Native Plant Restoration Project

A 7th Grade Pilot Program for PGCPS

Bridging the Watershed

An outreach program of the Alice Ferguson Foundation in partnership with the National Park Service and area schools

Bridging the Watershed

Bridging the Watershed is an outreach program of the Alice Ferguson Foundation, in partnership with the National Park Service and area schools, which offers secondary school students opportunities to study real-world science in national parks. Its purpose is to promote student academic achievement, personal connections with the natural world, lifelong civic engagement, and environmental stewardship through hands-on, curriculum-based, outdoor studies in national parks and public lands.

Many thanks go to the Alice Ferguson Foundation, National Park Service, and Prince George's County Public Schools, who have provided in-kind and financial support to foster the development and sustainability of the BTW program. The BTW administrative office is based at the Alice Ferguson Foundation, a 330-acre environmental center on the Potomac within Piscataway Park—10 miles downstream from Washington, D.C

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7th Grade Pilot Program for PGCPS

Table of Contents

Native Plant Restoration Project

Module Overview

In partnership with Prince George's County Public Schools, the Alice Ferguson Foundation created a new module focused on Native Plant Restoration for grade 7 students and teachers, with a curriculum-based Meaningful Watershed Educational Experience (MWEE). In this module, students learn about how they are connected to their watershed, the importance of native plants, and how humans can have negative and positive impacts on the environment. The students participate in a Bridging the Watershed field study in a national park to learn more about water quality and the many factors that affect it. Students then bring their knowledge to the outdoor classroom in their own schoolyard and make an assessment about environmental issues that they can fix. Students choose a project and what they will plant based on their research. They present this information, including a maintenance plan, to their administrator for approval. Students conduct soil testing to establish a baseline for future plantings or research. Students complete the planting themselves and participate in reflection about their work.

In our pilot year, student reflections at the end of the project included:

"I feel accomplished and that I finally helped the environment."

"I felt humbled that everyone can see and I hope everyone does this."

"I feel proud because we actually did something to improve our school."

"I feel like we really cared about how our garden looks, and we really did our best."

"I feel proud to have successfully collaborated with my class to revive our garden."

"I feel happy because even though we got dirty we still worked [to make] the garden to look beautiful."

This curriculum addresses Earth and Human Activity and Ecosystems: Interactions, Energy, and Dynamics, as we look at positive and negative human impact on native and invasive species, biodiversity, and demonstrate the food web and energy cycle with producers, consumers, and decomposers in their own garden.

MS-ESS3-3 Earth and Human Activity

Students who demonstrate understanding can: Apply scientific principles to design a method for monitoring and minimizing a human impact on the environment.

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories. • Apply scientific principles to design an object, tool, process or system.	**ESS3.C: Human Impacts on Earth Systems** • Human activities have significantly altered the biosphere, sometimes damaging or destroying natural habitats and causing the extinction of other species. But changes to Earth's environments can have different impacts (negative and positive) for different living things. • Typically as human populations and per-capita consumption of natural resources increase, so do the negative impacts on Earth unless the activities and technologies involved are engineered otherwise.	**Cause and Effect** • Relationships can be classified as causal or correlational, and correlation does not necessarily imply causation. - ***Connections to Engineering, Technology, and Applications of Science*** **Influence of Science, Engineering, and Technology on Society and the Natural World** • The uses of technologies and any limitations on their use are driven by individual or societal needs, desires, and values; by the findings of scientific research; and by differences in such factors as climate, natural resources, and economic conditions. Thus technology use varies from region to region and over time.

MS-LS2 Ecosystems: Interactions, Energy, and Dynamics

Students who demonstrate understanding can:

MS-LS2-1. Analyze and interpret data to provide evidence for the effects of resource availability on organisms and populations of organisms in an ecosystem.

MS-LS2-2. Construct an explanation that predicts patterns of interactions among organisms across multiple ecosystems.

MS-LS2-3. Develop a model to describe the cycling of matter and flow of energy among living and nonliving parts of an ecosystem.

MS-LS2-4. Construct an argument supported by empirical evidence that changes to physical or biological components of an ecosystem affect populations.

MS-LS2-5. Evaluate competing design solutions for maintaining biodiversity and ecosystem services.*

Science and Engineering Practices

Developing and Using Models

Modeling in 6–8 builds on K–5 experiences and progresses to developing, using, and revising models to describe, test, and predict more abstract phenomena and design systems.

- Develop a model to describe phenomena. (MS-LS2-3)

Analyzing and Interpreting Data

Analyzing data in 6–8 builds on K–5 experiences and progresses to extending quantitative analysis to investigations, distinguishing between correlation and causation, and basic statistical techniques of data and error analysis.

- Analyze and interpret data to provide evidence for phenomena. (MS-LS2-1)

Constructing Explanations and Designing Solutions

Constructing explanations and designing solutions in 6–8 builds on K–5 experiences and progresses to include constructing explanations and designing solutions supported by multiple sources of evidence consistent with scientific ideas, principles, and theories.

- Construct an explanation that includes qualitative or quantitative relationships between variables that predict phenomena. (MS-LS2-2)

Engaging in Argument from Evidence

Engaging in argument from evidence in 6–8 builds on K–5 experiences and progresses to constructing a convincing argument that supports or refutes claims for either explanations or solutions about the natural and designed world(s).

- Construct an oral and written argument supported by empirical evidence and scientific reasoning to support or refute an explanation or a model for a phenomenon or a solution to a problem. (MS-LS2-4)
- Evaluate competing design solutions based on

Disciplinary Core Ideas

LS2.A: Interdependent Relationships in Ecosystems

- Organisms, and populations of organisms, are dependent on their environmental interactions both with other living things and with nonliving factors. (MS-LS2-1)
- In any ecosystem, organisms and populations with similar requirements for food, water, oxygen, or other resources may compete with each other for limited resources, access to which consequently constrains their growth and reproduction. (MS-LS2-1)
- Growth of organisms and population increases are limited by access to resources. (MS-LS2-1)
- Similarly, predatory interactions may reduce the number of organisms or eliminate whole populations of organisms. Mutually beneficial interactions, in contrast, may become so interdependent that each organism requires the other for survival. Although the species involved in these competitive, predatory, and mutually beneficial interactions vary across ecosystems, the patterns of interactions of organisms with their environments, both living and nonliving, are shared. (MS-LS2-2)

LS2.B: Cycle of Matter and Energy Transfer in Ecosystems

- Food webs are models that demonstrate how matter and energy is transferred between producers, consumers, and decomposers as the three groups interact within an ecosystem. Transfers of matter into and out of the physical environment occur at every level. Decomposers recycle nutrients from dead plant or animal matter back to the soil in terrestrial environments or to the water in aquatic environments. The atoms that make up the organisms in an ecosystem are cycled repeatedly between the living and nonliving parts of the ecosystem. (MS-LS2-3)

LS2.C: Ecosystem Dynamics, Functioning, and Resilience

- Ecosystems are dynamic in nature; their characteristics can vary over time. Disruptions to any physical or

jointly developed and agreed-upon design criteria. (MS-LS2-5) - ***Connections to Nature of Science*** **Scientific Knowledge is Based on Empirical Evidence** • Science disciplines share common rules of obtaining and evaluating empirical evidence. (MS-LS2-4)	biological component of an ecosystem can lead to shifts in all its populations. (MS-LS2-4) • Biodiversity describes the variety of species found in Earth's terrestrial and oceanic ecosystems. The completeness or integrity of an ecosystem's biodiversity is often used as a measure of its health. (MS-LS2-5) **LS4.D: Biodiversity and Humans** • Changes in biodiversity can influence humans' resources, such as food, energy, and medicines, as well as ecosystem services that humans rely on—for example, water purification and recycling. (secondary to MS-LS2-5) **ETS1.B: Developing Possible Solutions** • There are systematic processes for evaluating solutions with respect to how well they meet the criteria and constraints of a problem. *(secondary to MS-LS2-5)*

Native Plant Restoration Curriculum

Lesson 1: Watershed Issues

Overview: This lesson introduces students to the watershed, native plants, and the Native Plant Restoration Project.

Lesson Characteristics: Use the table below for lesson planning purposes:

Time Required	90 minutes
Key Concepts/Terms	Watershed, pollution, runoff, precipitation, impervious surfaces, native plants, invasive/exotic plants
Setting	classroom
Materials	Clear bottle of vinegar with removable lid, Spray bottles half filled with water, scrap paper, multiple colored markers, sponge for cleanup

Essential Question: How do humans impact the water supply and the Bay?

Learning Objectives: Students will understand the importance of the watershed to their own well-being and how humans can impact water through their actions throughout the watershed.

Preparation: Have all supplies in the classroom.

Procedure:

Phase	Step	Action
Engage	1	Explain that students will have an opportunity to fix an environmental problem through this program.
	2	Ask: What is a watershed? How can a piece of trash from your neighborhood make it to the ocean? How does what you do matter to our drinking water? **Teacher Notes:** A watershed is the entire land area that drains into a particular body of water. In city areas, trash and

	3 4 5 6	pollution often travel through storm drains into the closest stream, then to the Anacostia River, the Potomac River, and then the Chesapeake Bay and Atlantic Ocean. Many people get their tap water from the Potomac River. Watch a short video on watersheds and runoff: https://www.youtube.com/watch?v=N9HUoMnvsRw Explain importance of native plants (vs exotic or invasive plants) and that they support keeping water in place (preventing runoff) and help with filtering. Give examples. Watch a short video on native plants and how they protect the watershed: https://www.youtube.com/watch?v=znNX6CC-m9Q Explain that this program entails a field study component to understand how water quality is impacted by human decisions, problem-solving with an assessment of the school, and actually planting a garden or trees of their choice.
Exploration	7 8	**Vinegar Parameters** Discuss the necessity of measuring different parameters using bottle of vinegar as an example. Ask the students if they have seen the local river and if they would drink that water. Ask why not (answers- dirty, brown, stuff in it, etc). Holding up the bottle of vinegar, ask if the students think this water is clean enough to drink (clear, looks clean). Ask them why they believe this. Then, ask for a volunteer who will use proper wafting technique to smell the liquid. Ask the student if they would drink the water now, and why not. (vinegar, acidic) Explain that as scientists we look at different measures or parameters to determine the health of the water. Students will have the opportunity to act as scientists at upcoming field studies - Watershed Watchdogs (water chemistry, 7 parameters) or Water Canaries (biological indicators). **Crumpled Paper-** Students will mark an x anywhere on a piece of scrap paper. Instruct students to crumple their own paper and then partially unfold the paper to keep peaks and valleys. Using a

	9 10	different colored marker, students will trace the high points of the paper (the ridge lines of the mountains). Ask: If it were to rain on this land form, what do you think will happen? What if the x is a leaky sewage treatment plant? Students pass around a spray bottle and make it rain.
Explanation	11	Ask for observations. What is the impact of the high levels of the watershed on the lower levels? Are their multiple watersheds, smaller ones that lead to bigger ones?
Elaborate	12	Ask: What has your leaky sewage seeped into? Why are watersheds important?
Evaluation	13	Reflection: How do you as an individual impact the health of the water? Now that you know this, what will you do differently?
Extension	14	Students will prepare for upcoming field study by reviewing information on appropriate clothing and procedure for their particular module.

Native Plant Restoration Project
Bridging the Watershed Field Study Experience

If school and AFF schedules allow, the period between the first and second lesson is ideal for a field study. This experience allows students to act as scientists to make observations and an analysis of water quality. Please see the specific module handbook for pre-activities, preparations, and the content of each module.

Native Plant Restoration Curriculum

Lesson 2: Schoolyard Assessment

Overview: Students will be divided into expert teams and make an assessment of the schoolyard using their team's lens. At the end of this activity, the class can make a plan for their planting.

Lesson Characteristics: Use the table below for lesson planning purposes:

Time Required	Two 90 minute class periods
Key Concepts/Terms	Vegetation, biodiversity, topography, compacted soil
Setting	School grounds
Materials	From the Resource Guide: Schoolyard Assessment Worksheets, Shared Schoolyard Assessment Vision Statement, Plant Lists, printed Google Earth images of the school grounds
Technology	GoogleEarth- https://www.google.com/earth/

Essential Question: How can we help the environment within the school property using native plants?

Learning Objectives: Students will collect information for their expertise on their schoolyard environment and form a plan to correct an issue.

Preparation: Ask students to dress for the weather, as the assessment will be outside.

Procedure:

Phase	Step	Action
Engage	1	Remind students of the opportunity they have to fix an environmental problem. Review watershed and native plant concepts.
Exploration	2	Show the class the Google Earth image of their

		schoolyard. Assign small group expert teams for the topics of: Vegetation and Biodiversity, Traffic Patterns and Permanent Structures and Water Flow, Topography and Water Flow, Soil and Sun/Shade, Land Use. Each group has a different criteria they are exploring (see worksheets) Review vocabulary and terms with the whole class.
	3	Take the entire class outside. Give specific parameters on where they should make their observations (Example: between the soccer field and the left wing of the building, not past the woods). The teacher may help guide the students by asking them to concentrate on specific and pre-approved sites, but the students should have the opportunity to observe at least three sites on the school property. Allow time for a thorough exploration, at least 10-15 minutes per site.
	4	Return to the classroom and give students 5-10 minutes to prepare a presentation for the rest of the class on their observations and their recommendations for a target area.
Explanation	5	A spokesperson from each group will report their findings to the class and give a recommendation on the class project. Teacher will use the Schoolyard Assessment Vision Statement form to write down problems with pollution, ways to use native plants to fix problems, the most important values (beauty, attracting pollinators, reducing runoff, etc), and specific planting locations. If possible, the teacher will guide the discussion so that there is consensus, otherwise a vote can be taken to determine the class project.
Elaboration	6	Students will begin researching specific native plants according to the site that is chosen, sunny, wet, etc. They will decide which plants will best suit their schoolyard. Note: See Resource Guide for suggested plant lists for different conditions.

Evaluation	7	Using what they know about watershed issues and the qualities of native plants, students will compose a proposal, in teams, to the principal/administrator requesting permission for the project. Note: Internet resources to help form argument: Pages 12-14 of the pdf. http://www.schoolgardenwizard.org/wizard/pdf/make_guide.pdf http://www.kidsgardening.org/article/research-supporting-benefits-school-gardens Note: See Resource Guide for sample letter to Buck Lodge principal.
Extension	8	Students will prepare for an oral discussion with the administrator in which they defend their decision to bring more native plants to the school yard. Students will prepare counter-arguments. Students will also create a plan for maintenance, including weeding and watering, during the school year and summers, including appropriate maintenance and administrative staff. Note: See Resource Guide for sample worksheet from Buck Lodge teacher.

Native Plant Restoration Curriculum

Lesson 3: Planting

Overview: Taking all of the information gathered in the previous sessions, students will clear the garden space of weeds and debris, test and prepare the soil, and actually plant the native plants into their garden.

Lesson Characteristics: Use the table below for lesson planning purposes:

Time Required	90 minutes, possibly over two days, depending on needs of space
Key Concepts/Terms	Weeds, energy cycle, food web, compost, producers, consumers, decomposers
Setting	Planting area on school grounds
Materials	plants, shovels, soil amendments, soil testing kits, tables, soil data sheets, clipboards, mulch, tarp for collecting weeds, gloves, watering cans, hoses

Essential Question: How can our actions impact the watershed?

Learning Objectives: Students will recognize the value of growing native plants. Students will implement a solution to protect the watershed using native plants.

Preparation: All materials need to be purchased and transported to the planting site ahead of time. Create a plan for how to dispose/compost weeds. Figure out the water source and how students will transport the water to the planting site. Make sure there are enough tools so that every student has a job during the work/exploration phase.

Procedure:

Phase	Step	Action
Engage	1	Remind students that the purpose of today's work is to fix an environmental problem. Describe what plants need to grow - sun, soil, water. Explain that weeds compete for nutrients with the desired plants, which is why we will remove them today.

Exploration	2	Take students outside and give every student a specific job. Two teams will conduct soil testing, using the soil testing kits. One team will test the garden site and one team will test a site close by, but not in the garden (control site for future reference). Show everyone how to weed and the proper use of tools. Students will clear the area of weeds, condition and turn soil, plant native plants according to their conditions and spacing and height requirements. Create labels for plants, if needed. Place mulch around plants and check for watering. Leave time for cleanup of weeds. As students make observations about found weeds, insects, fungus, etc, ask them if they are producers, consumers, decomposers, and where they fit into the food web of this habitat. Note: Use the Resource Guide's plant lists to determine appropriate order of plants (taller in the back, appropriate spacing).
Explanation	3	Ask students to make observations about the current garden status, and how plants compete for nutrients.
Elaboration	4	Ask students to show where the plants will change how water is filtered or absorbed in this watershed.
Evaluation	5	Ask students to complete the final survey and reflection. How do they feel about their schoolyard now? What other ideas do they have for future projects? How have their actions impacted the environment?
Extension	6	Students will continue to monitor the space through watering and weeding. They will problem-solve as issues come up in the garden.

Schoolyard Assessment

Date _____

School _____ **Students** _____

Team – Vegetation and Biodiversity

Do trees and bushes cover:

a. Most of the schoolyard?
b. part of the schoolyard?
c. a small part of the schoolyard or not at all?

Are there natural areas? Are there landscaped areas other than lawns? Describe them here and mark them on your Google Earth image. _____

_____

_____

What plants are already here? For each category, try to identify the types and count how many of each are present. If you cannot identify the type of tree, use the bark to see if all trees are the same or different.

	Types	How Many?
Deciduous Trees		
Evergreen Trees		
Shrubs		
Grasses		

Mark the lowest lying part of the schoolyard on the Google Earth image. Describe the vegetation in this area. Why might these plants be important when it rains?_____

_____

_____

Of the different species of vegetation you have observed, are they native? Which ones? _____

_____

_____

Are there more of one species than another? Why do you think that might be?_____

_____

_____

Are there any signs of wildlife? Write observations from today and ask if anyone remembers seeing wildlife at the school at other times. _____

_____

_____

How does your schoolyard look now? _____

_____

Start thinking, if you could change one thing about your schoolyard, what would it be? _____

_____

_____

_____

Schoolyard Assessment

Date _____

School _____ **Students** _____

Team – Traffic Patterns, Permanent Structures, and Water Flow

Using your Google Earth image, draw arrows for foot traffic, bicycle traffic, car traffic on the school property.

Outline the sidewalks.

Where do people walk (formal paths and unmarked paths)?_____

_____

How could these traffic patterns affect the location of our planting project? _____

_____

Mark the impervious surfaces on your image (areas where water cannot go through, such as a roof, sidewalk, street, or other hard areas).

When it rains, where does the water flow? Draw placement of pipes, downspouts, storm drains, sewers.

Where does rain water drain after falling in the parking lot(s)? _____

_____

Are there any rain gardens or rain barrels? Mark them on the image.

Are there ponds or streams on the property? Mark these on the image. (if yes, we will plan to do water quality testing at this site, before planting if appropriate.)

Where does this water go?_____

_____

What is carried in that water? _____

_____

How does your schoolyard look now? _____

_____

Start thinking, if you could change one thing about your schoolyard, what would it be? _____

_____

_____

Schoolyard Assessment

Date _____

School _____ **Students _____**

Team – Topography and Water Flow

Do you observe any hills, valleys, or slopes? Use arrows to show the downhill slope on your Google Earth image.

Where does water flow when it rains? Draw water on your Google Earth image.

Are there any areas that usually hold puddles? Draw the puddles on your Google Earth image.

Where does water flow? Draw placement of storm drains, sewers on your Google Earth image.

Where does this water go? Describe. _____

_____

What might be carried in that water? _____

_____

Are there signs of erosion? Bare patches of soil? Mark these on your Google Earth image.

Is there any evidence that sediment has moved? Describe. _____

_____

How does your schoolyard look now? _____

_____

Start thinking, if you could change one thing about your schoolyard, what would it be? _____

_____

_____

_____

Schoolyard Assessment

Date _____

School _____ **Students** _____

Team – Soil and Sun/Shade

Are there bare patches of soil? Signs of erosion? Where has rainwater carved out ditches or washed out vegetation? Mark these on your Google Earth image.

If there is an area of bare soil, write down the color, texture (sand/silt/clay), and moisture level.

_____

_____

Is the soil compacted (pushed down over time, made hard)? If so, how did it get this way? How would this impact plants? _____

_____

_____

Where on the school property is there sun all day? Mark this area with a sun on your Google Earth image.

Where on the school property is there shade all day? Mark this area with a cloud on your Google Earth image.

Where does it mix for sun and shade (sun moves during the day)? Mark this area by writing mix on your Google Earth image.

Why is it important to know which areas are sunny or shady before choosing plants for our project? How will it change with the seasons? _____

_____

_____

How does your schoolyard look now? _____

_____

Start thinking, if you could change one thing about your schoolyard, what would it be? _____

_____

_____

_____

Schoolyard Assessment

Date _____

School _____ **Students _____**

Team – Land Use – School/History/Local People

How do students use the land around your school now? _____

_____

How do your neighbors use the land around your school?_____

_____

What is happening on the land around the school property? _____

_____

_____

How would this affect what you choose to plant at your school? (example: neighbors walk across the field to get to a baseball field and step on the garden area) _____

_____

_____

_____

How long has this school been here? What was here before? _____

_____

_____

Do you think adding native plants will help or hurt the local community? How?_____

_____

_____

How does your schoolyard look now?_____

_____

Start thinking, if you could change one thing about your schoolyard, what would it be?_____

_____

_____

_____

Schoolyard Assessment

Date _____

School _____ **Students** _____

Vision Statement

What problems do we see with water and pollution at our school? _____

_____

_____

_____

How can we use native plants to help with any of these problems? _____

_____

_____

_____

What is most important to us in a schoolyard planting project? If there is not a consensus, vote.

____ Erosion control

____ Water quality

____ Stopping storm water runoff (keeping rain from carrying pollution to another place)

____ Bird habitat

____ Butterfly habitat

____ Growing food

____ Beautification

____ Area for resting and relaxation

____ Education activities

____ Research

Describe three possible locations on the school property where we could plant our garden and why we should plant there. _____

_____

_____

_____

_____

Bridging the Watershed

Date:

Native Plants Restoration Datasheet

Teacher:

School: Study Site:

Educators: (one per row)	Group Members: (one per row)

	Yesterday			Today		
Air Temperature	˚C			˚C		
Cloud Cover	□ Clear	□ Partly Cloudy	□ Cloudy	□ Clear	□ Partly Cloudy	□ Cloudy
Precipitation	□ None	□ Rain	□ Other	□ None	□ Rain	□ Other

Rainfall of the last month? in

Describe the location of your soil testing, using approximate measurements and descriptive words

Soil Color Soil Odor

Tree Canopy: □ Full Shade □ Partial Shade □ Sun

Sketch the study site, showing all the details that will allow someone to find this location again in 6 months or 1 year

Any observed plants in area (names of plants, or simply describe the leaves or flowers):

Soil Testing Results:

Soil (pH) Reaction:	
Nitrogen:	lb/acre
Phosphorus	lb/acre
Potash:	lb/acre

Other coments and observations of study site:

NPR Plant List – Pollinator Garden

Below are plants that will be relatively easy to obtain that are recommend for a colorful pollinator garden. Here is a link for a good resource, Pollinator-Friendly Plants for the Northeast United States <http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/nypmctn11164.pdf>, published by the USDA. If students have access, they can click on the names of the plants to see beautiful pictures and brief descriptions of growing needs as they make their choices.

Colorful Native Plants to Attract Pollinators in the MD region:

Plant	Height	Spacing
Asters	2-4’	1’
Alyssum	4-6”	6-12”
Common Milkweed	4-6’	2-3’
Butterfly Milkweed	18-24”	12”
Wild Bergamot	4’	2-3’
Dense Blazing Star	3-6’	6-12”
Lobelia	1-3’	1’
Black Eyed Susan	3’	1’

NPR Plant List - Full Sun Location

Below are plants that will be relatively easy to obtain that are recommend for a colorful pollinator garden. Here is a link for a good resource, <http://www.nrcs.usda.gov/Internet/FSE_PLANTMATERIALS/publications/nypmctn11164.pdf>

If students have access, they can click on the names of the plants to see beautiful pictures and brief descriptions of growing needs as they make their choices.

Plants	Height	Spacing
Ox Eye Sunflowers	3’	1’
Ironweed	4-6’	18”
Cowslip	8”	6”
Dense Blazing Star	3-6’	6-12”
Wild Bergamot	4’	2-3’
Joe Pye	6’	3-4’
Goldenrod	3-5’	12-18”
Viburnum Nudem	5-6’	6’
Spirea	4-6’	3-6’

NPR Plant List - Shady and Wet

Here is a good link for student exploration on rain gardens, specific to MD (page 22 has photos of suitable plants):
<https://extension.umd.edu/sites/default/files/_docs/articles/Rain_Gardens_Across_MD.pdf>

Starting on page 39 is a guide (without pictures) of other appropriate plants, by light and moisture needs. Our target area here would be best suited to plants who can tolerate sun and shade and moisture and dryness.

Some of the most recommended plants for shady and wet conditions in this area:

Plant	Height	Spacing
Spiderwort	2-4’	1’
Tall White Beardtongue	3’	12-18”
Swamp Milkweed	4’	18-36”
Blue Flag Iris	3’	1-2’

Sample Proposal Letter from Students to Administrator

A Plan to Save our World

Dear Mr.Nance,

Our class has an idea to plant a pollinator garden and we are looking for your approval. Buck Lodge middle school has the potential to enhance student learning outside of the classroom as much as it does inside. Did you know planting a garden doesn't only make things beautiful but also gives educational purposes and helps the earth. Gardens attracts pollinators and provides more oxygen to the environment making it a good place to breath in. A curriculum based school garden could be a living laboratory and an outdoor classroom for subjects across the curriculum right in our own schoolyard. In this garden students could participate in activities that increases science knowledge, sharpens math skills, spur literacy and support lessons in geography, writing, and social studies.

Our garden will be in the 200 and 300 courtyard.the 1st garden is 12.5 ft,27.5 ft the second garden is 18.75ft, 5ft. We will plant black eyed Susan's, butterfly milkweed, and blazing stars. We don't only want to plant these flowers because it's a fun and exciting experience, we want to plant these flowers because when students teachers and, or parents go out they can enjoy the view. When I went out to see the garden, I saw some plants dying and invasive plants in the garden. If we go and plant this garden we will take care of it, remove all the weeds and invasive plants, we would plant, these flower that are actually good for the environment and it's a nice view. Especially if we plant flowers that means more bees will come and more honey.

Planting a garden in our school will be productive for our students education. Students get to learn in a relaxing environment in which incline them to reach the peak of their learning.They obtain an education by learning through physically and personally experiencing the growth of an ecosystem connecting to biology in science. Also we could also envision how a tribe begins agriculture and grows it into a sustainable food supply, connecting with geography.Reading outside lets the reader interpret the plot better as the environment acts as a supporting setting.In addition, we could utilize mathematical methods in our world and derive a deeper comprrehension. There are many benefits from owning a school garden.

1.) Active learning and student engagement

2.) Give students a environmental stewardship and connection with nature

3.) Improve life skills, including working with groups and self-understanding.

4.) Improve social skills and behavior

5.) Improve environmental attitudes, especially in younger students

6.) Have a positive impact on student achievement and behavior

7.) Contributes to communication of knowledge and emotions, while developing skills that will help them be more successful in school

Not only will the garden help Buck Lodge's students but it will help in the effort to save bees. Honeybees have thrived for 50 million years, each colony 40 to 50,000 individuals coordinated in amazing harmony. But seven years ago, colonies started dying. This is not simply a problem because bees pollinate a third of the world's crops. If honeybees ever go instinct there will be a worldwide famine. When bees pollinate a dusting of pollen clings to hairs on the bee's body, where it is then transferred to the stigmas and stamens of plants. This ensures the next generation of fruits, nuts, and vegetables—not to mention the abundance of beautiful wildflowers. Without bees plants can not reproduce and without pants nothing on earth can survive. This garden will help in the effort to save bees and the effort to save the world.

Conclusively, planting a garden in our school will boost our educational absorption. All of these benefits from applying a garden where dead plants are there right now. You do not have to pay for anything, it is going to be funded by a grant from the Alice Ferguson Foundation. They will buy the plants and all the supplies that are needed.Now it's up to you will you choose to Enrich the lives of the students at buck lodge. To possibly save the world from starvation and to help an animal from going extinct. Or turn your back on the world you live in and deprive your students of an enriched education. Thank you for taking time to listen to us, if you have any question please contact us in room 202, Have a good day:).

Save the garden

Sample Worksheet for Developing a Counter-Argument

Name: _____ Date: _____

Proposal section you are working on: _____

Pretend you are the principal on the other side of the argument (against the school pollinator garden).

1. Write one point the principal may come up with that would lead him to **not support** our planting a pollinator garden.

2. How would you respond to his point you listed above?

Bridging the Watershed

Participant Reflections – ***Pre-visit***

School: _____ Date: _____/_____/_____

Grade: _____ Teacher: _____

We are looking forward to working with you on the Native Plants Restoration project. Please take a few minutes to answer some questions before we get started. You are not expected to know all of the answers now. Thank you.

At this time, I am _____ with being in an outdoor setting.

Very Comfortable Comfortable Unco…fortable

Have you ever visited a National Park? Yes No

._____willing to take ac…on towards caring for th_ environment.

Am Might be Am not

Do you know of any native plants? If so, list a few names:

_____

_____

Read the statements ***carefully*** and answer to the best of your knowledge. You are not expected to know all the answers at this time. This is a ***very important*** assessment tool for us, so take your time and do your best – by yourself.

True False	The word watershed refers to the land and small bodies of water that drain into a large body of water
True False	We all live in a watershed
True False	Human behavior (driving, recreation, farming, building) has a direct impact on watershed health
True False	Native plants require extra care because they evolved in another place.

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NPR Program Pre-Assessment

Reflection:

How does your schoolyard look now?

NPR Program Pre-Assessment

Reflection:

How does your schoolyard look now?

Bridging the Watershed

Participant Reflections – ***Post-visit***

School: _____ Date: _____/_____/_____

Grade: _____ Teacher: _____

We hope you enjoyed your experience with the Native Plants Retoration project. We have enjoyed working with you. Please take a few minutes to reflect on the past year and help us to evaluate our program. Thank you.

After this program I am _____ with being in an outdoor setting.

Very Comfortable Comfortable Uncomfortable

Will you visit a National Park again? Yes No

I_____willing to take action towards caring for the environment.

Am Might be Am not

Names of the native plants we have planted in our garden:

_____

_____

Read the statements ***carefully*** and answer to the best of your understanding based on the work and learning you did this year. This is not a test you are graded on, but it will help us determine if what we taught you is what you learned. This is a ***very important*** assessment tool for us, so take your time and do your best – by yourself.

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NPR Program Post-Assessment

Reflection:

After our planting project, how does your schoolyard look now?

When you think about your schoolyard and the work we did, how do you feel?

What other ideas do you have to improve your schoolyard?

NPR Program Post-Assessment

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