Pre-Visit Lesson

An Invasive Species—Garlic Mustard

Grade Level: 5-7

Teaching Methods: Discussion, Reading, Writing

Time:
- Preparation Time: 20 minutes
- Activity Time: 40 minutes

Materials:
- *Garlic Mustard Fact Sheet*
- *Garlic Mustard—An Invasive Species* Worksheet

Summary:
Students determine why garlic mustard is an invasive species in the United States and how it is detrimental to the native landscape.

Objectives:
- Students will define an invasive species.
- Students will determine how to identify garlic mustard, where it grows, why it is an ecological threat, and how to control its spread.

PA Environment & Ecology Standards:
4.6.7. Ecosystems and their Interactions
C. Explain how ecosystems change over time.

4.7.7. Threatened, Endangered and Extinct Species
B. Explain how species of living organisms adapt to their environment.
C. Explain natural or human actions in relation to the loss of species.

PA Science & Technology Standards:
3.3.7. Biological Sciences
D. Explain basic concepts of natural selection.

Other PA Standards:
- Reading, Writing, Speaking and Listening

Background:
Non-native species are species that have been introduced into an environment in which they do not originally grow. Other names for non-native species are: invasive species, non-indigenous species, exotic species, or aliens. Introduction of invasive species has been both accidental and deliberate. Effects from the introduction of exotic or non-native species can range from detrimental to beneficial. Some introductions may have no noticeable effect.

To date in the United States, 7,000 species of invasive species have been introduced. They are blamed for four in 10 endangered species listings, and their economic toll is estimated, by one study, at $137 million a year. The National General Accounting Office has labeled invasive species as "one of the most serious yet least appreciated environmental threats of

the 21st century."

Biodiversity is greatly reduced when invasive species move into a natural community. Aggressive, non-native plants usually have no enemies or controls to limit their spread. They have been introduced into an environment in which they do not belong and therefore, are not affected by natural controls that would normally keep them in balance. As they invade complex native plant communities, they compete with native plants for light, water, and nutrients. Invasive plants typically exhibit the following characteristics:

- Rapid growth and maturity
- Prolific seed production
- Highly successful seed dispersal, germination, and colonization
- Ability to out-compete native species
- Hard to eliminate or control

Garlic mustard is an invasive plant species that poses a severe threat to native plant communities in the eastern and midwest United States. It competes with native plants for sunlight, nutrients, water, soil, and space. Garlic mustard is not eaten by wildlife like the native plants so it often replaces them in great quantity.

Getting Ready:

- Copy the *Garlic Mustard Fact Sheet* and *Garlic Mustard—An Invasive Species* worksheet—one per student.

Activity:

1. Ask the students if they have heard of invasive species. Can anyone explain what they are? Ask the students if anyone can name an invasive species. Explain that the students will soon be taking a trip to Presque Isle State Park where they are going to study garlic mustard, an invasive species. Before they go on the trip you would like them to become more knowledgeable about the plant and why it is an invasive species.

2. Pass out the *Garlic Mustard Fact Sheet* and ask the students to read it.

3. When the students have completed the reading, pass out the *Garlic Mustard—An Invasive Species* worksheet. Explain that the answers to the questions are in the fact sheet that they just read. Explain that you would like them to answer the questions on the worksheet. You may choose to take the fact sheet away from the students or let them use it for reference.

4. When everyone has completed the worksheet review and discuss their answers.

5. Explain to the students that when they go to Presque Isle State Park they will conduct a study to determine if garlic mustard is a problem in a particular area of the park. The information that they learned will help them in the study.

Evaluation:

- Students will define an invasive species and discuss the characteristics of garlic mustard.

References:

- Department of Conservation and Recreation, Virginia Native Plant Society, *Invasive Plant Species of Virginia.*
- www.dcr.virginia.gov/dnh, Virginia Natural Heritage Program, Invasive Alien Plant Species of VA, *Garlic Mustard Illustration*.
- www.nps.gov/plants/alien/fact/alpe1.htm, PCA *Alien Plant Working Group—Garlic Mustard.*

Developed By:

- E-Concepts LLC, Albert, JoAnn and Davis, JoAnn, 2005.

FACT SHEET
Garlic Mustard (Alliaria petiolata)

Description

Garlic mustard is an invasive species. An invasive species is a non-native species that was intentionally or accidentally introduced by human activity into an area in which it does not belong. Invasive species typically have the following characteristics:

- Rapid growth and maturity
- High volume of seed production
- Highly successful seed dispersal, germination and colonization (become established)
- Fast vegetative spread
- Ability to out-compete native species
- Hard to eliminate or control

Garlic mustard is a biennial herb in the mustard family. Biennial means that it takes two years for a plant to grow from seed to maturity and die. The first year plants form rosettes of kidney-shaped leaves close to the ground. Rosettes remain green through the winter and develop into mature flowering plants the following spring. In its second year, the plant grows a stem with leaves that are heart shaped and sharply toothed. If the leaves are crushed they give off a strong odor of garlic. When mature, plants range in height from 2 to 3 ½ feet. The flowers form in a cluster at the end of the stem, and each small flower has four white petals. Seeds are black, oblong, and found in rows within a long narrow capsule called a silique. A single plant can produce thousands of seeds, which can scatter far from the parent plant.

Garlic Mustard *(Alliaria petiolata)*

Habitat

Garlic mustard grows in forests, forest openings, river floodplains, roadsides, and trail edges. It favors disturbed areas where it can quickly take over and dominate other plant species.

Distribution

Garlic mustard ranges from eastern Canada, south to Virginia, and as far west as Kansas and Nebraska. Garlic mustard was first recorded in Long Island, New York in 1868. It was likely introduced by settlers for food or medicinal purposes.

Ecological Threat

The lack of predators and aggressive growing habits of garlic mustard pose a severe threat to native plants and animals in forest communities. Many native wildflowers that complete

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their life cycles in the springtime occur in the same habitat as garlic mustard. Once introduced to an area, garlic mustard out-competes native plants by monopolizing light, moisture, nutrients, soil, and space. Wildlife depends on native plants for leaves, seeds, nectar, pollen, fruits, and roots, and when garlic mustard invades an area animals are deprived of essential food sources.

Management Options

Light infestations of garlic mustard can be controlled by hand-pulling. Plants should be pulled before seeds have ripened. Care must be taken to insure the entire root is removed because new plants can sprout from root fragments. Pulled plants should be removed from the site if at all possible, especially if flowers are present.

Severe infestations can be controlled by cutting flowering stems at ground level to prevent seed production. Once seedpods are present, but before the seeds have matured or scattered, the stalks can be clipped, bagged and removed from the site to help prevent continued buildup of seeds in the soil. This can be done through much of the summer.

For very heavy infestations, application of an herbicide is also effective. Extreme care must be taken not to get the herbicide on plants that you are trying to save.

GARLIC MUSTARD—AN INVASIVE SPECIES

Define an Invasive Species:

Common Name: Garlic Mustard

Scientific Name:

What does Garlic Mustard look like?

What adaptations allow Garlic Mustard to invade areas?

Where does Garlic Mustard like to grow? Why?

Where did Garlic Mustard originally come from?

How did it get to the Eastern United States?

How does it threaten ecosystems?

Is it possible to control the spread of Garlic Mustard? Why or why not?