Riparia's River

Michael J. Caduto

Illustrated by Olga Pastuchiv

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Children / Environment; Grades 3-6

When Gretchen, Jason, Mark, and Daphne find their favorite swimming hole filled with green slime, they are horrified. A mysterious, almost magical naturalist named Riparia helps the children understand why the water became polluted—and together with a community of friends and neighbors they figure out what they can do to bring clean water back to the river they all love.

Michael J. Caduto's story about the nature of a river, and how it is affected by a non-point source of pollution, is filled with both information and action. Olga Pastuchiv brings the story to life with realistic, lush illustrations that illuminate the children's passion for their river.

*Riparia's River* could prompt conversations about:

- Non-point source pollution
- The life cycle within a river
- Service learning for the environment
- Kids as environmental heroes
- The power of working together to solve a problem

**Activity: Mapping Rivers**

Invite children to use a map of your area to find the closest river.

- Then trace the river back to its source and follow it on the map to its outlet.
- Discuss the water cycle and the flow of water from mountain spring to ocean.
- Ask what impact humans have on this cycle and this flow.
- (Focus on potential or existing non-point sources of pollution.)

**Activity: Is Your River Healthy?**

If you live near a river or stream, take a walk with your children and look at the river.

- Is it healthy?
- Is there need for some restorative work along the riverbank?
- Maybe the river environment could be the source of a service-learning project.

**Activity: Where Does the Water Go?**
Ask children to investigate where the water from their home goes after they wash their hands.

- Is any of that water carrying pollutants?
- How is that pollution cleaned up before the water is released back into the environment?

**Notes about Non-Point Pollution and Riparian Buffers**

by Michael J. Caduto

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Most of the time, when we picture a source of water pollution, it looks like some kind of toxic fluid flowing from a pipe. Scientists call this a **point source** simply because the pollution comes out of one spot, such as a pipe from a sewage treatment plant, a factory, or a hot-water flow from a nuclear power plant.

*Riparia's River* however, is about **non-point** sources of pollution. This kind of pollution happens when rainfall picks up pollution as it washes over the land and then flows into waterways like rivers, ponds, lakes, and oceans. Because rainwater flows downhill and runs off of the land, it is called **runoff**. Rain carries pollution into our waterways from sources like farmland, parking lots, roads, garbage dumps, and lawns. About two-thirds of non-point pollution in rivers enters as runoff from agriculture, including cropland and farms that raise cattle, dairy cows, pigs, and other animals.

Three main kinds of water pollution are described in *Riparia's River*. Nutrients are one kind of pollution that, in this story, comes in two forms: manure from the cow pasture and fertilizer that is being applied to the cornfield. The pasture and cornfield are the sources of the pollution. Runoff containing manure and soil erosion is feeding the river with lots of nutrients, causing algae to "bloom" or grow in large amounts. When these algae die, the bacteria that decompose them use up much of the oxygen in the water, making it hard or impossible for many insects, fish, and other animals to survive. The rotting algae often give off a sulfurous, "rotten egg" smell.

Toxic chemicals are the second source of pollution in *Riparia's River*. In the story, the farmer is spraying weed killer, which is called **herbicide**, onto the cornfield. Similar chemicals wash into our waterways after being sprayed onto lawns and gardens. There are other kinds of toxins that enter our waterways, such as pesticides, toxic chemicals from factories, and acid runoff from coal mines. In addition, acid precipitation (acid rain) forms from emissions created by power plants, factories, and vehicles that burn fossil fuels.

A third kind of pollution found in the story happens because the trees that once shaded the river have been cut down along the edge of the farmer's land, causing the sunlight to heat up the water. Warmer water holds less oxygen, stresses the animals, and causes the impacts of the other two kinds of pollution to be even worse. Trout are sensitive to all three kinds of pollution found in this story. Forestry and construction projects often remove plants right down to the shoreline.

Erosion causes other problems. Once the plant roots are gone, waves and currents start to remove soil from the riverbanks. Fine pieces of soil, called **silt**, can bury the gravel where fish go to **spawn**—to lay and fertilize their eggs. Silt can cover fish eggs and coat the gills of fish and aquatic insects, causing stress and suffocation.

By planting the edge of the farmer's land, the children are dealing with all three kinds of pollution, as well as erosion. The zone of plants along the edge of a stream or river forms a barrier or **buffer** that protects the waters from nutrients and toxic pollution. The overhanging tree branches shade and cool the water. Because these buffers are "of the river bank," they are called **riparian buffers**.
Riparian environments act as shields that protect the water. Soil particles, plant debris, roots, and bacteria absorb 80-90 percent of nutrients and pesticides before they enter the water. Plant roots form mats that bind the soil in place and prevent erosion.

At least fifty feet of buffer is needed to hold soil in place on gradual slopes, and 100 feet on each side for steep banks. Buffers ought to be 100 feet wide to protect fish habitat and filter nutrient runoff and pesticides, 150 feet wide to control erosion and sediments, and 200 feet wide to help prevent flooding.

The kind of buffer that the kids plant in Riparia's River is the best kind, full of native grasses, sedges, cattails, flowering plants, shrubs, and trees. That's because riparian buffers are also important homes or habitats where animals find water and places for resting, breeding, and raising young. Many different kinds of plants live here that offer food and shelter for wildlife. Riparian buffers that are 300 to 600 feet wide make the best kind of wildlife habitat because they're wide enough for even larger animals to use as corridors for safe travel between the vast wild areas in which they live.

Fallen tree trunks and branches in the water create habitats for insects, trout, and other wildlife. Flowing water is churned up by these obstacles, which act like blenders that mix oxygen into the water. Autumn leaves that fall into the river give food energy to aquatic insects and the animals that eat them.

When heavy rains fall and when snow melts in the springtime, the plants and soils of riparian habitats store the extra water, which helps to prevent floods. Because the water flows more slowly through flooded riparian buffers, it allows silt to settle out before entering the rivers. From 50-100 percent of sediment settles and is filtered out as runoff passes through the riparian zone. Also, as water moves slowly through wetlands along the edges of rivers, it flows down through the soil and adds to the groundwater.

Not only are riparian habitats good for the environment, they are places we go for fishing, boating, bird watching, and for taking nature photographs. Buffers are beautiful natural areas that help us connect with wild places. And, as the kids learned in the story of Riparia's River, they help to keep our swimming holes clean.