * Nutrients and harmful microbes from wastewater treatment facilities can enter waterways and can cause algal blooms.
    - Nonpoint-source pollution is pollution that enters the environment from a wide area rather than one concentrated/confined space. Some examples include city streets and parking lots, construction sites, and agricultural fields.
      * Each of the above sources of pollution carry that pollution through runoff; when it rains, water moves along the surface of the earth, often picking up nutrients, sediments, and contaminants along the way, then depositing them into rivers, lakes, etc.
  + Pollutants in a watershed will eventually end up in the same place due to the water cycle moving it through, typically via rain
  + Explain to students that they will be modeling how different sources of pollution travel through a watershed
* Procedure
  + Each group should have their prepared watershed models ready and one container each of the listed materials.
  + Explain to students that these materials will be their “pollutants” that will be spread out over their watersheds
    - Brown sprinkles: Pet waste
    - Cocoa powder: Dirt/sediment
    - Green sprinkles: Fertilizer
    - Red food coloring: Toxic wastes
    - Vegetable oil: Car and machine oil
    - Dish soap: Laundry and car wash waste
  + Have students add pollutants one at a time. They should brainstorm and rationalize why they are using each pollutant.
    - Think of some buildings and places you might find in a watershed (housing developments, farms and ag fields, factories, cities, businesses). Spread the pollutants in different places on the model. Not every pollutant should be found in the same spot.
      * Ex. One “hill” might serve as a housing development where pet waste and car oil might be found. Put some brown sprinkles and vegetable oil down on that hill.
      * Ex. There may be a factory in a valley. This factory uses oil in its machines. Put some vegetable oil in that valley..
* Closure
  + After students have added their pollutants, pass out the spray bottles and have students spray a little water over their watershed model.
    - What happens to the pollutants? Did they stay in the same place? Did they mix together or stay apart? Where did the pollutants wind up after you were done spraying the water?
  + Pollutants in a watershed will eventually end up in the same place due to the water cycle moving it through. The pollutants and water should’ve wound up in the same or nearly the same place.
    - Can you think of any other sources point-source or nonpoint-source pollution? What things can we do to keep the watershed clean? (pick up after pets, conserve water, properly dispose of medications and chemicals, use conservation/ regenerative agriculture, etc.)