Project Learning Tree®

# School Site Investigation

PLT GreenSchools

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Third Edition


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# What Will You Do?

**In the School Site Investigation you will:**

- ✔ **Observe and record the plant and wildlife species around the school, as well as natural habitats.**
- ✔ **Assess gardening and composting possibilities on the school grounds.**
- ✔ **Investigate the presence, health, value, and benefits of trees.**
- ✔ **Learn how the school grounds are maintained and if sustainable practices are being used.**
- ✔ **Assess the percentage of pervious and impervious areas on the school site.**
- ✔ **Determine whether changes to the school site would encourage the use of outdoor spaces for classes, lunch time, studying, and physical activity.**
- ✔ **Develop an understanding of how individual and collective student actions can improve the school site.**
- ✔ **Develop plans for improving the school site.**
- ✔ **Implement one or more school site improvement strategies.**

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# Directions
## FOR GREEN TEAM MEMBERS

### ❑ Gather Documents and Supplies.

If possible, gather the following documents and supplies before the team begins the Investigation:

- Regular tape measure (25 feet or more); if available, a forestry diameter tape measure
- Tree-flagging tape
- Field guides to local birds, flowers, shrubs, trees, and wildlife
- Clipboards, pencils, and calculators
- A map and aerial photographs of the school site

### ❑ Review and Conduct the Investigation.

Review the School Site Investigation to determine if the questions are appropriate for your school. Also determine if there are additional questions that you'd like to add.

Provide a printed copy of the entire School Site Investigation to the Green Team members to use as they conduct the investigation. They should answer the questions to the best of their ability according to the time allotted and materials available.

### ❑ Develop and Implement an Action Plan.

Using the data collected from the Investigation, prioritize your ideas for action projects and implement one or more of these plans. You can apply for a PLT GreenWorks! grant to help fund your action projects. Find out more at www.plt.org/greenschools.

### ❑ Celebrate Success.

Communicate your findings and achievements with other students, school administrators, and the community. For suggestions on how to share your achievements, see the Celebrate Success tip sheet available on page 11 of the Adult Leader Guide.

### ❑ Apply for GreenSchools Certification.

Once you have completed all five PLT GreenSchools Investigations and taken action in at least one area, you can be recognized for your hard work and achievements through this national certification program. Certified schools are eligible for great recognition items, such as buffs and wristbands for students, weatherproof signs and banners for the school grounds, and more! You can view the certification requirements at https://www.plt.org/green-schools/certification-requirements.


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# Why Investigate School Site?

Although most learning takes place inside the school, the grounds that surround the school building can have an important impact on student health and learning. Well-maintained, landscaped grounds can provide many benefits to students including a place to read, relax, and feel connected with nature. Outdoor areas can also be used to conduct experiments, plant a garden, or play sports. In addition, outdoor areas around a school can provide many environmental benefits and **ecosystem services**. For example, having trees around a school can improve the quality of the air that students breathe.

**Definitions for the words in bold text can be found in the Glossary on page 9.**

As you complete the School Site Investigation, you'll note the types of outdoor spaces found around your school. The information that follows on outdoor school sites, school gardens, schoolyard habitats and outdoor classrooms may be useful as you complete the Investigation. It may also give you ideas of ways to improve your school grounds.

## Outdoor School Sites

Outdoor school environments are important because they are potentially one of the few designated areas for outdoor physical activity for many students. They are also important because they provide a place for outdoor education. Numerous studies have show that environmental education boosts science scores. In September 2009, students from Bicentennial Elementary in New Hampshire showed significant fourth grade science score improvement as a result of the PLT GreenSchool program they instituted there in 2008 (Source: www.plt.org/story/green-teams-keep-students-engaged.)

Outdoor school sites can be used for a variety of educational and physical activities. A few examples include:

- Outdoor classroom
- Weather station
- Vegetable or butterfly garden
- Place to study local plant and animal species
- Space for lunch, reading, and studying
- Place for physical education classes and outdoor recreation


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# Why Investigate School Site?

## School Gardens

School gardens can serve as educational tools to help you see real-world applications of science, technology, engineering, and math (STEM). A few of the skills that you can learn through gardening include analyzing data, charting, classifying, collecting data, measuring, and reporting. Science lessons in a garden might cover ecosystems, life cycles, organisms, soil, and weather. Gardens also teach a vital lesson about human dependence on nature. Finally, gardening can be a fun, enjoyable physical activity.

Gardening projects can range from simple, indoor herb gardens to extensive, outdoor vegetable gardens. Here are some popular school garden themes:

- Bird garden: Grow plants that provide food and shelter for birds.
- Flower garden: Harvest flowers to brighten the indoor school environment or to deliver to hospitals, nursing homes, and so forth.
- Herb garden: Grow a variety of herbs that can be used for sensory activities.
- History garden: Plant seeds for crops that Native Americans or early settlers may have used.
- Phenology garden: Monitor the garden throughout the year to observe seasonal changes and their effect on when certain plants sprout, when flowers bloom, when insects appear, and so forth.
- Pizza garden: Grow vegetables that can be used as pizza toppings.
- Pollinator garden: Plant native plants that attract butterflies and other pollinators.
- Rain garden: Select plants and design landscaping to prevent runoff.
- Reading garden: Add benches, large boulders, and other seats so students can read in the garden.

Many organizations provide support, supplies, and financial resources for garden projects. For information on a variety of organizations that support gardening, go to the online Resources for this Investigation at www.plt.org/resources/resources-for-plt-lessons.

## Schoolyard Habitats and Outdoor Classrooms

Schoolyard habitats and outdoor classrooms provide a place where you can investigate the plants and animals that live in your area. School grounds also provide an ideal place to study seasonal changes, such as when flowers bloom, when birds migrate, and when leaves change colors. The data collected can be contributed to a variety of citizen scientist programs, including the Smithsonian Tree Banding Project, Project Budburst, Project Feederwatch, and FrogWatch USA. In addition, the U.S. Fish and Wildlife Service has developed a "Schoolyard Habitat Project Guide" that is useful when planning wildlife habitats and outdoor classrooms. You can find out more about each of these in the online Resources section for this Investigation at www.plt.org/resources/resources-for-plt-lessons.


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# Why Investigate School Site?

## Benefits of Trees

As part of this School Site Investigation, you will assess the number of trees on the school grounds, the health and value of those trees, and the amount of tree canopy cover. The following information on the benefits of trees explains why it is so important to maintain and increase the number of trees on school properties.

Trees provide many aesthetic values and social benefits. They attract birds and other wildlife, provide habitats for animals, reduce pollution, and make the world a more pleasant place. Their shade reduces energy costs. The very presence of trees translates into a less-stressed physical environment that ultimately promotes better learning.

Scientists are discovering the importance of trees in helping to maintain the global environment. Trees act as carbon sinks, absorbing carbon dioxide from the atmosphere. In the United States, forests capture from 10 to 20% of U.S. carbon emissions each year. (Source https://www.fs.usda.gov/ccrc/topics/forests-carbon)

Here are some of the many other ecosystem services that trees provide to benefit humans and wildlife:

- Improving water quality by slowing the flow of runoff water, which helps to keep pollution out of streams, rivers, and lakes
- Providing shade along waterways to maintain the proper water temperature for fish and other aquatic life
- Reducing soil erosion
- Sequestering carbon, which helps offset the greenhouse effect
- Absorbing various air pollutants
- Filtering and trapping smoke, dust, and ash, thereby making the air cleaner
- Providing habitat for wildlife

Trees also provide many economic benefits:

- Serving as windbreaks, which can lower heating bills in the winter (some estimates have shown a 25 percent reduction in energy consumption in winter months)
- Providing shade that lowers air conditioning bills in the summer
- Absorbing water, which helps to prevent flooding
- Increasing property aesthetics and values


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# Why Investigate School Site?

## Native, Nonnative, and Invasive Plant Species

After you complete the School Site Investigation, one of your action projects may be to increase the diversity of plant species on the property. Before planting anything new on your school site, try to select **native species** whenever possible. Native plants occur naturally in your local area and are adapted to the local environment, so they typically do not need fertilizing or watering (except during establishment). They are also resistant to insects and disease because they co-evolved with the pest species in the area.

**Nonnative species** have been introduced or moved by human activities into an area where they do not naturally occur. A nonnative species is not necessarily harmful, and in fact, many nonnative species (e.g., apple trees) are beneficial. However, when a nonnative species overruns or outcompetes native species and causes ecological or economic problems, it is called an **invasive species**.

## Pervious and Impervious Areas

Part of the School Site Investigation involves calculating the percentage of pervious and impervious areas around the school site. **Pervious** areas allow rainwater to percolate through the earth's surface. Examples include grassy areas, natural-surface athletic fields, playgrounds with a wood chip surface, and green spaces. Pervious areas replenish the groundwater table and reduce storm runoff.

Examples of **impervious** areas include asphalt, concrete, paved courtyards, paved driveways, parking lots, and sidewalks. According to the U.S. Environmental Protection Agency (EPA), impervious surfaces have a variety of negative impacts on local watersheds and significantly alter the water cycle. (Source: http://water.epa.gov/action/weatherchannel/stormwater.cfm)

Here are some specific negative impacts of impervious surfaces:

- Impervious areas increase the rate and volume of stormwater runoff, which contributes to flooding and erosion along streams and rivers.
- As stormwater runoff flows over impervious areas, the temperature of the water increases. When the warmed water flows into streams, it increases the stream temperature. Warmer waters hold less dissolved oxygen, which negatively affects aquatic life.
- Pollutants and sediment carried from impervious surfaces into nearby aquatic environments reduce water quality and impair the health of fish.
- Runoff damages fish habitats and spawning grounds.


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# Why Investigate School Site?

Because stream degradation can occur when as little as 10–20 percent of the area around the stream is impervious, it is useful to assess the percentage of impervious area on school grounds. To increase infiltration and reduce excess stormwater runoff, Green Teams can implement a variety of simple strategies, such as:

- designing green roofs to absorb rain and reduce runoff,
- planting a rain garden (a planted depression that absorbs runoff and allows it to filter back into the groundwater),
- planting trees and shrubs around the school, and
- using rain barrels to capture rainwater for release when and where the water is needed.

More intensive strategies include installing permeable pavement, planting a wide buffer zone of native vegetation around parking lots to absorb runoff before it reaches natural habitats, and creating an infiltration basin (a vegetated depression similar to a rain garden but located specifically to catch runoff from parking lots and other impermeable surfaces).

## Students Making a Difference

Individual and collective student actions can improve the grounds around your school, creating outdoor spaces that benefit both students and wildlife.

In addition, you can apply what you've learned to improve the environment around your home. For useful tips, see Green Your Home: Improving Outdoor Spaces found at the end of this Investigation. You can also download it at www.plt.org/activities-for-families/around-your-home/.

## PLT GreenSchool Videos

To learn more about improving school grounds and to see how other GreenSchools across the country are taking action, watch PLT's short videos **Investigating School Site** and **GreenSchools in Action: School Site.** These videos are available on PLT's YouTube channel: https://www.youtube.com/user/ProjectLearningTree.


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# Careers

There are many careers related to the design and maintenance of school grounds. Here are a few of the fields that you may discover as you conduct the investigation:

- Arborist
- Cartographer
- Gardener
- Environmental Health and Safety Technician
- Environmental Scientist
- Forester
- Grounds Maintenance Staff
- Hydrologist
- Integrated Pest Management Specialist
- Irrigation Engineer
- Landscape Design and Architecture
- Surveyor
- Wildlife Biologist

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# Glossary

**Ecosystem services**—the services that humans derive from environmental functions, such as oxygen production, photosynthesis, and water purification.

**Green space**—any area that is mainly covered with grass or other vegetation.

**Habitat**—an area that provides animals or plants with adequate food, water, shelter, and living space in a suitable arrangement.

**Impervious surface**—any surface that does not allow rainwater to soak into the soil, such as asphalt, concrete, a paved courtyard, a parking lot, or a sidewalk.

**Integrated Pest Management (IPM)**—a sustainable approach to managing pests that combines biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks.

**Invasive species**—a plant, animal, or other organism that is not native to a particular ecosystem and whose introduction causes (or is likely to cause) harm to the economy, the environment, or human health.

**Native species**—a species that occurs naturally in an area or habitat.

**Nonnative species**—a species that has been introduced by human action, either intentionally or by accident, into areas outside its natural range.

**Pervious surface**—any surface that allows rainwater to soak into the soil, such as a lawn, meadow, forest, playground with a wood chip surface, or other green space.

**Wildlife**—animals that are not domesticated and are living in their natural habitat.


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# PART I: SCHOOL INFORMATION

## Overview

Through this investigation, you will assess your school grounds on the basis of various criteria. The results will help you determine if there are ways to improve the school site to make it a more sustainable, healthier, and safer environment.

**School Name:** _____ **Date:** _____

**GREEN TEAM:**

*(Please include administrators, teachers, school staff, students, community members, parents, and others involved in this investigation.)*

| NAME | TITLE/ROLE |
|---|---|
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### SCHOOL POPULATION

Students: _____ Staff: _____


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# PART II: SCHOOL SITE MAP

1. Look for existing maps, aerial photographs, or blueprints of the school site to answer the questions that follow. If you don't have access to an existing map, you can generate a map using Google Maps or other map websites. The map of your school grounds will be useful as you complete the Investigation.

   a. What is the total size of the site, including buildings and all outdoor areas? *(Look for scales on maps to calculate the size of the site.)*

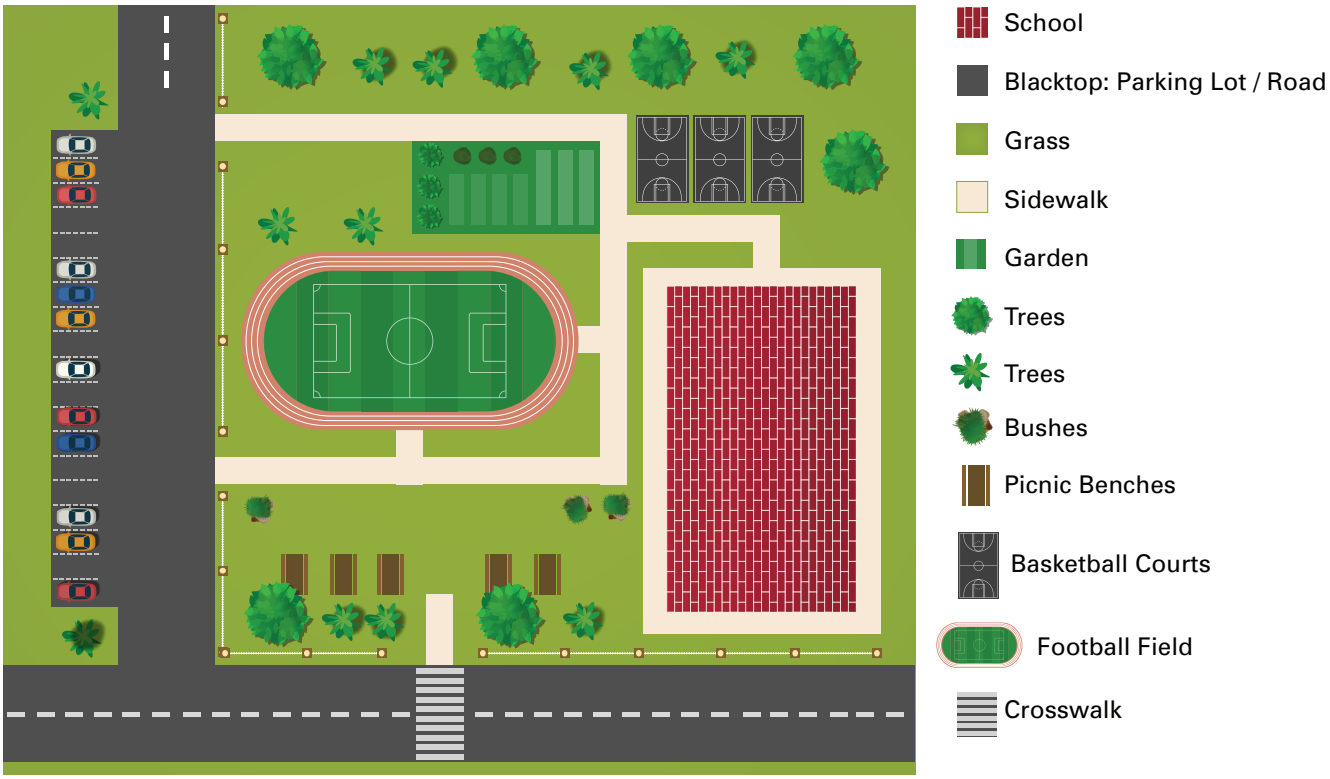
   _____

   _____

   b. Does the site include an outdoor classroom for use with class instruction or community education programs? . . . . . ☐ Yes ☐ No

   c. Does the site include a natural area, garden, or other green space for nature observation and outdoor discovery? . . . . . ☐ Yes ☐ No

## Sample School Map (not to scale)





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# PART III. PERVIOUS AND IMPERVIOUS AREAS

1. Walk around your school site and mark the pervious and impervious areas of the school grounds on your map. **Pervious** surfaces allow rainwater to soak into the ground and include lawns, meadows, gardens, forests, and other green spaces. **Impervious** surfaces don't allow rainwater to soak into the ground and include asphalt, concrete, paved courtyards, parking lots, and sidewalks.

**Definitions for the words in bold text can be found in the School Site Investigation Glossary on page 9.**

List the pervious areas and their approximate size:

Area: _____ Size:_____

Area: _____ Size:_____

Area: _____ Size:_____

Area: _____ Size:_____

Area: _____ Size:_____

Area: _____ Size:_____

List the impervious areas and their approximate size:

Area: _____ Size:_____

Area: _____ Size:_____

Area: _____ Size:_____

Area: _____ Size:_____

Area: _____ Size:_____

Area: _____ Size:_____

Approximately what percentage of your school site is pervious? _____%

Approximately what percentage of your school site is impervious? _____%

2. Why do you think it is important to have as much pervious area as possible?

_____

_____

3. Brainstorm and then record a list of ways that the amount of pervious area on the school site could be increased.


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# PART IV. OUTDOOR SPACE ASSESSMENT

1. What types of outdoor areas are found on your site that are not covered with grass or other vegetation? (Check all that apply.)

☐ Basketball/blacktop sports area ☐ Parking lot ☐ Wood-chipped area
☐ Tennis court ☐ Gravel ☐ Permeable pavement
☐ Track ☐ Paved trail
☐ Other(s):_____

2. What types of green spaces are found on your site? (A green space is any area that is mainly covered with grass or other vegetation. Check all that apply.)

☐ Lawn ☐ Wildlife observation area ☐ Wetland area
☐ Nature area ☐ Field ☐ Forest
☐ Garden ☐ Outdoor classroom
☐ Other:_____

3. What types of vegetation are found in the green spaces? (Check all that apply.)

☐ Mowed grass ☐ Tall grass ☐ Trees
☐ Flowering plants ☐ Shrubs ☐ Garden plants
☐ Other:_____

4. What types of animals are found on your site? (Check all that apply.)

☐ Birds ☐ Small mammals:_____
☐ Insects ☐ Large mammals:_____
☐ Earthworms ☐ Amphibians (e.g., frogs, toads, salamanders)
☐ Snails ☐ Reptiles (e.g., turtles, snakes, lizards)
☐ Other:_____

5. Is a log kept of the plants and animals observed on the school grounds?
(See page 16 for a chart that can be used to record plant and animal observations.)

☐ Yes ☐ No

6. What types of activities take place in the outdoor spaces?

☐ Instruction ☐ Gardening ☐ Sports/games
☐ Meetings ☐ Observing wildlife ☐ Art
☐ Studying ☐ Eating/relaxation ☐ Music/dance
☐ Other: _____

7. Which of the following items are found in the outdoor spaces?

☐ Benches/chairs ☐ Houses for animals (e.g., bird, bat)
☐ Bird feeders ☐ Water feature
☐ Tables
☐ Other: _____


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8. If your site includes a garden, please answer the following questions:

   a. What type of garden(s) is on the site?

   ☐ Butterfly ☐ Rain ☐ Flower
   ☐ Vegetable ☐ Fruit ☐ Raised Bed
   ☐ Rooftop ☐ Pollinator ☐ Reflective
   ☐ Herb ☐ Container garden ☐ Wildlife
   ☐ Theme: _____(e.g., cultural, pizza, historical)
   ☐ Other:_____

   b. How are harvested items from the garden used?

   ☐ Used in classes ☐ Given to cafeteria for use in lunches
   ☐ Donated to local food pantry ☐ Sold to school and community members
   ☐ Other: _____

   c. Who maintains the garden(s)? (Provide a brief description.)

   _____

9. Are the trees, flowers, and other plants in the green spaces native to your area?
   (See the Green Team Guide for information about Native, Nonnative, and Invasive Plant Species.)
   ☐ Yes ☐ No ☐ Some

10. List any other types of habitats or outdoor spaces found on your site that have not been addressed in the previous sections.

    _____

    a. What types of plants and wildlife are found in these habitats that are different from the ones previously listed?

    _____

    b. What types of facilities have been placed in these areas to make them better for teaching or exploring? (e.g., nature trails, decks, signs)

    _____

11. Brainstorm and record a list of recommendations for ways the school site could be improved. Think about how to make the outdoor areas better for outdoor education, outdoor activities, gardening, instructional use, safety, pollution control, runoff reduction, wildlife, and biodiversity. (You can use the School Site Assessment Chart that follows as a way to consolidate the information you gathered.)



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## SCHOOL SITE ASSESSMENT CHART

Directions: Using the data that you collected, fill in this chart to create an overview of your school site. In the first column, list each of the outdoor spaces on your school site. See the sample line provided.

| Type of outdoor space | Use (for example, instructional, sports, meetings) | Who uses the space? (e.g., teachers, students, community members) | Ideas for improvement |
|---|---|---|---|
| *Sample: Courtyard with tables and chairs* | *Science, art, and English classes* | *Teachers and students* | *Add bird feeders and native plants that attract butterflies and birds; add more tables and chairs* |
| | | | |
| | | | |
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## PLANT AND ANIMAL OBSERVATIONS CHART

Directions: Use this chart to record signs and sightings of wildlife, emergence of flowers, birds nesting, leaves changing, and other evidence of plants and animals responding to the seasons on the school grounds. The chart will provide a record of events in nature. It will also provide baseline data so that as you make improvements, you will be able to determine whether more diverse species are inhabiting the school grounds. Make multiple copies of the chart so data can be collected throughout the year. Note whether each species is native, nonnative, or invasive.

Date:_____ Weather:_____ Location:_____

| | Name of Species and Number Observed | Interesting Observations |
|---|---|---|
| **Mammals** | | |
| **Birds** | | |
| **Reptiles** | | |
| **Amphibians** | | |
| **Insects** | | |
| **Flowers** | | |
| **Trees** | | |
| **Others** | | |


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# PART V. GROUNDS MAINTENANCE

1. Does your school have a landscape management or natural resources plan for the grounds? . . . . . ☐ Yes ☐ No

2. Are grass clippings left on the green areas to retain moisture and reduce the need for watering? . . . . . ☐ Yes ☐ No
   If no, what happens to them?

   _____

3. What is done with leaves in the fall?
   ☐ Left on lawns to decompose
   ☐ Left on lawns but mowed to break up the leaves into smaller pieces
   ☐ Removed for composting
   ☐ Removed for use on garden beds
   ☐ Other: _____

4. Does your school have an Integrated Pest Management (IPM) Plan? (IPM is a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks. For example, an IPM plan to reduce mosquitoes might be first to eliminate stagnant water because mosquitoes lay their eggs in standing water. A chemical method, such as spraying an insecticide, may be used next if the physical method was not effective.) . . . . . ☐ Yes ☐ No

5. Are pesticides used on green areas? . . . . . ☐ Yes ☐ No

6. Are chemical fertilizers used on green areas? . . . . . ☐ Yes ☐ No

7. What community partners in your region support gardening, tree planting, or natural area development?

   _____

8. Brainstorm and record a list of recommendations for ways the grounds maintenance could be improved.


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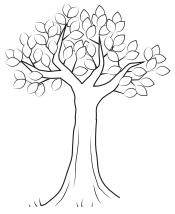
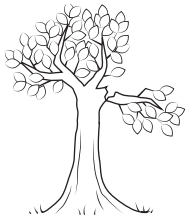
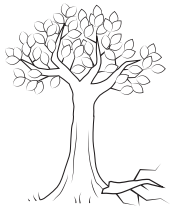
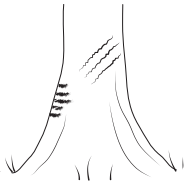
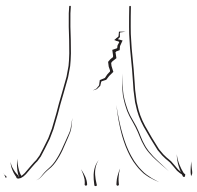
# PART VI. TREE ASSESSMENT

This section of the School Site Survey will help you determine the health and value of the trees on your school grounds.

## 1. Tree Health

Complete the Tree Health Chart and the questions that follow. Depending on the number of trees on the property, you can assess every tree or take a representative sample. To make it easy to keep track of the trees that will be assessed, tie tree-flagging around each tree and mark it with a number.

**TREE HEALTH CHART**

| Write the number of each tree in each row if it matches the description | Sign | Example | Information |
|---|---|---|---|
| | Healthy tree, no signs of disease or damage |  | |
| | Broken branches caught in tree or hanging down |  | Common causes include damage from strong winds, heavy snowfall, and ice. Large broken branches hanging in the tree should be removed to prevent them from falling on people and buildings. |
| | Broken branches on ground |  | Common causes include damage from strong winds, heavy snowfall, and ice. |
| | Damaged trunk |  | Trunks may be damaged by lawn mowers or cars. Large animals can also make deep scratches in trunks. |
| | Branch stubs | | Branch stubs should be trimmed so the tree can heal. |
| | Cracked trunk |  | Common causes are damage from lightning or frost. Small cracks are usually not serious, but they do provide an opening where disease organisms can enter. |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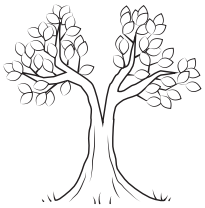
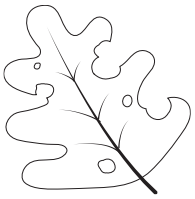
| TREE HEALTH CHART (CONT.) | | | |
|---|---|---|---|
| Write the number of each tree in each row if it matches the description | Sign | Example | Information |
| | Split trunk |  | Trees with split trunks may fail during a storm. |
| | Tree leaning | | Leaning is often caused by root failure due to roots that are restricted and cannot grow. This unequal support system may cause the tree to fall over during storms. |
| | Vandalism | | Carving into bark creates a wound on the tree where disease organisms can enter. This can compromise a tree and cause it to die. |
| | Tree broken off | | If the tree has a rotten inner core, a storm can cause the tree to break. |
| | Problems with staking | | Stakes that are not straight will cause the tree to lean. |
| | Leaves full of holes or missing |  | A common cause is insects feeding on the leaves. The tree is considered unhealthy if 10% or more of the leaves are damaged. |
| | Leaves deformed | | Common causes include drought, insects, fungi, and herbicides. The tree is considered unhealthy if 10% or more of the leaves are damaged. |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| TREE HEALTH CHART (CONT.) | | | |
|---|---|---|---|
| Write the number of each tree in each row if it matches the description | Sign | Example | Information |
| | Rotten spots on trunk | | These spots often develop when fungi and bacteria get into trees from cracks and wounds. |
| | Dead tree | | Trees may die after showing any of the above signs of disease and damage. Consult an arborist to determine if a tree is dead, dying, or a hazard. |

a. Total number of trees showing signs of disease or damage_____

b. Total number of trees that are healthy_____

c. Percentage of trees that are diseased or damaged:_____

## 2. Tree Value

You can easily assess the value of trees using i-Tree, a US Forest Service tool that provides tree benefit assessments. Depending on the number of trees on the property, you can assess every tree or take a representative sample. Be sure to include trees of varying sizes.

You will need the following supplies: Field guides for local trees, tape measures, pencils, and calculators. Make as many copies of the Tree Value Chart that follows as needed.

Then go to itreelearn.org and follow the the prompts to determine the dollar value and other benefits identified below on the Tree Value Chart. You will need the following information for each tree you will assess:

- Tree species
- Tree diameter or circumference at 4.5 feet above the ground
- Year your building was built
- Tree condition (can be used from the chart above)
- Tree sunlight exposure

You may want to show students these video tutorials:

- How to Calculate Tree Benefits, https://www.plt.org/i-tree/how-to-calculate-tree-benefits/video
- How to Calculate DBH, https://www.plt.org/i-tree/how-to-calculate-dbh/video

Also check out PLT's Teaching with i-Tree Unit that includes three activities that help middle and high school students discover and analyze the many ecosystem services that trees provide. Go to www.plt.org/curriculum/teaching-with-itree.


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| TREE VALUE CHART | | | | |
|---|---|---|---|---|
| Tree Name | Circumference at 4.5 feet above the ground | Calculated diameter (D = circumference/3.14) | Dollar value per year | Benefits (Stormwater, Energy, Air Quality, and $CO_2$) |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
| | | | | |
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| | | | | |
| | | | | |
| | | | | |

a. Total value of the trees on the school site for the year: $_____

b. Major benefits the trees provide:


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## 3. Tree Canopy Cover

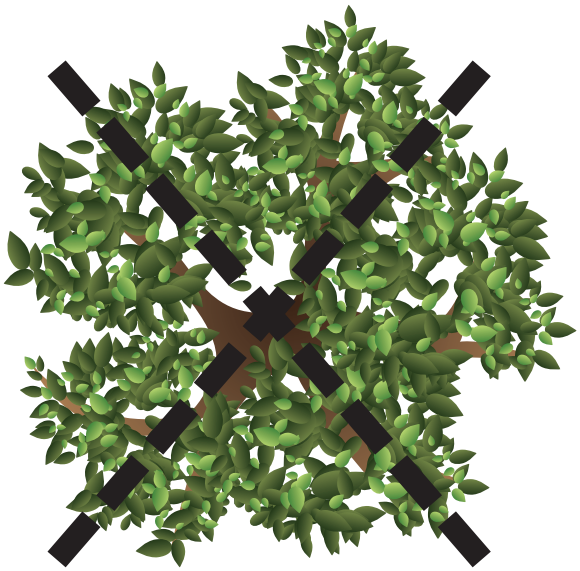
Tree canopy cover is defined as the area of ground shaded by plant foliage. In other words, tree canopy is the layer of leaves, branches, and stems of trees that cover the ground when viewed from above.

Because of the environmental and economic benefits of trees, many urban communities and schools are planting trees to increase the percentage of tree canopy. Once you know the percentage of tree canopy cover for your school site, you can set a goal to increase the amount. Many urban areas are setting goals of at least 40 percent tree canopy cover in areas east of the Mississippi and in the Pacific Northwest. Tree canopy goals should include a plan to maintain healthy trees.

Choose one of the following two methods and follow the steps to answer the following question:
What percentage of the school site is covered with tree canopy? _____

_____ **Method A: Individual Tree Canopy Cover Measurements**

The percentage of tree canopy cover on the school grounds can be estimated by calculating the area of each tree's canopy. This method works best for schools that have only a few trees on the property.



First, measure the canopy diameter. You can put sticks in the ground at the farthest points of canopy cover and then run string between the two points. The length of the string is the diameter. Then take a second diameter at a right angle to the first.

Find the average diameter and then calculate the radius.

The tree canopy area can be calculated using the formula for the area of an ellipse:

**Area = π x radius 1 x radius 2**

where π = 3.14, radius 1 is half of diameter 1, and radius 2 is half of diameter 2.

If the tree canopy is a circle (both diameters are the same), you can use a single diameter and apply the formula for the area of a circle:

**Area = π × radius 2**

The total area covered by tree canopy can be divided by the total area of the school site to obtain the percentage of canopy cover. This works best for areas with no overlapping tree canopies.

Combined area of all tree canopies ÷ Total area of school site = % of school site covered by tree canopy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### Method B: Aerial Photography Dot Grid

An easy and relatively fast method for determining the percentage of tree canopy cover on your school grounds is to use the dot grid method. This method is useful for schools that have many trees on the property. You will need an aerial photograph of the school grounds. Check with your school office to see if someone in your building has one. The photograph should be of the school site when the trees are in full foliage.

A good source for free, printable aerial maps is google maps. Another source is Terraserver, at www.terraserver.com. Terraserver provides free online access to U.S. Geological Survey digital aerial photographs; however, there is a fee to print the photos.

Once you have a printed color aerial photograph, mark the school boundaries on it. Then make a transparency of the **100 Dot Grid** or **400 Dot Grid**. You may need to reduce or enlarge the dot grid to fit your photograph. The tree canopy cover can be estimated by counting the number of dots that fall on tree crowns compared with the total number of dots in the area sampled.

The percentage of tree canopy cover can then be calculated using the following formula:

$$100 \times \frac{\text{dots falling on tree canopy}}{\text{total number of dots in sample area}} = \%\ \text{canopy cover}$$

*Notes:*

- The reliability of the canopy cover estimate will increase as the dot density increases on the grid. Use the **400 Dot Grid** if you want greater accuracy.
- If historical photos are available, you can look at tree canopy cover changes over time.
- You can also use the i-Tree canopy tool to determine the percentage of tree canopy cover on school grounds. Go to www.itreetools.org/canopy/index.php to learn more.


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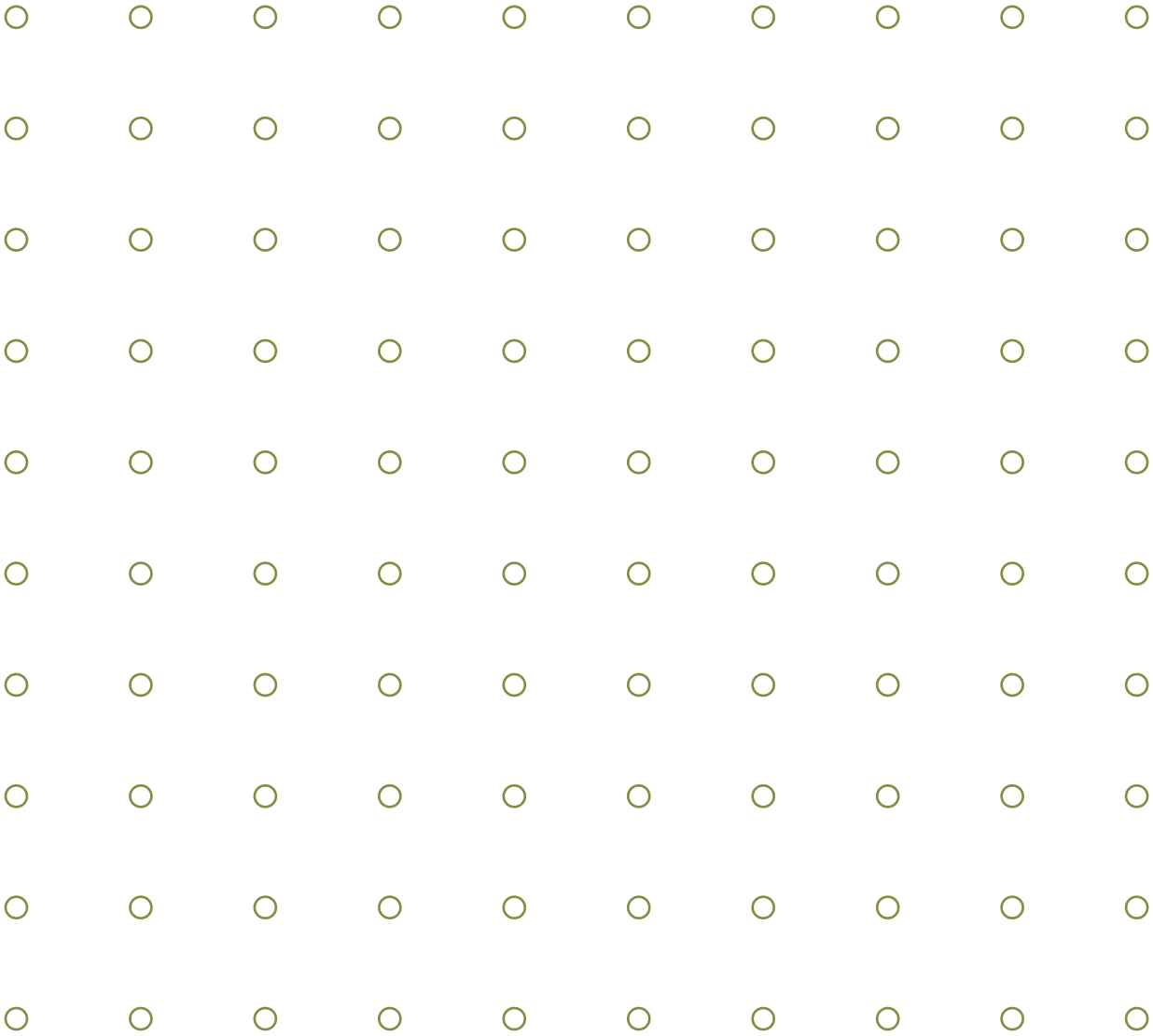
## 100 Dot Grid

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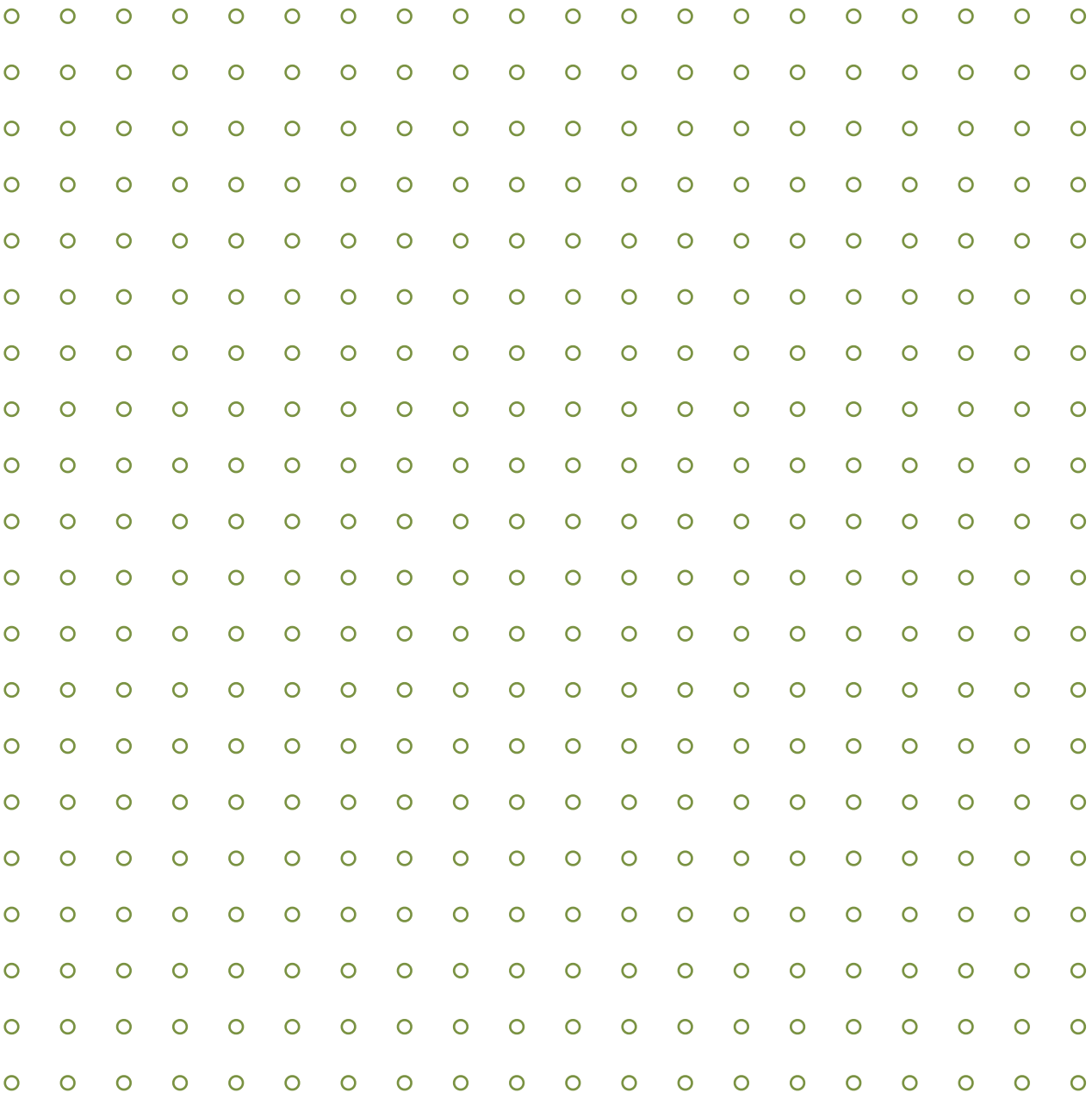
## 400 Dot Grid

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## 4. Tree Assessment: Analysis and Recommendations

1. Would your school site benefit from more trees? . . . . . ☐ Yes ☐ No
   Explain.

   _____

2. Research and list the organizations that support tree planting in your community. (Types of organizations that support tree planting include the Arbor Day Foundation, Tree City USA, Association for Community Trees, Fruit Tree Planting Foundation, State Division of Forestry, and Local Extension Agents. Your local community may have other community groups that can be of assistance, like a tree and beautification committee.)

   _____

   _____

3. Brainstorm and then record a list of ways to improve the number and health of the trees on your school grounds. Indicate on your map where additional trees might be planted.


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# PART VII. EDUCATION, TRAINING, AND COMMUNITY CONNECTIONS

1. Have at least two members of your staff participated in PLT professional development? . . . . . ☐ Yes ☐ No

2. Are PLT professional development opportunities available to all teachers? . . . . . ☐ Yes ☐ No

3. Do at least 10% of classes or courses embed environmental education, including PLT? . . . . . ☐ Yes ☐ No

4. Are outdoor areas used for class education or community education programs? . . . . . ☐ Yes ☐ No
   a. If yes, what topics and who participates?

   _____

   b. If no, could outdoor areas be used to teach certain concepts? (For example, concepts that might be taught outside include measurement, weather, plant growth, plant identification, animal identification and habitats, runoff, erosion, pollution, poetry, and so forth.)

   _____

5. Does your school use any nearby natural areas for education?
   ☐ Nature Center ☐ School Forest ☐ Wetland
   ☐ Stream ☐ Park
   ☐ Other: _____

6. What community partners in your region support gardening, tree planting or natural area development?

   _____

   _____

7. Brainstorm and record a list of ways that your school could improve its use of outdoor areas for education and community outreach.


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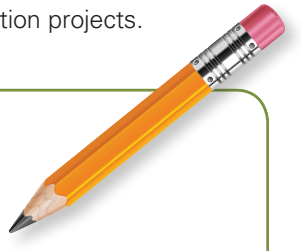
# PART VIII: SCHOOL SITE ACTION PLAN

Review the list of ideas that you brainstormed for each section of the investigation. Prioritize the list and decide on a few action projects that you can do to improve your site. See the next page for examples of action projects.



List your action project ideas for each section of the School Site Investigation:

**Pervious and Impervious Areas**

**Outdoor Spaces**

**Grounds Maintenance**

**Trees**

**Education, Training, and Community Connections**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## School Site Action Project Ideas

Here are just a few ideas to help get you started. You can check out what other PLT GreenSchools are doing by watching PLT's short video GreenSchools in Action: School Site (available on PLT's YouTube channel at https://www.youtube.com/user/ProjectLearningTree) and by reading stories posted at www.plt.org/teacher-stories.

- Planting trees—and caring for them!
- Creating an outdoor classroom.
- Establishing vegetable gardens to study science, math, and other core subjects; to grow nutritious food; and to teach healthy eating habits.
- Planting a pollinator garden (many of the plants that produce our food rely on pollinators!)
- Building a container garden, indoor herb garden, or rooftop garden.
- Improving wildlife habitat by planting a butterfly garden, hanging bird nesting boxes, or adding bird baths.
- Building a rain garden to improve the health of your local watershed.
- Constructing a wildlife observation site.
- Building a nature trail or a fitness trail.
- Working with maintenance staff to establish environmentally friendly and sustainable management practices for the grounds.

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# Green Your Home:
## Improving Outdoor Spaces

Project Learning Tree®

There are many simple things that you can do to make your yard, patio, or windows more appealing to your family and to wildlife. Use the following questions to help you identify various ways that you can green your outdoor space.

| | | |
|---|---|---|
| 1 | Can you plant herbs, flowering plants, strawberries, tomatoes, and other small plants in window boxes or containers on your patio? | ❑ Yes ❑ No |
| 2 | Can you hang nesting boxes for birds and bats in your yard? Birds and bats eat lots of insects, including mosquitoes, which will make your yard more comfortable! | ❑ Yes ❑ No |
| 3 | If your lawn and plants need to be watered, do you water them during the cooler parts of the day to minimize evaporation loss? | ❑ Yes ❑ No |
| 4 | Do you plant native vegetation that is adapted to the local climate so that it requires less watering and benefits native wildlife? | ❑ Yes ❑ No |
| 5 | Can you remove invasive species from your yard that compete with native species? | ❑ Yes ❑ No |
| 6 | Can you place mulch around plants and trees to retain moisture? | ❑ Yes ❑ No |
| 7 | Can you plant flowers, shrubs, and trees that provide food and shelter for wildlife? Watching wildlife is a fun and relaxing family activity. | ❑ Yes ❑ No |
| 8 | Do you have several layers of plants that provide shelter and food for wildlife, such as ground cover, small shrubs, large shrubs, and trees? | ❑ Yes ❑ No |
| 9 | Do you use nontoxic methods to eliminate or reduce the use of pesticides? | ❑ Yes ❑ No |
| 10 | Do you use a compost bin for yard waste, fruit peels, and vegetable scraps? The compost will make a good fertilizer for your yard. | ❑ Yes ❑ No |
| 11 | Can you plant a vegetable garden and grow some of your own food? | ❑ Yes ❑ No |

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www.plt.org

**To learn more about PLT GreenSchools:**

- Watch tutorials and videos showing how GreenSchools across the country are taking action by viewing PLT's videos on our YouTube channel (https://www.youtube.com/user/ProjectLearningTree).

- Read stories on GreenSchools posted online at PLT's website (www.plt.org/teacher-stories).

- Subscribe to our e-newsletter for updates and information about new resources, grant opportunities, tips from educators, and stories of students making a difference at school and in their communities (www.plt.org/sign-up)

Project Learning Tree®

Project Learning Tree educates teachers and youth about forests and the environment.

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