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# Noting Notable Features for Rain Gardens

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## Activity Overview

Students survey their schoolyard to begin to identify characteristics and features relevant to building a rain garden.

## Objectives

### Students will:

1. Practice observation and investigative skills
2. Survey and collect information about their school site
3. Describe interactions and details about their school site

## Subjects Covered

Science and Math

## Grades

K through 12

## Activity Time

1 hour on the school grounds, 3/4 hour discussion in the classroom

## Season

Any, Spring and Fall are best

## Materials

Clipboards, pencils (or colored pencils), Noting Notable Features field sheets, map of schoolyard showing property lines and building locations, 1 air thermometer, 1 soil thermometer, map transparency, overhead projector, and colored markers

## State Standards

### Math

Use reasoning abilities (A.4.1, A.8.1, A.12.1)

Communicate mathematical ideas (A.4.2)

Use vocabulary, symbols, notation (A.4.4)

Analyze non-routine problems (A.8.3)

## Background

Before making any decisions about locating and building a rain garden, students need to understand the characteristics of their school yard. Site analysis activities are a great way to involve students from the very beginning of the project. All of these activities can be represented on a final site analysis map. The map will help you and your students determine where to locate rain gardens and what types of rain gardens are suitable for your site. The exact form a rain garden takes can be determined by design and educational considerations as well.

The site analysis data gathered will include information about physical objects such as buildings and other structures, topography, water movement, land use, existing vegetation, slopes, traffic patterns, patterns of sun and shade, views, and other characteristics such as predominating wind patterns, wildlife, and underground utilities. Students learn about the soil on their school grounds in more depth through experiencing Earth Partnership for Schools activities “Getting to Know Your Soil for Rain Gardens” and “Infiltration Test: Exploring the Flow of Water Through Soils.”

## Pre-activity preparations

- The first step in the process is to outline the physical area of the school grounds. Many schools already have site plans showing measurements of property boundaries and buildings. If you don't have such a plan, you have an excellent opportunity for students to measure and present a site map. See Earth Partnership for Schools activity, “Mapping Your Schoolyard” in the *EPS K-12 Curriculum Guide*.
- Make a copy of an existing map showing the location of buildings, drives, and property lines. Locate north, east, south, and west on the map. Create a transparency of the schoolyard map for focused discussions after the outside portion of the activity. Make enough copies of the map and field sheets for each student or student team.
- If desired, divide the schoolyard into sections. Investigate one section at a time.

## Activity Description

**Introduction:** This activity will help you get acquainted with your schoolyard. It is the first step in understanding the natural and cultural features of your schoolyard. The data you gather will provide information to help make decisions about where to locate rain gardens on your school grounds and what type of rain gardens to build.

### Follow these steps –

1. Divide into 8 teams of 2 - 4 students. Each team is responsible for completing instructions on their assigned field sheet. A brief description of what each team will investigate follows:

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Apply proportional thinking (B.8.5)

Use coordinate systems to find map locations (C.4.4)

Analyze properties and relationships of figures (C.12.1)

Demonstrate understanding of measurable attributes and units (D.4.2)

Select & use tools to determine measurements directly (D.12.2)

### Science

Explain survival and population growth of species (F.8.9)

Find connections among living and non-living things (F.4.4)

Investigate cooperation & competition (F.12.7)

Infer changes in ecosystems (F.12.8)

### **Water Flow Team – This team will identify**

**Water Movement** – Diagram the flow of water on the school grounds. Find areas where water is standing for a period of time after a rain and areas that dry out more quickly than others. (See Earth Partnership for Schools activity, “Follow the Drop” for more information or a more in-depth investigation.)

**Downspouts and Storm Drains** – Locate downspouts where water drains from the roof. Locate storm drains where water might exit the school property.

### **Topography Plus Team – This team will identify**

**Topography** - Find high spots in the schoolyard. Determine the highest spot. Find low spots. Determine the lowest spot. Locate steep slopes, ditches, and flat areas.

**Prevailing Wind** - Determine wind direction. Winter winds are predominantly from the northwest, summer winds from the southwest.

### **Sun/Shade Team – This team will identify**

**Sun/Shade Patterns** - Map shade from trees and buildings. Shade from buildings is different than shade from vegetation because it is solid and nearly shady year-round. Shade from deciduous trees is usually dappled, and the ground under the trees may be sunny from fall to late spring. Map areas of full sun.

### **Land Surface Team – This team will identify**

**Hard (impervious) and Porous Surfaces** - Locate hard surfaces (impervious) such as parking lots and sidewalks where water runs off. Next locate porous surfaces (pervious) such as planted beds or lawn areas, where water may soak (infiltrate) into the ground.

**Soil** - Identify areas with bare soil or where you observe erosion. Determine what may be causing the erosion such as foot traffic, steep slopes, or water movement.

### **Vegetation Team – This team will identify**

**Existing Vegetation** - Locate existing vegetation on site, starting with trees and shrubs. Look for trees, shrubs, and plants that provide food (berries, nuts, or seeds) and cover for wildlife. Locate different ground covers such as lawn grass, flower beds, unmowed areas (or old fields), prairies, woodland ground covers, agricultural areas, etc.

### **Wildlife Team – This team will identify**

**Wildlife** - Identify wildlife or signs of wildlife and where you observed them on your school yard. Do any patterns emerge where you sighted wildlife?

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### **Traffic Patterns Team – This team will identify**

**Traffic Patterns** - Identify traffic patterns for cars and people in and around the school.

**Views** - Identify good and bad views from drives, walkways, and classrooms.

### **Land Use Team – This team will identify**

**Site Use** - Locate play areas, sports fields, and play equipment.

**Structures** - Indicate locations of bike racks, signs, benches, picnic tables, and fences.

**Utility features** - Locate obvious utility lines above or below ground.

2. Walk the school grounds and follow the instructions on the field sheets.
3. Return to the classroom. Teams orally present their findings and use a map transparency on an overhead to display their observations.
4. Discuss the possible locations for building a rain garden based on the class' observations. Consider the following guidelines:
  - a. **Location**
    - Near drain spouts
    - Where water collects and drains off of a hard surface
    - To catch water before it flows over a sidewalk to reduce ice forming in winter
    - Along a ditch or swale
  - b. **Sun/Shade**
    - The amount of sunlight determines plant selection. Generally, gardens in full sun are more effective.
  - c. **Wildlife**
    - Knowing what wildlife is currently living on the school grounds will inform you about the existing habitat. This way you are able to plan a rain garden that will complement or enhance wildlife habitat on your school grounds.
  - d. **Traffic Patterns**
    - Well-worn shortcuts or other traffic patterns are more easily accommodated than changed. Habits are hard to break, and people usually take the most direct route to a destination. Therefore, try not to plant a rain garden directly over an existing path.
    - Consider locating the rain garden in a visible spot for others in the community to see as an example of sustainable landscaping.
    - Locate a rain garden conveniently for classes to visit and study.

### **Extensions**

- Survey the school grounds to identify current maintenance practices such as use of fertilizers and herbicides, lawn mowing, composting, mulching, and salt use in winter. Research practices that help to improve water quality and make recommendations based on your research.
- Discuss where you see wildlife on your school ground. How does it interact with its environment? Given your observations, how could you enhance wildlife habitat at your school?

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### **Additional Resources**

- Boume, Barbara. (1990). *Taking inquiry outdoors: Reading, writing, and science beyond the classroom walls*. Portland, ME: Stenhouse Publishers.
- Ripple, Karen, Garbisch, Edgar W. (2000). *POW! The planning of wetlands*. St. Michaels, MD. Environmental Concern Inc.
- Wyzga, Marilyn. (1993). *Homes for wildlife: A planning guide for habitat enhancement on school grounds*. New Hampshire Fish and Game Department.
- Diggers hotline

### **Assessments**

- Describe your schoolyard and how it affects the flow of water during a rainfall.
- Describe a cause and effect relationship on your school grounds.
- Determine the best place to locate a rain garden on your school grounds and explain why.

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### Water Flow Team

Team Members: \_\_\_\_\_

Location: \_\_\_\_\_

1. Locate the following on your site map:

- a. Direction of water movement from high points to low spots
- b. Areas where water puddles
- c. Areas that dry out quicker than other areas
- d. Places where ice might form on sidewalks or drives
- e. Locate downspouts
- f. Locate storm drains

2. If you observe areas where water puddles, explain why the water doesn't seem to be draining. Considerations include compacted soil from traffic (foot and vehicular); heavy, clay soil; existing or previous wetland; or large quantities of water draining to the site.

3. Are there any downspouts draining directly onto pavement or other hard surfaces? Can the water be directed to a lawn area, other porous surface or rain garden? If so how?

4. Have you noticed downspouts that may release more water than others? If so, why?

5. Based on your observations, list possible locations for a rain garden. Why do you suggest these areas?

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### Topography Plus Team

Team Members: \_\_\_\_\_

Location: \_\_\_\_\_

1. Locate the following on your site map:
  - a. High spots and the highest spot
  - b. Low spots and the lowest spot
  - c. Steep slopes
  - d. Ditches or swales
  - e. Flat areas
  - f. Where winter winds blow over the school ground. Winter winds come from the northwest
  - g. Where summer winds blow over the school ground. Summer winds come from the southwest

2. Describe the topography of the school yard. Are there any hills, valleys or slopes?

3. Where are places that offer shelter from winter winds and places that may be cooler in the summer?

4. If any, are there places where snow drifts develop naturally or where snow is piled by snowplows? (These areas are a source of water during snowmelt.)

5. Based on topography, list possible locations for a rain garden. Why do you suggest these areas?

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## Sun/shade Team

Team Members: \_\_\_\_\_

Location: \_\_\_\_\_

1. Locate the following on your site map:

- a. Shade from trees
- b. Shade from buildings
- c. Areas of full sun

2. Record air and soil temperature at each site.

- a. **Shade from trees**                      Location: \_\_\_\_\_  
Air temperature: \_\_\_\_\_  
Soil temperature: \_\_\_\_\_
- b. **Shade from buildings**              Location: \_\_\_\_\_  
Air temperature: \_\_\_\_\_  
Soil temperature: \_\_\_\_\_
- c. **Full sun**                                      Location: \_\_\_\_\_  
Air temperature: \_\_\_\_\_  
Soil temperature: \_\_\_\_\_

3. Based on your measurements, what conclusions can you make about temperature variation in different sun/shade conditions?

4. If a sunny spot is desirable for a rain garden, where would you locate it and why?

5. If you decide to locate a rain garden in a shady spot, where would you choose? Consider that the garden needs some sun and, therefore, cannot be in shade all day long.

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## Noting Notable Features for Rain Gardens (cont.)

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### Land Surface Team

Team Members: \_\_\_\_\_

Location: \_\_\_\_\_

1. Locate the following on your site map:
  - a. Hard (impervious) surfaces such as driveways, sidewalks, and parking areas (water cannot soak in and runs off)
  - b. Porous (pervious) surfaces such as planted beds, lawn or natural areas (water soaks in)
  - c. Locate areas of bare soil or where you observe erosion or gullies.

2. Do you observe spots where water flows off hard surfaces and collects? (These are potential sites for rain gardens.) Describe the location and mark it on your map.

3. If you observed bare or eroded soil, determine what may be causing it such as traffic (foot or vehicular), steep slopes, water or other cause.

4. Rate the quality of pervious surfaces on the school ground from 1 to 5 with one being the best. Natural areas allow most of the water to soak into the ground and lawn allows the least. Provide a rationale for the rate you assigned the school ground as a whole.

5. Based on the rating you gave above, how could you increase infiltration on the school ground?

6. Name 2 or 3 locations for possible rain gardens. Why did you choose these spots?

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### Vegetation Team

Team Members: \_\_\_\_\_

Location: \_\_\_\_\_

1. Locate the following on your site map:

- a. Trees
- b. Shrubs (areas of shrubs not individual shrubs)
- c. Different ground covers such as lawn, flower beds, unmowed areas, natural areas such as prairie or woodland.

2. Identify trees, shrubs and plants that provide fruit, nuts or nectar for wildlife. What kinds of wildlife food do you observe?

3. Does any of the vegetation provide cover for wildlife? If so, what types of cover?

4. Identify plantings that are pleasant to be around. Why do these places feel good to you?

5. Based on your observations, where are possible locations for a rain garden that are near a pleasant spot to sit or gather as a class and/or would enhance habitat for wildlife?

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### Wildlife Team

Team Members: \_\_\_\_\_

Location: \_\_\_\_\_

1. Locate the following on your site map:
  - a. Locations where you observe wildlife
  - b. Indicate the type of wildlife observed
  - c. Signs of wildlife use such as chewed leaves, holes in trees, holes in the ground, ant mounds, etc.

2. Describe what each animal is doing that you see.

3. Consider habitat needs for wildlife—space, water, food, shelter—how well does your school ground provide for these needs?

4. Based on your observations, what would you recommend to improve the habitat?

5. Are there any places on the school ground that are well suited for locating a rain garden as well as providing habitat? Where are they?

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### Traffic Patterns Team

Team Members: \_\_\_\_\_

Location: \_\_\_\_\_

<p>1. Locate the following on your site map:</p> <ul style="list-style-type: none"><li>a. Driveways and parking areas with direction of traffic flow</li><li>b. Sidewalks</li><li>c. Pathways (watch where people walk and/or look for signs of pathways such as well-worn trails and shortcuts)</li><li>d. Where people enter or exit the school ground</li><li>e. Good views as a pedestrian or passenger in a car</li><li>f. Bad views as a pedestrian or passenger in a car</li></ul>
<p>2. Describe any things of interest or concern as you analyze the traffic patterns on your site.</p>
<p>3. How well are the needs of walkers and bike riders met on the school ground?</p>
<p>4. How would you change traffic patterns for reasons of safety or to improve movement in and around the school ground?</p>
<p>5. Where would you locate a rain garden when considering views and access to the garden for students and people interested in learning about rain gardens?</p>

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## Noting Notable Features for Rain Gardens (cont.)

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### Land Use Team

Team Members: \_\_\_\_\_

Location: \_\_\_\_\_

1. Locate the following on your site map:

- a. Play areas
- b. Sports fields
- c. Play equipment
- d. Bike racks
- e. Benches and picnic tables
- f. Fences
- g. Obvious utility lines above or below ground

2. Is there anything missing on the school ground that you would like to add? If so, explain.

3. How do the adjoining neighbors use their land?

4. Based on your observations, where could you locate rain gardens that would not conflict with existing uses? What would you describe as potential conflicts?

5. Based on your observations, where could you locate rain gardens to complement existing uses? Why would these locations enhance the space?