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## Stream Studies Carry Local Elementary Students Closer to Science

As Arcola Elementary School's fourth graders clomp through the woods behind their playground, one boy suddenly shouts out, "Where the heck are we going?"

"To the creek!" a girl answers.

"What creek?" the boy says. "Are we gonna get wet?"

As they get farther away from their Silver Spring, Maryland, school, the sounds of the dozen-plus children shouting mingle with birds chirping and screeching. The students fall in line behind Diane Lill, director of GreenKids, an educational outreach program developed by the Audubon Naturalist Society (ANS) and funded in part by the Howard Hughes Medical Institute. Stream studies, such as the one these fourth graders are about to embark upon at nearby Sligo Creek, are just one component of the GreenKids program, offered free to participating public schools in Montgomery County, Maryland, and Loudoun County, Virginia.

Schools that apply and are accepted into the GreenKids program enter into a two-year partnership with ANS, which provides a naturalist to visit all classrooms; stipends for field trips and teacher training; and support for habitat restoration projects around the school, such as butterfly gardens, nature trails, and tree plantings. The goal is for schools such as Arcola, in Montgomery County, to be recognized as a Maryland Green School. That distinction signifies that the school's curricula include environmental education and that it serves as a model for addressing community environmental issues, such as stream and land pollution or recycling. In Virginia, the equivalent recognition is called a Virginia Naturally Award.

ANS's GreenKids program was launched five years ago and has received support from HHMI since 2009. The program began in Montgomery County, where 29 schools have participated so far, and expanded in 2009 with a pilot program for two Loudoun County schools. The program has now reached more than 20,000 students in Maryland and Virginia. "Students who participate in environmental science projects feel empowered by the positive

contributions they are making to the environment and to their communities,” Lill says. “But they also get the chance to envision themselves as scientists.”

The ANS naturalists typically are assigned to three schools and dedicate on average 125 hours per year to each school. They provide lessons that complement the county science curriculum for each grade. First graders, who study earth and soil, might learn how to use red wiggler worms to create compost from food scraps, for example. Second graders might culminate their unit on liquids by creating their own “green” cleaners. Or students might extend their study of the butterfly life cycle by creating native plant gardens that include both nectar plants for butterflies and host plants for caterpillars. Maryland fourth graders study the Chesapeake Bay, which is what brings them to Sligo Creek this June morning

As the students walk along the trail to the creek, Lill slows them as they reach a large color-coded map depicting Washington D.C., its outlying suburbs, and surrounding bodies of water. “How many of you have heard of the Potomac River?” Lill asks. Several students’ hands shoot up. “Did you know that’s where your drinking water comes from?”

The hands drop, and one girl audibly whispers, “Ewww!”

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**- Diane Lill**

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“The Potomac River leads to a big bay that I *know* you’ve studied in your science class,” Lill continues.

“The Chesapeake!” many children shout.

“Exactly. So think about it: Right here at your school, you’re connected to the Chesapeake Bay.” Lill indicates on the map how Sligo Creek leads to the Anacostia River then to the Potomac, which eventually dumps to the Chesapeake Bay and the Atlantic Ocean. “So any trash coming from your schoolyard that falls into Sligo Creek, where do you think it’s going to end up?” There’s a look of sheepish recognition on some kids’ faces, and a few scan the area for litter.

Several yards farther down the trail, the group meets Maria Sgambati, GreenKids' stream study coordinator. Sgambati typically leads 25 such studies every month, weather permitting. They are a hands-on—and feet-in—exercise that allows kids to develop hypotheses and reach conclusions about the relative health of their community stream. Before their visits, according to Lill and Sgambati, the children often have no idea that there's a stream near their school, much less have visited it.

Sgambati has stationed numerous pairs of large yellow rubber boots on the ground near the stream for kids to wear while wading in and collecting samples. There are also tables with microscopes and insect and larvae identification charts. Closer to the river are nets and buckets, which pique the students' interest. But once they step in the water, that's when the kids *really* come alive.

Sgambati instructs the students about what to look for in and along the creek: First, physical characteristics of a healthy stream, such as riffles and pools, and, eventually, insects to catch. Then the kids, in teams of two or three, step into the water, gingerly at first and then with mounting enthusiasm. Sgambati jumps into the stream to show them how to unearth benthic macroinvertebrates—aquatic animals without backbones—from the streambed by rubbing together rocks and massaging the soil. “This is *cool*,” Lovell Djieya Jr., 10, manning a net, says as his 9-year old partner Jason Cueva kneels in the water overturning rocks. Whether they find pollution-tolerant or pollution sensitive organisms will give the students an indication of about the health of Sligo Creek.

A few minutes later, all the students jostle for space around the microscope table set up near the stream and call out over one another: *A leech! It's a water skipper. Look, a crayfish! We got snails!* “Oh we found good stuff, Josue!” Tao Lin calls, as he pats the back of his partner, Josue Mejia.

Megan Zahra, the students' teacher, circulates among the excited teams with Lauren Simpson, Arcola's ANS naturalist, who has been working with Arcola students throughout the year. They help the kids match the insects they found with items from the identification chart.

“Most of these kids rarely, if ever, have the opportunity to come out and explore like this,” Zahra remarks. Arcola is a Title One school, which means it serves a large population of students from low-income families.

It takes the combined efforts of all four educators to pull the children away from the microscope tables when their hour-and-a-half excursion nears a conclusion. When they finally gather around to discuss their data, they have found benthic macroinvertebrates that can tolerate a moderate amount of pollution along with significant signs of erosion, which are indications that the stream has been damaged. But they also observed lots of plants along the creek bed and clear water with no smell. Together, they formulate a

conclusion: Their portion of Sligo Creek ranks about a five, on a scale of 1-10, for stream health. While this conclusion isn't scientifically precise, it does give the students a way to think about their local stream's health.

Then the kids scuffle, somewhat grudgingly, back up the trail toward the school. As she breaks down the equipment, Sgambati talks about her hope that, once their Audubon partnership winds down next year, Arcola and other schools will team up with watershed groups like "Friends of Sligo Creek" to create sustainable stream programs so the students can regularly devote time to cleaning the stream or removing invasive plants.

Sgambati smiles wistfully as the sounds of footsteps, shouts, and giggles fade into the distance. "They don't even realize they're learning stuff," she says of the children. "Which is what I love. Every kid in the stream! That's my motto."