Teaming with Nature

Turning a square kilometer around your school into an outdoor classroom

by Mark Baldwin

Gilbert White was an 18th century cleric who spent most of his life in the tiny English village of Selborne. His name would probably have vanished quickly from memory were it not for three other facts about him. He was intensely curious about the natural world, he kept detailed records and corresponded vigorously with scientists about what he saw, and his records and letters were published. In fact, White’s *The Natural History of Selborne* has been in continuous publication for more than 200 years. His humble, childlike questioning about everything, especially the commonplace close to home, has inspired generations of naturalists — including Henry David Thoreau, who is said to have kept a copy of White’s book with him during his sojourn at Walden Pond. At the Roger Tory Peterson Institute of Natural History, we too were inspired by White’s legacy when, in 1993, we developed a place-based professional development program for teachers called the Selborne Project. The program is now called Teaming with Nature, and is offered as a graduate course in partnership with the State University of New York at Fredonia.

Although the name has changed, we still ask our teacher participants to imagine their students as young, inquisitive Gilbert Whites who want to learn more and more about their own communities.

The Teaming with Nature program enables teachers to use the nature and culture of their local community as a meaningful context for learning, and to make good use of middle school constructs such as common planning time for teachers, heterogeneous grouping of students, and block scheduling. Recent education reforms that require schools to raise standards and boost student performance highlight the importance of using an inquiry approach and tasks that require higher-order thinking skills such as evaluation and analysis. Such tasks can naturally be incorporated into local outdoor nature investigations.

Teachers who participate in the Teaming with Nature program learn how a one-square-kilometer area can be used as an open-air, real-life laboratory for the study of natural and human systems in their communities. A square kilometer is a unit that we can comprehend. It is community sized. Any part of it is reachable in a 20-minute walk, and yet it encompasses one million square meters. To learn everything there is to know about one square meter would be daunting. Multiply that by a million and you have a lifetime’s occupation. No wonder creative teachers can find plenty of links to their curriculum in a square kilometer around their school.

The following steps will introduce you to the Teaming with Nature idea and suggest how you could use it to create a rigorous, place-based unit of study rooted in the environment of your own school and community.

**Teaming with Nature step by step**

**Observe your school’s surroundings**

Many teachers know little about their school’s immediate surroundings because they simply drive there to work each day. Therefore, the first step is to sketch or jot down what you see of interest within walking distance of your school. As you become acquainted with the area, start to consider how the school’s environment could spark learning. It may help to make two lists:

1. What do I know about my school’s surroundings? (e.g.,“The school is on Maple Street. Highway 380 is nearby. There is a bridge over a stream about half a kilometer from...”)

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Eighth-grade students calculate the velocity of water in a stream that flows through their square-kilometer study area.
the school, but I’m not sure if the stream has a name. There is a cemetery three blocks from the school.”

2. **What questions do I have?** Productive inquiry is propelled by good questions that stem from careful observation. Some of your questions may be very broad (e.g., “What is the human history of this area?”) and could become the focus of an entire unit. Others may be quite specific and easily answered with a little research, but nevertheless have broad implications (e.g., the answer to a question such as “How much precipitation does the area receive annually?” may be closely linked to questions about dominant vegetation or economic activity). Some sample questions are shown here to help guide you (see chart below).

**Map your study area**

First, gather several maps or aerial photographs that show the area. Topographic maps, street maps, soil maps, tax maps, and aerial photographs are all useful for gathering facts and seeing your plot in new ways. You can find 1:50,000-scale topographic maps of Canada at the Centre for Topographic Information website at <maps.nrcan.gc.ca>, and U.S. Geological Survey 1:24,000-scale topographic maps at <topomaps.usgs.gov>. Perhaps you can obtain digital information about your plot from a local business or local government agency that uses a geographic information system (GIS) for land-use planning. Still, ordinary paper maps are adequate.

Next, determine the boundaries of your study area. Refer to the map scale and draw onto a transparency a square template that represents one square kilometer on the map. Place this template on the map so that your school is inside the square (but not necessarily in the middle of it), and move the template around to determine what features a square kilometer around your school might include. Position your study area so that it includes certain human-made boundaries such as streets, roads, or property lines. (One Teaming with Nature school in Washington, D.C., settled on a triangular study site because of the way the streets of that city are laid out.) Also consider the features in the environment of your school that are both unique and commonplace. No other place has the same latitude and longitude or the same combination of soil, ecosystems, watersheds, topography, or history of human presence. But the particularity of your area is balanced by the fact that it has much in common with other places and is connected to other places in many ways.

Once you have decided where your study area will be, you will need a large-scale map of your square kilometer. You can make one from an ordinary map using a scanner or

<table>
<thead>
<tr>
<th>Topic</th>
<th>Sample Questions to Stimulate Inquiry</th>
</tr>
</thead>
<tbody>
<tr>
<td>geology</td>
<td>What kind of bedrock underlies the area? How old is it? What formed the soil? Is the soil derived from forces that acted on the bedrock, or have glaciers or other forces brought the soil to the area from elsewhere?</td>
</tr>
<tr>
<td>paleontology</td>
<td>If the soil or bedrock contains fossils, what do they reveal about what lived here before. When did those organisms live here? How can we find out more about the ancient history of this area?</td>
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<tr>
<td>hydrology</td>
<td>Where does water that enters this area come from? What watershed is it part of? Where does our school’s drinking water come from? Once water is used and goes down the drain, where does it go? Are surface water (streams, lakes, ponds, vernal pools) or wetlands present?</td>
</tr>
<tr>
<td>meteorology</td>
<td>From what direction does air usually flow over this area? What difference does this make to our weather? How much annual precipitation does the area receive?</td>
</tr>
<tr>
<td>biology</td>
<td>What are the dominant life forms of this area? Which are native or indigenous and which are non-native or alien? How has the biology here changed over time, and in response to what forces? What types of ecosystems are present? How can we investigate them?</td>
</tr>
<tr>
<td>patterns of energy flow</td>
<td>Where do stored forms of sunlight, such as carbohydrates and hydrocarbons, come from in this area? How are they used? Are any crops, trees, natural gas, or other stored forms of solar energy harvested or mined here? If so, where do they go and how do they get there? What other energy transformations, such as mechanical to electrical or electrical to heat, take place here?</td>
</tr>
<tr>
<td>patterns of matter cycling</td>
<td>Where do various organisms obtain the materials they need to live and grow? Are commercial fertilizers used in this area? What materials are recycled here? How could recycling be made more efficient?</td>
</tr>
<tr>
<td>demography</td>
<td>Where do people tend to live (e.g., up on the hillside, down by the river) and why do they live where they do? What are the ages and ethnic backgrounds of the people who live here? What else can we learn about them?</td>
</tr>
<tr>
<td>human history</td>
<td>What is the history of human habitation of this area? What is the archaeological evidence for it? If villages, towns, or cities have occupied this site over time, why was this site chosen?</td>
</tr>
<tr>
<td>economy</td>
<td>What kinds of economic activities do people engage in here? Does the area have stores, restaurants, factories, or other places where people work besides our school?</td>
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</tbody>
</table>
Consider these points as you map your study area:

- **Interest.** Identify features that make your plot special. These might include a stream, grove of old trees, or historic home. Wetlands are wildlife magnets; if one is within walking distance of your school, you are lucky. Cemeteries are not only open-air museums of local history; they are often rich in natural history as well.

- **Safety.** Some urban neighborhoods are unsafe even during the day. Avoid busy highways, cliffs, electric fences, or other hazards. Make the safety of your students your top priority and, as you plan the fieldwork for your class, think through the risks that may be involved.

- **Curriculum.** Pinpoint (literally, with colored pushpins, if you like) places that link to various areas of your curriculum. A door-to-door survey of a residential neighborhood could tie in to a unit on graphing and statistics. The biodiversity of a park could be studied in a unit on ecology, a cemetery in a unit on history, a business in a unit on economics, and so on. Think creatively about how to use your locality to achieve your curricular goals.

- **Accessibility.** Use a highlighter pen to color in all the walking routes and places in your study area that are accessible to the public. Think about the requirements of students who have disabilities or special needs. Do not neglect points of interest that are on private property; ask the owner of a beautiful specimen tree, for example, if your students may study it up close.

- **People.** As well as places, think about local resource people, volunteers who can help you interpret your community’s natural and cultural history. Perhaps someone with a special interest in local architecture would be willing to take your students on an architectural tour of the neighborhood.

### Create a curriculum grid

Make a curriculum grid that lists all the concepts or topics you normally teach in each discipline. Organize these by subject area along the Y-axis, and by time frame (e.g., month or marking period) along the X-axis. Once you have completed the grid, you can see potential areas of curriculum alignment, where one topic could be taught in conjunction with others. New ideas for collaboration and instructional efficiency will emerge as you refer to your grid during the development of your unit. For example, a language arts teacher and a science teacher may discover that exercises in comparison/contrast and classification in their respective subject areas could be covered during a tree survey in a local cemetery. This may prompt the social studies and math teachers to plan a study of mortality due to an influenza epidemic by gathering data from the cemetery, an activity that helps cover the topics of local history, time lines, and graphing. Creating the curriculum grid will help ensure that the unit you develop is rooted in your curriculum.

### Draw a concept map

A concept map will help to identify the concepts or topics you teach that relate to your square kilometer. To make the concept map, write the organizing concept (“The Square Kilometer”) in the center of a sheet of paper. Draw spokes, which represent the disciplines, radiating from the organizing concept. At the end of each spoke, list concepts in that discipline and indicate how they relate to the organizing concept. For example, concepts listed under math might be “averaging” and “graphing.” Under these might be listed “Big Tree survey” and “daily weather observations.” The concept map reveals how place-based studies connect to specific areas of the curriculum, as well as areas of overlap among different disciplines.

### Identify focusing questions

The focusing questions that will drive your students’ learning are of two kinds: Unit Focusing Questions and Daily Focusing Questions. Unit Focusing Questions identify the main themes of your place-based studies throughout the
Each question is worded so that students: (1) can understand the question, (2) cannot answer the question with a simple yes or no, (3) cannot answer the question using skills or concepts from only one discipline, and (4) cannot answer the question in one day’s learning. An example of a Unit Focusing Question is “What are the relationships between humans and the natural world in our square kilometer?” The Daily Focusing Questions, which students may generate, maintain a sense of discipline and purpose in the creation and implementation of learning activities. Examples are “What have you learned about the history of our plot today?” and “What are the characteristics of trees that help us identify them?”

List and plan activities
List activities that will enable students to answer the focusing questions. Evaluate the activities you choose on the basis of how well they provide information or develop skills that are needed to answer the focusing questions. Activities that pass muster will compose the syllabus for your unit.

Implement the plan
Now consider how to implement your plan. Teaming with Nature veterans have reported that ingredients for success include the following:

The principal’s support. Leaving the school building to pursue first-hand learning seems reasonable, but is a nontraditional approach in most communities. Discuss your plan with your principal and make sure before you proceed that he or she supports it.

Parent volunteers or other community members. A volunteer coordinator and a corps of volunteers to help organize and supervise field trips will make your life easier and provide the child–adult ratio necessary for safe learning experiences outdoors.

Safety. Consider outfitting your students with highly visible, brightly colored T-shirts, perhaps with a logo that they help to create. Keep first aid supplies, students’ asthma inhalers, and bee sting kits where you can get to them quickly in an emergency.

Have a cell phone with you at all times, and make sure that school personnel know how to reach you when you are afield.

Student comfort. Make sure students dress for the weather. A well-timed snack can make a big difference in the energy levels and attitudes of your students. A tarp or sheet of plastic can make dew-covered ground a more inviting place to sit.

A culminating event. Plan a public gathering to give your students an opportunity to share what they have learned. Invite the local media to cover the event. Community members will appreciate what your students are discovering about the community you share.

Gilbert White professed “to be an outdoor naturalist, one that takes his observations from the subject itself, and not from the writings of others.” Perhaps this, and Thoreau’s assertion that “I have traveled a good deal in Concord,” can inspire teachers who wish to have their students discover first hand the richness, beauty, and complexity of their local community. We hope that the Teaming with Nature model provides enough structure and yet enough room for creativity to enable teachers to do just that.

Mark Baldwin is director of education at the Roger Tory Peterson Institute of Natural History. The institute offers nature education programs, publications, and Web-based resources such as its Electronic Naturalist <www.enaturalist.org>. The institute’s headquarters in Jamestown, New York, house the life work of 20th-century naturalist Roger Tory Peterson.

The Teaming with Nature program
Teaming with Nature is a professional development program for teachers offered by the Roger Tory Peterson Institute of Natural History (RTPI) in partnership with State University of New York (SUNY) at Fredonia. Teachers participate in a two-year cycle of implementation that starts with a five-day summer institute at RTPI’s Jamestown, New York, headquarters. Teachers who wish to can receive three semester-hours of graduate credit from SUNY Fredonia on successful completion of the summer institute. For more information, contact RTPI’s education department at (800) 758-6841, ext. 228, or mbaldwin@rtpi.org, or visit RTPI’s website at <www.rtpi.org>.