

Reading the River

Summer 2006

The Development of a School Site Wetlands
& Related Interdisciplinary Curriculum

7th grade

Science

Beth Davis

Twenhofel Middle School

Kenton County School District

Kenton County

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Context of Curriculum Project

My school is located in southern Kenton County. There are no areas of water nearby for me to take the students to do any water quality testing. Money for field trips is so limited; I decided to see what could be done to bring the water to us. I first attended a *How to Build a Wetland Workshop* at the Kentucky Association for Environmental Education (KAEE) Conference in Prestonsburg, KY last September. This is where the idea came from for the construction of a wetland at Twenhofel Middle School. I mentioned the idea to my principal and she was very supportive.

Wetlands typically have three general characteristics: soggy soil, water-loving plants and water. A wetland will have vegetation; places where we expect to see specific birds and mammals. Having a wetland on a school premises will open the doors to such a huge array of opportunities for student learning.

A naturally appearing, oval-shaped wetland for use in environmental studies that will attract a variety of plants and animals will thus be constructed on our middle school site. This small wetland will help clean runoff and enhance the appearance of the school grounds. The wetland will be built with a maximum depth of twelve-inches, and will provide habitat for salamanders, frogs, toads, crustaceans, and lots of aquatic invertebrates.

Educational Goals

This project has the potential to address multi- academic expectations and core content across multiple subject areas. One goal I have is for our 7th grade team to do a wetland unit. The social studies teacher will do the history of wetlands; the language arts teacher will focus on literature related to wetlands. For example she can use the following: "Wetlands" by Linda Stone, "Walking by the Wetlands" by Janet Lyons and "Look What I found" by Marshal Case. The math teacher will be able to do area using the dimensions of the wetland. In science, I will do water quality testing after the project is finished. We will be able to do studies weekly, monthly and even yearly.

Prior to the construction of the wetland I will use the "WOW- the Wonders of Wetlands" resource book to do several lessons. I plan to do these the four days before the actual construction date.

Programs of Studies

S-6-SI-3 Students will identify and refine questions that can be answered through scientific investigations combined with scientific information.

S-6-LS-1 Students will investigate how organisms obtain and use resources, grow, reproduce, and maintain stable internal conditions. Examine the regulations of an organism's internal environment.

S-6-LS-2 Students will analyze internal or environmental stimuli and organism's behavioral responses. Explore how organism's behavior changes through adaptation.

S-6-LS-3 Students will observe populations and determine the functions (e.g. decomposers, producers, consumers) they serve in an ecosystem.

S-6-LS-5 Students will investigate factors (e.g. resources, light, water) that affect the number of organisms an ecosystem can support.

S-6-AC-2 Students will recognize how science is used to understand changes in populations, issues related to resources, and changes in environments.

S-7-LS-3 Students will investigate unity among organisms.

S-7-LS-4 Students will investigate biological adaptation and extinction.

Kentucky Core Content

SC-07-3.4.2 Students will describe and compare sexual and asexual reproduction.

SC-06-3.4.2 Students will make inferences about the factors influencing behavior based on data/evidence of various organisms' behaviors.

SC-06-4.6.2 Students will describe the effect of the Sun's energy on the Earth's system and the connection/relationship between the Sun's energy and seasons.

SC-06-4.6.4 Students will describe or represent the flow of energy in ecosystems using data to draw conclusions about the role of organisms in an ecosystem.

SC-06-4.7.1 Students will describe the consequences of change in one or more abiotic factors on a population within an ecosystem.

SC-07-4.7.1 Students will compare abiotic and biotic factors in an ecosystem in order to explain consequences of change in one or more factors.

Project Outline

After getting the approval from the principal, I had to work on funding and who was going to help build the wetland. I was able to get the 6th grade science teacher to help me with everything. Having the support from your colleagues is important. You want as many teachers in your building to be on board with a project such as this so it will be used for years to come.

Funding-There are many grants available for outdoor classroom plans. I applied for a conservation grant, but unfortunately do not get one this year. I will continue to apply each year. Lowe's also has a special outdoor classroom grant you can apply for.

For the funding of the wetland at Twenhofel Middle School I contacted Robert Lape, Kenton County's architect. Since we are in a brand new building, fortunately there was some money put aside for the development of the building grounds. Mr. Lape is going to be able to use these funds to pay for the materials for the construction of the wetland.

I contacted Tom Biebighauser from the USDA Forest Service in Morehead, KY. He came to Twenhofel in March and helped us decide on a location for the wetlands. I asked Robert Lape and our school "plant manager" Mike Lowe to attend. We decided on a place outside the back of the building and actually staked it off with flags. We will need topsoil brought it because most of it was removed when the building was under construction. We had to keep in mind in the future the building might be expanded and where the expansion would be. Mr. Lape and Mr. Lowe were able to answer questions about where certain pipes were underground and had an input on the selection for the site.

Materials for Wetlands Construction:



Supplies Needed:

A.) Synthetic Liner, PVC, 30-mil or thicker, *aquatic-safe, fish-grade*

Size: 30 feet wide by 40 feet long

Quantity = 1

Estimated cost = \$340.00

B.) Geo-textile pad, 8 ounce, *aquatic safe grade*
Size: 15 feet by 40 feet = Quantity = 4 (to protect both sides of the liner)
Estimated cost = \$625.00

Consider ordering the synthetic liner and geo-textile pad(s) from:
Fabseal Industrial Liners, Inc.
42404 Moccasin Trail
Shawnee, OK 74804
1-800-874-0166 <http://www.fabseal.com>

The majority of synthetic liners that are available locally are treated with fungicides and algacides, and if used, would kill all aquatic life in your new wetland.

Note: Your local USDA NRCS office may be willing to donate the geo-textile material needed for this project. Many offices have this material on-hand for use by farmers in the area. You may also be able to obtain a synthetic liner at no charge from a landfill operation in your area. However, because the material often comes in narrow strips, they would have to provide a seaming crew the day of the project, and this can be complicated and expensive.

C.) Nails and washers: Please purchase 140 eight-inch long nails with washers to use for anchoring the top edge of the liner and pad(s). Shorter nails will not work. These long spikes are available at most lumber and hardware stores. Estimated cost = \$60.00.

D.) Heavy Equipment: Please hire a contractor who has a *small excavator with a blade* to build the wetland. Actual construction time is estimated at 5 hours. Expect to pay \$70.00/hour for heavy equipment work. Contact Tom if you have any questions about the type of equipment available in your area. Estimated Cost = \$350.00 (Note: a backhoe with rubber tires does not work well for building a wetland, a dozer would be okay, but the small excavator is best).

E.) Soil: We will need from 24-30 cubic yards of soil to build a wetland on the rocky ground. Since Twenhofel is on a new site we have no soil, only gravel surrounding the school. (A single axle dump truck will haul approximately 8 cubic yards of soil, a double-axle (tandem) 13 cubic yards, and a tri-axle 18 cubic yards).

The soil will be used to create a depression for the wetland and to cover the liner once it is placed in the depression. It is best to contact construction and/or landscaping contractors in your area to see who can deliver soil that is not sandy or rocky. You cannot use soil with rocks as they may puncture the synthetic liner. You can use soil with a few rocks, however, these rocks must be removed by hand during construction, and this is no fun at all! The soil should be dumped adjacent to the wetland construction site, and may be delivered weeks before the project begins. Estimated cost = \$270.00.



F) Wheat: Please purchase 1 (50 lb) bag of winter wheat for the project. This wheat provides for the rapid control of erosion and will be seeded the day of the project. Estimated cost = \$9.00.

G) Straw: Please purchase 12 bales of straw for use as mulch, estimated cost = \$54.00 (\$4.50/bale). All areas of exposed soil, except for the bottom of the wetland, will need to be covered with a layer of straw to

reduce erosion and increase plant survival. Do not use hay as it contains too many weeds that are difficult to control later.

H.) An assortment of 24 potted native aquatic and terrestrial plants may be obtained for free from the Kentucky Department of Fish and Wildlife Resources in Frankfort for use in both rain gardens. In order to receive these plants, you must enroll your outdoors classroom as a Kentucky Department of Fish and Wildlife Resources “Backyard Habitat.” You’ll be sent a Backyard Habitat kit when you sign up. The cost for the Backyard Habitat kit is \$15.00. The contact person for the program is:

Mary Carol Cooper, Coordinator
Native Plant Program, Information/Education Division
Kentucky Department of Natural Resources
#1 Game Farm Road, Frankfort, KY 40601
(502) 564-5280
marycarol.cooper@mail.state.ky.us

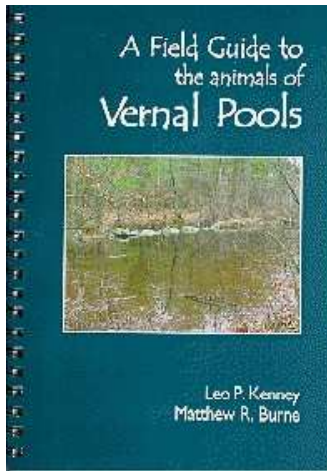
These live plants will do best when planted during the wet time of year. They must be watered once a day if planted when it is dry. You’ll need to make arrangement to pick these plants up in Frankfort.

I.) Optional: A mixture of native grasses may be sown on areas of exposed soils following construction for erosion control and to reduce the potential for invasive species colonization. You may wish to order 1 lb of the wet grassland seed mix for \$25.00/lb from Shooting Star Nursery in Georgetown, KY
(<http://www.shootingstarnursery.com/seedmixesprices.html>)

4) Consider purchasing these items to help students better explore the new wetland ecosystem:

A) Nets with very fine mesh so that students will be able to capture tadpoles and small invertebrates. These cost about \$20.00/each.

B) Purchase “A Field Guide to the Animals of Vernal Ponds” by Leo Kenny and Matt Burne @ \$12.00/each, (<http://www.mass.gov/dfwele/dfw/nhosp/nhpubrare.htm>)



C) Acorn Naturalists (<http://www.acornnaturalists.com>) sells a great Two-Way Magnifying Viewer (#T-1245) for use examining wetland life for \$8.95 each. You may wish to purchase some of these.

5) Build and place bluebird nest boxes.

One class of students can work to assemble bluebird nest boxes for placement around the school grounds. Tree swallows are likely to use those boxes placed near the wetlands. Estimated material cost for materials is approximately \$2.00/box.

6) Place two bat roosting boxes.

These boxes along with a steel mounting pipe have been donated by East Kentucky Power Cooperative, Inc. and may be placed by your students within the outdoor classroom. Contact Tom Biebighauser for delivery.