



Environmental Science

Stormwater Happens!

Project Area:
Environmental Science

Skill Level: Intermediate to Advanced

Learner Outcomes:

- ⇒ Be able to identify permeable and impermeable surfaces.
- ⇒ Be able to map a flow path of stormwater.
- ⇒ Understand the connection between stormwater and the water cycle.

Tennessee Science Curriculum Standard GLEs:

Embedded Technology & Engineering 0607.T/E.1
0707.T/E.1 0807.T/E.1

S7. The Earth 0707.7.6

Success Indicator:

Students understand the difference between a natural and urban water cycle.

Science Skills: Observe, collect data, interpret, engineer solutions

Life Skills: Observing, Reasoning

Tags: stormwater, water cycle

Materials:

- ⇒ Sidewalk chalk
- ⇒ Two glasses of water
- ⇒ Computer (optional)
- ⇒ Paper or grid paper
- ⇒ Ruler
- ⇒ Colored pens or markers

Have you ever noticed where raindrops go when it rains?

Stormwater is runoff that happens when the land cannot absorb the rain that falls onto it. Stormwater can cause flooding, carry pollutants, and harm aquatic ecosystems.

The purpose of this activity is to define key terms related to stormwater and watersheds and to get students to think about where runoff is generated, how it moves across the land, where it goes, what it can carry with it, and the impacts it may have on stream ecosystems.

Stormwater = Runoff that happens when land cannot absorb all the rain.

Watershed = The land area that drains water to a common location.

Ask your students:

- ⇒ What is runoff and where does it come from?
- ⇒ What produces more runoff — a parking lot or grass field or forest?
- ⇒ Why should we be concerned about increased stormwater in cities?
- ⇒ Where does stormwater go?

Introduce Key Concepts:

Talk about how the water cycle is changed in the urban environment (reference figure in activity). Increased impermeable surfaces in communities leads to more stormwater.

Most stormwater runoff from urban areas goes straight to streams with no filtering of pollutants.

Resultant problems are increased flooding, poor water quality, degraded aquatic habitat for fish and macroinvertebrates and decreased biodiversity.

Activity: Soak It Up!

Pour glasses of water on various surfaces around your school yard to demonstrate the difference between a permeable and impermeable surface. Before each demonstration ask your students to predict what will happen to the water (answer key above).

Activity: Where Does Stormwater Go?

Ask students to write the name of their watershed on the sidewalk in chalk. "Rain" on it with a hose or watering can and observe the flow path.

Activity: Stormwater Mapping

Students will map their home or school and the flow path of water coming off of it during a rainstorm. Have them note downspouts, drainage ditches, and permeable and impermeable surfaces.

Optional: Your students may use Google Earth to get an aerial photo of their home, allowing them to develop technology skills. If you have access to a GPS, use it to obtain your school's coordinates and ask your students to find the location and aerial photo online.

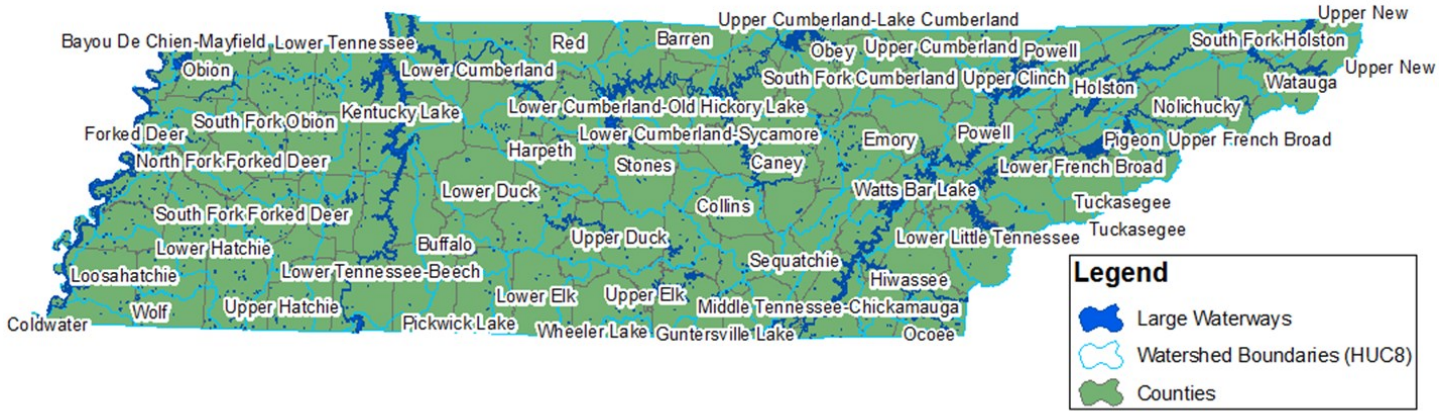
Ask your students to go outside when it rains and see where water falls on their homes and lawns. Help them complete a map of their home and show where water soaks in and where it runs off. Ask them to pretend like they are a raindrop and follow their pathway down to the nearest stream.

SURFACE	Impermeable?	Permeable?
Driveway***	X	X
Lawn		X
Flower bed	X	
House Rooftop	X	
Vegetable garden	X	
Sidewalk***	X	X
Roadside Drainage***	X	X
Barn/Shed Roof	X	

*** These may be either impermeable or permeable. If the driveway or sidewalk is made of a porous concrete mix, gravel, mulch, sod or pavers with pea gravel between, the water likely percolates through these materials, making it a permeable surface. If the roadside drainage way is grassed, then it is permeable, but if it's a concrete culvert or gutter, then it is impermeable.



Tennessee's Watersheds, Hydrologic Unit Code 12 (HUC 12)



Extension:

Install a stormwater tank at your school! Disconnect a downspout that is connected with the storm drain or falls onto impermeable surfaces and install a rain barrel or larger rain tank! The water collected from the rooftop can be used to water a garden or landscaping. This project would be a perfect complement to a school teaching garden.



Discuss and Apply:

1. What did the stormwater flow into? A culvert, storm drain, ditch or creek?
2. What surfaces were impermeable and what were permeable?
3. Where was the closest storm drain or pipe? Did you see any pollutants moving in the stormwater?
4. If more spaces at your home and in your community were permeable instead of impermeable, how would that change the amount of stormwater and pollutants that make it into our streams?
5. How can you reduce the impacts of stormwater runoff at your home? Share maps and brainstorm ways that you can direct stormwater away from impermeable surfaces onto permeable surfaces. Show how rain gardens and rain tanks are used to catch stormwater.