



# Restoring Our Native Forests

## NAAEE Guidelines for Learning:

### 4<sup>th</sup> Grade

Strand I A, E, G; 2.2 A, C; 2.4 A; 3.1 A, B

### 5<sup>th</sup> - 8<sup>th</sup> Grade

Strand I A, E, G; 2.2 A, C; 2.4 A

## Lesson Outcomes:

### Students will understand...

- that different tree species are adapted to different environments
- that native plants are well-suited to their local environment
- that invasive plants can out-compete their native counterparts, altering the balance of ecosystems
- that overall environmental conditions need to be considered when developing a restoration site plan
- the basic procedures that go into restoring a denuded streamside area to improve water quality

### Students will be able to...

- mathematically determine the number of trees that should be planted at a riparian restoration site
- analyze the environmental requirements of different tree species and determine if they would be well-suited for a specific site
- complete and interpret a stream restoration site plan

## Duration of Activity:

Two hours

## Vocabulary Words:

Composition, ecology, ecosystem, hardwoods, invasive species, native plants, physiographic, restoration, riparian, ripple effect, soil (sand, silt, clay, loam), species, sub-watershed, watershed

## Setting:

Indoors

## Materials:

### Student Pages:

1. "Local Forest Communities Worksheet:" One printed copy per group of three students
2. "Temple Hall Farm Park Site Description:" One printed copy per group of three students
3. "Green Thumb Nursery Catalog:" One printed copy per group of three students
4. "Restoration Site Plan:" One printed copy per group of three students

### Teacher Pages:

1. "Local Forest Communities Answer Key"
  2. "Restoration Site Plan Answer Key"
- Blackboard/whiteboard and chalk/dry erase markers, or sheet of butcher paper and markers/crayons

## Summary

Students will learn the importance of a balanced **ecosystem** and the problems associated with **invasive** species. By developing a mock **restoration** plan to establish a **riparian forest buffer**, students will assess what tree **species** are best suited for a streamside area.

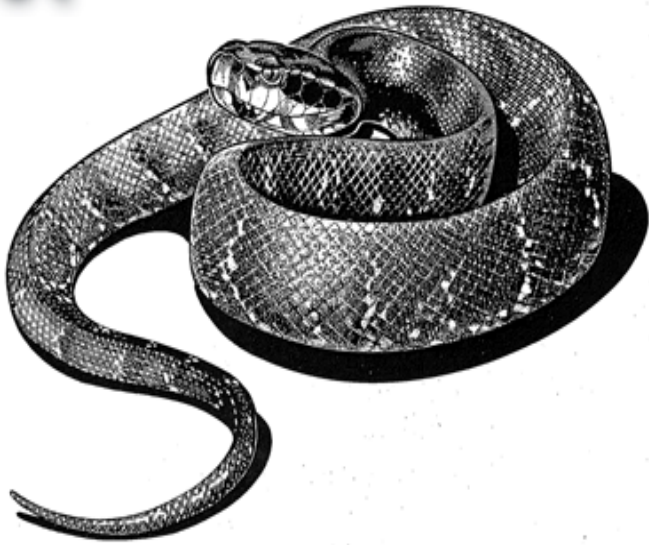
## Background Information

Environmental conditions (including climate and geology) determine the plants and animals that exist within a given ecosystem. The success of a given species depends on its ability to adapt to changing conditions, and as a result, entire ecosystems evolve over time.

Today, 58 percent of the Potomac River watershed is covered by forest. Across the region, the predominant forest type is oak-hickory. But the watershed contains a broad diversity of ecosystems, each characterized by a unique species composition.

In the Coastal Plain, loblolly-shortleaf pine forests are abundant. This area—characterized by tidal marshes, swamps, and low, flat land rich in **silt**, clay, and eroded **shale** soils—is ideal for bald cypress and magnolia, and terrapins and blue crabs abound here. In the higher-elevation Appalachian Plateau, cold, windy climates have resulted in maple-beech forests. Virginia pine, mountain laurel, several species of orchids, and American black bear are also common in this region. Together, the diverse regions of the Potomac River watershed comprise a biologically rich area that includes thousands of species, including threatened ones such as the American shad, wood lily, and short-nosed sturgeon.

In response to the loss of natural habitat and its intrinsic **biological diversity**—often caused by manmade activity—we have begun to reverse this damage by restoring natural landscapes. The first step to any



restoration project is to assess the site and its environmental characteristics, including its soil and climate conditions. Typically, restoration experts visit and map out the location, often taking soil samples. They may also study the site using Geographic Information System programs. Site visits can identify site-specific challenges—such as the presence of invasive plants or extensive **animal browsing**—that must be addressed during restoration.

Leaders of restoration efforts use the gathered data to identify tree species appropriate for the site, selecting those that mimic the naturally occurring diversity, and avoiding **invasive species**. Native trees and shrubs have a high survival rate and require little maintenance because they are adapted to local soil, rainfall, and temperature conditions, and have developed natural defenses against insects and diseases. They also provide wildlife with food and shelter. In contrast, plants and trees imported from other areas can reduce wildlife and plant diversity. Not all nonnative plants are harmful, but some (e.g., multiflora rose and oriental bittersweet) are invasive species. These species can spread unchecked, out-competing native species and disrupting the entire ecosystem.

Riparian forest buffers are the most common areas for restoration projects and here, species selection is particularly critical because most riparian areas are prone to flooding and heavy **sedimentation**. Since riparian forests serve as critical wildlife corridors, project managers also seek to select trees and shrubs that are beneficial to animals.

After carefully selecting species and using scientific standards to determine their placement, the next stage in a restoration project is the planting. Typically, young trees (called **saplings**) are planted, primarily because it is easier and more economical. In rare cases, adult trees may be used. If pests or deer browse have been identified at the site, tree tubes or other tools may be installed to protect young trees.

To ensure the successful establishment of a restoration planting, it is critical to monitor tree growth and survival and determine if additional plantings or special measures are needed. Human involvement, such as providing weed control and rodent prevention, often continues for years until a restored site is fully grown.

### **Essential Questions:**

- Are the same trees found all over the world?
- What conditions do trees require to survive? Do all trees require the same conditions?
- What do the species in your neighborhood indicate about your local environment? (Think about soil, rainfall, and temperature conditions.)

### **Pre-assessment:**

Ask students to draw a tree in its surrounding landscape, making sure to include all of the things it needs to survive. Display students' artwork. Lead a class discussion around the Essential Questions, beginning by asking the students to describe what they included in their drawings and why. Record their answers to refer back to at the end of the Lesson.

### **Lesson Procedures:**

**1** Divide the class into groups of three. Provide each group with one printed copy of the “Local Forest Communities Worksheet.” Ask the students to read the handout and complete the questions as a group.

**2** Inform students that they will develop a restoration plan for Temple Hall Farm Park to establish a riparian buffer along degraded Alex Creek. Distribute the “Temple Hall Farm Park Site Description” (which is adapted from a real-life Potomac Conservancy restoration project) to each group. Ask students to read the site description in their groups. As a class, review any vocabulary words that the students may not know.

**3** Distribute one copy of the “Green Thumb Nursery Catalog” to each group. Ask the students to read the tree descriptions and work collectively to determine which species would be best suited for planting in Temple Hall Farm Park. If there is enough time, encourage students to learn more about each of the species in the catalog by visiting Virginia Tech’s Dendrology Web site ([www.cnr.vt.edu/DENDRO/DENDROLOGY/main.htm](http://www.cnr.vt.edu/DENDRO/DENDROLOGY/main.htm)).

**4** Distribute the “Project Restoration Site Plan.” Explain to the students that by completing this worksheet, they will develop a restoration plan for Temple Hall Farm Park. Ask students to work within their groups to develop their own plan, drawing from the previous handouts, information, and discussions.



**5** Ask each group to present its restoration plan to the class. As a class, review the plans, prompting students to explain their reasoning. After the discussion, provide the groups an opportunity to revise their restoration plans to improve them.

### Post-Assessment

Review the Essential Questions from the beginning of the Lesson and lead a group discussion of the “Local Forest Communities Worksheet.” Provide students time to make adjustments to this worksheet and their “Restoration Site Plan,” applying new knowledge they have acquired. Collect both the worksheets and the plans, and review them to assess students’ understanding of the Lesson matter.

### Extensions

- Survey a local site (e.g., on the school grounds) by taking soil samples and recording climate and moisture conditions. Assign students to write a site description and research what native plants would be best suited for the site.
- Arrange for a guest speaker to make a presentation to the class about local invasive plants and how they are controlled. Your local Parks and Planning or Natural Resources Departments are good sources for a speaker.



#### Take Action:

##### Encourage students to:

- Participate in *Growing Native* by collecting native tree seeds that will be used for restoration projects once they grow into saplings.
- Encourage their family to use native plants for landscaping and gardening. Download the *Good Neighbor Handbook* ([http://www.nature.org/wherewework/northamerica/states/maryland/files/goodneighborhndbk\\_web.pdf](http://www.nature.org/wherewework/northamerica/states/maryland/files/goodneighborhndbk_web.pdf)) for free and refer to the “Going Native” chapter to learn more about gardening and landscaping with native plants.
- Map out and estimate the value of trees in their neighborhood on American Forests’ CITYgreen web site ([http://www.americanforests.org/envir\\_edu/school.php](http://www.americanforests.org/envir_edu/school.php)). Encourage students to post their findings in a local newsletter and advocate for planting more trees in their community.

#### Additional Resources:

- Alice Ferguson Foundation’s “Bridging the Watershed Educational Resource:” [http://www.hardbargainfarm.org/btw/watershed\\_timeline/timeline\\_frameset.html](http://www.hardbargainfarm.org/btw/watershed_timeline/timeline_frameset.html).
- Interstate Commission on the Potomac River Basin: <http://www.potomacriver.org/>.
- National Park Service: [www.nps.gov](http://www.nps.gov).
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