

Earth Partnership for Schools: Ecological Restoration in Schools and Communities

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ABSTRACT

University of Wisconsin–Madison Arboretum’s Earth Partnership for Schools program works with students, teachers, and citizen volunteers to restore schoolyards and natural areas and to address diversity, pollution prevention, and ecological literacy across age, ecosystem, discipline, and culture. A ten-step restoration education process with more than 100 activities that address multiple learning styles is integrated with school curricula. The RESTORE (“Restoration Education, Science Training and Outreach for Regional Educators”) program has trained teams to bring Earth Partnership for Schools to a variety of ecosystems in 17 states and Puerto Rico, and has included more than 400 schools, 1,600 teachers, and 160,000 students. Key supporters and collaborators include the U.S. National Science Foundation, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Forest Service, and other public and private agencies, universities, arboreta, botanic gardens, and environmental organizations. Earth Partnership is inspired by Aldo Leopold’s “land ethic” that sees land as a community to which we belong, and was articulated so clearly in his beloved *Sand County Almanac* in 1949.

Keywords: community partnerships, ecological restoration, professional development, schoolyard gardens

Earth Partnership for Schools (EPS) was created in 1991 at the University of Wisconsin Arboretum in Madison in order to enhance environmental literacy of school children through restoration of native habitat on schoolyards and nearby areas. This program grew from the Arboretum’s mission to enhance people’s relationship with the land and from the realization that something more than a field trip was needed to help students form a lasting bond with nature. The land ethic, the idea that we should consider soil, plants, and animals as part of the community to which we belong, was proposed in *A Sand County Almanac* by Aldo Leopold (1949), cofounder and first director of the Arboretum. Earth Partnership for Schools nurtures this idea in children and forges beneficial links among students, their families, schools, and communities as they reintroduce

native plants and animals on school grounds.

Our RESTORE (Restoration Education, Science Training & Outreach for Regional Educators) program has trained teams to bring EPS to 17 states and Puerto Rico, and we’re still growing. In the last 19 years, EPS has been implemented in more than 400 schools by 1,600 teachers and 160,000 students. EPS offers more than 100 curricular activities, complete with education standards and assessment ideas. Support has been provided by the U.S. National Science Foundation, U.S. Environmental Protection Agency, and other public and private sources. In this article, we give an overview of EPS, how it works, what we’ve learned, and our thoughts on the future.

Earth Partnership for Schools works with students from kindergarten to college as well as teachers and citizen volunteers to restore schoolyards and natural areas and to address diversity, pollution prevention, and ecological literacy across age, ecosystem,

discipline, and culture. By focusing on schoolyards, neighborhoods, and local watersheds, EPS aims to bring environmental literacy to a scale that students and community members can understand. Native plantings can actually improve the ecological functioning of the school grounds, for example, preventing runoff pollution and enhancing the health of the landscape and water quality beyond the schoolyard boundaries. We have developed guides on installing rain gardens, which collect water from roofs and paved areas and allow it to infiltrate the ground, so that students can become active participants in lessening storm water impacts.

The Earth Partnership curriculum appears to be working in a variety of ecosystems; it’s been tested in the grasslands, savannas, and wetlands of the Great Lakes region of the Midwestern United States, the chaparral shrublands of California, and the tropical forests of Puerto Rico. Obviously the plant and animal species and natural history change, but



Lloyd Street Global Elementary School in Milwaukee, Wisconsin, partnered with Walnut Way Conservation Corps to remove more than 0.13 ha of asphalt on the schoolyard to reduce urban stormwater runoff, improve water quality, create a green space, and serve as a demonstration project and teaching tool. The project also helped support parents in building rain gardens in their yards to increase the cumulative benefits in the neighborhood. Photo by Cheryl Bauer-Armstrong

the basic process remains the same: creating learning environments with native species close to or on the school grounds. We provide all EPS materials in print and also digitally so that they can be adapted to different ecosystems, cultures, and languages. Our Puerto Rican colleagues at the Vieques Historic and Cultural Trust and at the Cabo Rojo National Wildlife Refuge are busy translating the activities into Spanish. They will create programs adapted culturally and biologically to their own communities and ecosystems. Likewise, urban greening of city schoolyards demands similar cultural and biological adaptation. As a nine-year-old Guatemalan boy in Madison explained, “The habitat in the world is getting less and less; by planting one tiny seed we can help the world.” A teacher in Milwaukee notes as EPS’s greatest impact: “Kids need to feel important, to feel that they make a difference in this world. This program provides ways to give kids a sense of purpose and build competency.”

How Earth Partnership for Schools Works

Teams of teachers and community partners come to the University of Wisconsin Arboretum every summer for one- to two-week “institutes” to learn a ten-step process for reintroducing native habitat on schools grounds. Supplementary lessons focus on phenology, woodland restoration, rain gardens, and storm water mitigation in the context of climate change and watershed ecology. During the institutes, participants practice the ten steps they will use to guide students back at their schools. They investigate the history of the Arboretum land, beginning with the earthen ceremonial effigy mounds built in the shapes of animals by the area’s first people on the shores of Lake Wingra. They then learn about the painstaking reclamation of dust-bowl era farmland by university students and professors and young men from the Civilian Conservation Corps (CCC), the Great Depression back-to-work program of the 1930s. Participants investigate

the Arboretum’s plantings planned to model the basic ecosystems of Wisconsin, including the world’s oldest prairie reconstruction, Curtis Prairie. They compare woodlands, grasslands, wetlands, and lawns, and analyze existing soil, topography, sunlight, moisture, vegetation, and aesthetic features. They learn basic botany and taxonomy and ways to design, implement, and manage a habitat restoration.

The theme of ecological restoration and the real-life task of restoring an ecosystem on a school’s grounds provide a framework that we see uniting lessons and activities across different subject areas and motivating students to learn about the world around them. Each activity in our kindergarten to 12th grade curriculum guide includes grade levels, subjects, standards, background, directions, assessment ideas, and relevant field sheets, as well as options for extensions and additional resources. They are organized in ten “Restoration Education Steps”:

1. *Study habitats and ecosystem(s).* Students visit remnant or restored ecological communities, identify species, record observations in journals, and imagine and plan what their restored schoolyard site can become over time. Our goal is for students to create a mental model of the ecosystem or habitat to be reconstructed. Reading and online research can expand horizons of what is possible, especially if high-quality restorations or remnants are not available. But nothing can beat walking through a waist- or shoulder-high grassland (where it is safe to do so) or experiencing a cool, green canopy overhead or discovering freshwater shrimp in a pristine stream to start the awakening process that leads to a desire to protect, restore, or recreate a natural area, encouraging the question *What is possible?*

2. *Investigate school site history.* Students review Land Office surveyors’ notes, historical maps, written and oral histories, and other primary sources to make some educated guesses about the ecological and human history of the place. Local literature, old letters, and



Every restoration project deals with unwelcome plants, many of which must be managed. Earth Partnership for Schools students inventory and determine the health of their restoration and then implement a management plan. These students are identifying a wild cucumber (*Echinocystis lobata*), not planted in their woodland planting but also not considered a problem. Photo by Cindy Landers

timelines add additional clues. Public records, journals, and interviews with elders can speak of open fields, dense forests, or soggy bottomlands, and students can begin to get a picture of *What was our place like in the past?*

3. *Analyze.* Current site conditions are explored to determine the suitability for different species and restoration strategies. This can include analyzing soil, measuring water infiltration rates, calculating slope, and mapping existing features such as buildings, paths, sun/shade, existing vegetation, and signs of wildlife. Sketching and visually assessing physical and aesthetic qualities can help answer the question *What is our place now?*

4. *Connect.* Students reach out to both school and local communities by giving presentations or writing articles for school and local media describing the project and needs. Resource professionals, neighbors, and parents welcome the opportunity to share their expertise and resources and get more connected with the school: *Who can help?*

5. *Design.* Based on their site analysis, students focus on an area for

the project, create a design, lay out the design on the ground, develop a budget, and select appropriate species. Native plant nursery catalogs and Web-based regional lists provide good starting points. Design considerations

"... I chose a place on the prairie. In this place I felt totally at ease with nature and insects. I felt like I could stay there forever. ... I felt content and happy, and even though I was far from everyone else I felt like I wasn't alone."

—5th grade student at an Earth Partnership school

include proximity to the school building for easy access by classes, existing land use, bloom time, and aesthetics. Small projects can make beautiful, useful, and prudent beginnings. The question is *What can we include?*

6. *Prepare the site.* Students research alternative methods for preparing the

site. A variety of approaches can be used to remove non-native vegetation, including cultivation, mulching, and sod removal. Parents and community volunteers can be helpful here. A well-prepared site will result in a better project and less frustration: *How do we begin?*

7. *Plant.* As many students as possible engage in seeding and planting, and celebrating the "birth" of the site. Adding a small area or creating a new site each year with additional students increases the number of stakeholders for the restoration project. The question is *How and when do we plant?*

8. *Manage.* Students learn to identify and control invasive plants and keep track of the health of their restoration. Master gardeners and other community volunteers are important assets to help students maintain restoration sites during vacations and assist with long-term maintenance to teach *How do we keep this going and growing?*

9. *Research.* Data are gathered throughout the restoration process. Seed mixes can be compared in terms of competition with weeds, site preparation, and management or aftercare techniques. Data can be collected and analyzed about insect and animal population dynamics. Most importantly, students can learn to observe and ask their own questions and use their own creativity to find the answers: *What do we want to know and how can we find out?*

10. *Learn.* There are endless learning opportunities available once students, teachers, and community members have restored a native habitat on their school grounds. Students participate in creating a living legacy at their schools and learn how to be citizen stewards of their local communities. *Who would have known what a small group of students could learn by doing?*

What We Have Learned

From our experience teaching, listening, and watching the schoolyard restoration process unfold over the last twenty years we have noted a few

persistent elements. Teams of teachers that draw on many resources and talents within a school community are essential for full implementation of a restoration-based curriculum across disciplines and grade levels. Beware of the “Lone Ranger” syndrome. While many talented teachers are able to accomplish extraordinary things with their students, lasting change usually requires a group effort. Schoolyard restoration and curriculum integration require the principal, the school board, and often the custodian.

In addition, partnerships with environmental organizations and agencies, master gardeners, universities, parents, and local businesses can bring credibility and resources to the restoration project. Earth Partnership for Schools has generated local and regional partnerships with botanic gardens, arboreta, environmental centers, sewer and water districts, watershed groups, and natural resources professionals.

An exciting example in northwestern Wisconsin is an evolving partnership of school superintendents, principals, teachers, the U.S. Fish and Wildlife Service, the U.S. Forest Service, the National Park Service, U.W. Extension Service, and the Lake Superior Research Institute, which will pilot a new curriculum extending the “schoolyard” to the Great Lakes. Students will develop an interactive map of their watershed using digital photography and GPS. This “Participatory Photo Mapping” will help students understand the unique northern forested lands and the coast, and follow water as it flows through the watershed. Their assessments will identify places and types of possible restorations. In Milwaukee, a similar coalition has been formed by the Urban Ecology Center, Riveredge Nature Center, the Metropolitan Sewerage District, the Discovery Center Museum, and others to address the relationship between urban schoolyards and Lake Michigan.

Another critical element is ongoing support of teacher teams to help the infusion of restoration-based activities into the curriculum. Periodic

No Plot Too Small

Kathy Kruthoff, Stevens Point WI

It was a splendid autumn afternoon. The New England asters had been flaunting their purple petals and beckoning with their yellow eyes. Who could resist? “Put down your math books,” I declared, “We’re going outside!” I led my third graders out into the small butterfly garden they had planted just outside the classroom. They lined the curved path and stretched out their arms. Within minutes, they were covered from finger tip to finger tip with Monarch butterflies, which descended in a cloud toward the small patch of native plants.

No plot of land is too small to sow the seeds of change. The prairie garden seeds had been planted only two years earlier. My classes still enjoy finding how the garden displays diversity and offers chances for serendipity in learning.

in-service workshops and renewal are also key to adding new people to the teams and ensuring long-term use of the schoolyard restorations. We strategically place RESTORE teams to provide this regional support. Support from the school districts and community is equally important.

Funding is also necessary—and available! In-kind resources, materials, and donations of time and money are available in every community. For example, a neighboring plastics manufacturer partnered with students to plant a rain garden on the school grounds to protect a local trout stream from parking lot run-off in Cross Plains, Wisconsin. The movement to get kids outside and involved with nature is growing exponentially. Sparked by Richard Louv’s (2005) documentation of “nature deficit disorder” in his much acclaimed *Last Child in the Woods*, the movement has grown to include the Children and Nature Network and “No Child Left Inside” legislation in the U.S. Congress, U.S. Fish and Wildlife Service’s “Connecting People with Nature” program, and the U.S. Forest Service’s “More Kids in the Woods” program. Green school programs are growing worldwide: for example, “Learning Through Landscapes” in the United Kingdom, “Evergreen” in Canada, and “School Learnsapes Trust” in Australia. The National Wildlife Federation has become the U.S. affiliate

for Eco-Schools, based in Denmark and with branches in 21 countries, and the Center for Ecoliteracy in Berkeley, California, has recently published *Smart by Nature, Schools for Sustainability* (Stone 2009).

Linking with existing curriculum priorities and standards is an important strategy with both short- and long-term benefits. Earth Partnership for Schools activities are keyed to state standards so that teachers can use them to accomplish many of their district’s curricular goals. Systemic adoption is the goal in order to achieve lasting change in learning outcomes, ecosystem functions, and ecological literacy.

The journey is as important as the destination. We remind our collaborators that it’s important to resist the temptation to use contractors, partners, and staff to “put in a restoration.” In restoration education, the process *is* the curriculum. The students are the principal actors (no matter how fun it is for the adults who want to do it themselves). The learners need guidance and can learn to use the knowledge and experience of “experts.” That is part of learning too. Students can learn to ask questions and find answers. Experiential education is an art and can also be a science. Restoring native habitat on schoolyards offers a context for both.

A teacher in South Milwaukee who joined one of the workshops wrote, “Give students opportunities to have

a real connection with the earth. The simple act of putting one's hands into the soil has a positive impact on students. We should create opportunities for children to do real work, to create something they can be proud of. The ownership and pride that the students take in their prairie is an excellent example of this."

Looking to the Future

The EPS is at work in a variety of ecosystems and in both formal and non-formal settings, urban and rural. There are many ways of going about schoolyard habitat restoration, and there is much to learn from the growing community of restoration education practitioners. Teams are integrating EPS in ways we did not imagine. One EPS team created a service learning course for teachers and science majors who collaborate with middle school students to plant rain gardens in the community. Another EPS center focuses on biofuels from native grasses in an agricultural community where biofuels are becoming an important part of the economy. They also address climate change issues and plant native species for sustainability.

While we have plenty of qualitative data and glowing evaluations from teachers, more quantitative data on student learning is needed to bolster anecdotal evidence of student achievement and the impact of schoolyard restoration curricula. We "know" that students are learning and highly motivated, but how can we demonstrate this with data? Action research, in which questions are posed by individual teachers who then gather data to find answers and identify possible actions, is beginning to address this gap. One project identified short class periods as a barrier to getting kids outside. The outcome was a district-wide change in the school-day schedule

to provide adequate time for taking students outside to learn.

A challenge remains for us to reach a broader, more inclusive population of educators and students, culturally and economically. We are developing partnerships with ethnically diverse urban areas like Detroit, Chicago, Milwaukee, and Philadelphia; indigenous and First Peoples organizations like the Menominee Indian School District in Wisconsin and the Healthy Nations Program at the Minneapolis American Indian Center; and with organizations, agencies, universities, and school districts in Puerto Rico. These partnerships have much to offer to the wider EPS and restoration education community in terms of the contextual meanings and practices of restoration ecology in urban and rural ethnic cultural communities.

In Philadelphia, Iris Brown is already rehabilitating empty lots to vibrant living gardens with vegetables and plants that are not always native to Pennsylvania, but native to the cultures of the newer immigrants from Puerto Rico and the Caribbean. "We start with the cultural connections and move to today's realities and possibilities." Already her projects have garnered annual awards from Philadelphia Green and the Pennsylvania Horticultural Society.

Her next frontier is to bring a team to an Earth Partnership RESTORE Institute and begin to define "native plant restoration" in inner-city Philadelphia. From there, she hopes to bring EPS to her native town of Loiza, Puerto Rico, with its vibrant mix of Afro-Puerto Rican culture, beaches, and pollution-threatened, bioluminescent bay.

Are we creating a new generation of land stewards, restorationists, and ecologically literate citizens? Are we fostering islands of refuge, migration

corridors, and places for inquiry, learning, and play, for reflection and day-dreaming and quiet observation, for awareness of the fragility, resilience, and interconnectedness of the natural world? Aldo Leopold (1949) wrote, "When we see the land as a community to which we belong, we may begin to use it with love and respect." This is our hope, that through modest efforts on schoolyards and in communities throughout the world, this love and respect will live in children and adults in growing partnership with the earth.

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Cheryl Bauer-Armstrong, EPS/RESTORE Director, with training and experience in landscape design, ecological restoration, and teaching and learning, codeveloped the EPS model and curricula on phenology, rain gardens, storm water, schoolyard restoration, and teacher professional development. She will speak at an international conference on Eurasian Steppes in Mongolia, September 2010. She can be contacted at cherylbauer@uwarb.wisc.edu.
