



Riparian Buffer Bracelets

This craft forces students to think critically about common sources of pollution while learning about Riparian buffers, what they are made up of, and how they positively impact water quality.

For grades K - 8

Created by the Athens-Clarke County Stormwater Management Program

Lesson Summary

While doing this bracelet craft, students will think critically about common water pollutants, as well as learn about Riparian stream buffers and their role in preventing water pollution.

After a brief discussion on water pollution, students will use colored beads and pipe cleaners to make a bracelet that represents the different components of a stream buffer. At the end of the activity, students should be able to recognize the importance of stream buffers in keeping our waters clean.

Objectives

- Students will learn that stormwater runoff is the number one source of water pollution.
- Students will learn about common water pollutants, including animal waste, litter, excess fertilizers and pesticides, oil, and sediment.
- Students will learn about the components of a typical freshwater stream buffer.
- Students will identify ways that stream buffers can prevent water pollution and slow down runoff.
- Students will learn several simple ways for humans to reduce their impact on water quality.

GSE Science Major Concepts

3rd Grade:

S3L2. Obtain, evaluate, and communicate information about the effects of pollution (air, land, and water) and humans on the environment.

4th Grade:

S4E3. Obtain, evaluate, and communicate information to demonstrate the water cycle.

S4L1. Obtain, evaluate, and communicate information about the roles of organisms and the flow of energy within an ecosystem.

5th Grade:

S5P1. Obtain, evaluate, and communicate information to explain the differences between a physical change and a chemical change.

6th Grade:

S6E3. Obtain, evaluate, and communicate information to recognize the significant role of water in Earth processes.

S6E6. Obtain, evaluate, and communicate information about the uses and conservation of various natural resources and how they impact the Earth.

7th Grade:

S7L4. Obtain, evaluate, and communicate information to examine the interdependence of organisms with one another and their environments.

Materials

- Different colored pipe cleaners
- Scissors
- Different colored pony beads (blue, green, dark red, gray, brown, neon green, silver or black, white)
- Small bowls to hold beads
- Labels for beads

Background Information

This activity focuses on stormwater runoff and the role stream buffers play in combatting the adverse effects of nonpoint source pollution, like runoff.

Stormwater runoff and household pollutants

Stormwater runoff is rainwater or snowmelt that flows over the ground. In natural areas, most rainwater soaks into the ground, because the ground is pervious, allowing water to pass through it. In developed areas, the ground is hard and impervious, which prevents stormwater from infiltrating, resulting in runoff.

As runoff moves across the landscape, it picks up many different pollutants. In Athens-Clarke County, when runoff enters a storm drain, it carries those pollutants directly from the streets and sidewalks to the streams and rivers. There is no stop for treatment. Some common pollutants include:

- **Sediment.** Sediment can cloud the water and harm aquatic plant and animal life. Sediment also presents points of nucleation for bacteria, promoting the growth of harmful bacteria.
- **Bacteria and pathogens.** Present in animal waste, bacteria and pathogens can enter the stream through septic tank leaks, pet waste and wild animal waste. Once there, the bacteria can make the water unsafe for recreation and drinking.
- **Nutrients.** Found in fertilizers and animal waste, plant nutrients such as nitrogen and phosphorous can cause problems. Once in the stream, nutrients promote algae growth, resulting in algal blooms and the disruption of aquatic ecosystems.
- **Litter.** Trash and dumped items can suffocate, choke or otherwise harm aquatic animal life.
- **Household chemicals.** Soaps, pesticides, paints and other commonly used household chemicals can enter streams and rivers and poison aquatic life.

Riparian Stream Buffers

Riparian buffers are vegetated areas next to streams that protect them from nonpoint source pollution, help with bank stabilization, and provide aquatic and wildlife habitat. Usually they are made up of a variety of vegetation including trees, small shrubs, grasses, as well as rocks and flowers.

These buffers intercept sediment, nutrients, pesticides, and other materials that may be running off toward a stream before they reach the water. This is key to counteracting eutrophication downstream - or the buildup of nutrients that induces algae growth. They help slow runoff, filter out pollutants, and hold the bank in place to prevent erosion. They also provide habitat for a large number of species, including birds, aquatic animals, and bugs.

If you have a stream or tributary in your backyard, there are several things you can do to protect it:

- Do not mow right up to the water's edge. Leave a section where grass and vegetation can grow freely.
- Do not cut down trees near water. Tree roots help hold the bank in place and provide shade.
- Do not apply fertilizers, pesticides, or herbicides in the buffer. These can wash off into the stream.

In Athens-Clarke County, stream buffers are protected for 75 feet on both sides of the bank. No construction, movement of heavy equipment, excavation, or clearing is permitted within the buffer. Visit www.athensclarkecounty.com/3105/stream-buffers for more information.

Set-up

Set the beads and pipe cleaners out on a table, putting the different colored beads in different bowls. Label each bowl with the pollutant that the bead represents.

- Blue beads – represent water/the stream
- Green beads – represent vegetation
- Dark red bead – represent soil or mud
- Gray beads – represent rocks
- Brown beads – represent animal waste
- Neon green beads – represent fertilizer
- Black or silver beads – represent oil
- White beads – represent other pollutants like litter or paint

Once they pick out a pipe cleaner, walk them through the procedure outlined below. Once the bracelet is done, tie the pipe cleaner around the student's wrist and cut off the excess.

Procedure

Start a discussion about stormwater. Ask the students what happens to rain when it hits the earth. The students should generate a list that includes soaking into the ground, going into a river, or hitting infrastructure or homes. Discuss what happens to the water when it soaks in [becomes groundwater, gets used by plants, can evaporate in evapotranspiration]. Then ask what happens to the water when it runs off the ground [picks up pollutants, can heat up, goes into a storm drain and enters the water quickly]. Ask students to compare/contrast stormwater in natural areas and urban ones [what happens when it rains on top of a forest vs. what happens when it rains on top of a parking lot].

Ask students to name pollutants that runoff can pick up and explain how those pollutants harm the ecosystem and affect humans. Fill in the gaps of their list with pollutants from the background information. For older grades, ask students to explain what can happen when multiple pollutants enter our waters [algal blooms and warm water can both lower dissolved oxygen, harming fish, for example].

Segway into a discussion about stream buffers and what they're made up of. Make sure to mention trees, rocks, soil, and plants. Tell students that they will be constructing a stream buffer bracelet. Explain that stream buffers are meant to be a protective layer on the edge of a stream that prevents erosion, filters out pollutants, and helps preserve the integrity of the stream. They are made of up a few different components, and we are going to model one on a bracelet.

Steps to build the bracelet:

- Have the students "build" their stream on the pipe cleaner using 4-5 blue beads.
- Next, have them add other components of the buffer in any order they like. They can add vegetation and trees (green), rocks (gray), and soil (dark red). Explain that these components will all help stabilize the stream bank.

- Next, ask the student if they can name common pollutants that might get in our water. Prompt them by asking if they have pets at home. Make sure to mention that pet waste, oil, excess fertilizers, and litter are all very common water pollutants because stormwater runoff carries them into streams or storm drains (which lead directly to streams).
- Now they can add any combination of pollutants onto the bracelet. They should limit themselves to two of each color bead.
- Once all the beads are on, ask the student if any of their pollutant beads are touching the blue beads. Explain that the pollutant beads on the end are blocked from touching the stream (the blue beads) because there is a protective buffer in between.

Assessment

In the closing discussion, students will be asked the following questions:

- What are the different types of water pollutants and how do they enter our waterways?
- What components make up a stream buffer?
- How does a stream buffer help prevent water pollution?
- What are the other benefits of stream buffers?
- How can you properly care for a stream buffer if you live near a stream?
- What are some other ways you can help prevent water pollution?

