



# LANDSCAPE FOR LIFE™

Based on the principles of the Sustainable Sites Initiative™

## *Instructor's Manual*

[www.landscapeforlife.org](http://www.landscapeforlife.org)



# 7



SOURCE: ELENA ELISEEVA

## Class Preparation Checklist

- Prepare computer, projector screen and other necessary items required to lead the Class Seven PowerPoint presentation.
- Research local recycling centers and compile a list of acceptable green waste materials they accept.
- Research the recommended planting times in your region for trees, shrubs, perennials and other vegetation.
- Identify the key landscape diseases and pests in your region.
- Identify nearby sustainable gardens to use as local example gardens.

# Class 7

## Lesson 13: Sustainable Landscape Maintenance

## Lesson 14: Sustainable Landscape Maintenance Practices

**Learning objectives** After completing this class students will be able to:

### Lesson 13

- Identify the key elements to maintaining a sustainable landscape.
- Identify pollutants found in their home landscape.
- Create a sustainable landscape maintenance plan.

### Lesson 14

- Identify the proper pruning techniques and time of year.
- Identify common disease and pests along with treatments to treat them.
- Complete the sustainable landscape maintenance plan.

# Lesson 13

## Sustainable Landscape Maintenance



### Overview

This module will discuss sustainable concepts as related to garden and landscape maintenance. As previously discussed, sustainability is broadly defined as meeting the needs of the present without compromising the ability of future generations to meet their needs. Sustainability recognizes the interdependency between the environment, human health, and the economy and considers all three when measuring success. The concept of sustainability is becoming widely accepted and is now applied to many different industries including architecture, agriculture, landscape architecture and the manufacture of goods and materials.

A key attribute of a sustainable landscape is the provision of ecosystem services. Ecosystem services are the multitude of resources and processes that sustain and fulfill human life such as clean air and water, mental respite and habitat. These benefits, collectively known as ecosystem services, are essential to our human health and well-being and are a key attribute of a sustainable landscape. A more in-depth study of landscape sustainability and ecosystem services can be found in Lesson 1.

Sustainable practices regarding plants, soil and materials have been discussed in Landscape For Life lessons one through four. The design and construction practices can be applied to both new gardens and renovations of existing landscapes. No step is too small and landowners can make incremental changes over time that lead to an increase in ecosystem services and community benefits.

The positive impacts of sustainable design and construction practices are ultimately dependent on the short and long-term maintenance strategies that support their continued success. Maintenance practices impact resource consumption and the provision of ecosystem services provided by landscapes. Sustainable maintenance works with nature to support and nurture the living systems that make up our gardens, and strive to diminish negative impacts by reducing water consumption, reusing or recycling waste, protecting air and water quality, and minimizing the use of fossil fuels.

## Lesson 13

### Discussion

- Have you purchased any materials or services that were marketed as being sustainable?
- What made them sustainable?
- Why was this important to you?

## Lesson 13

### Discussion

- What ecosystem services are provided by trees?
- How can tree maintenance impact ecosystem services?

**INSTRUCTOR GUIDANCE:** Trees provide shade and evapotranspiration that reduce the urban heat island effect and decrease surrounding temperatures. They provide habitat for insects, birds and other wildlife. Trees also increase property values, capture air pollutants and intercept rainfall which can reduce storm intensities and flooding. Taking all of this into consideration, it becomes obvious that something as simple as tree trimming can have many long-term impacts. Proper pruning can encourage strong growth, healthy branch structure, and the longevity of the tree. However misguided pruning practices can lead to misshapen vegetation, the spread of disease, loss of valuable habitat or plant stress – all of which negatively impact the health of the tree and its ability to provide the ecosystem services we depend upon.

## Davey National Tree Benefit Calculator

### Activity

Using the National Tree Benefit Calculator, students can calculate the benefits of trees in their yards or other landscapes.

The calculator can be found at:

<http://www.davey.com/arborist-advice/articles/national-tree-benefit-calculator/>  
or by googling Davey National Tree Benefit Calculator.

Report your findings to the class.

## Sustainable Landscape Maintenance

This Landscape For Life section will focus on the important connection between maintenance and landscape sustainability. In the following pages, we discuss the impacts of landscape maintenance on the environment, human health, and the economy. This section will also provide guidance regarding sustainable maintenance planning and land-care practices that will enhance the beauty and provide ecosystem service benefits to your home garden and surrounding community.

### **Sustainable landscape maintenance: why is it important and what does it include?**

The appearance of a landscape is often a key driver for maintenance, however, care of your garden can have many impacts beyond aesthetics. We will begin by discussing the influences of landscape maintenance and its relevancy to sustainability.

### **Environmental health**

Developed landscapes make up a significant portion of our cities and as such effect the environmental health of our region. Landscape maintenance examples with environmental impacts include:

- › Release of chemicals into environment. Garden centers across the country sell “over-the-counter” fertilizers, herbicides and pesticides that can have negative impacts on the health and well-being of people and the larger natural world on which we depend. Recently, scientists have become more aware of landscape chemicals and their impacts on pollinators, particularly bees, which provide valuable ecosystem services and are in significant decline. Sustainable landscapes reduce the release of chemicals into our environment by using organic fertilizers such as compost and implement Integrated Pest Management strategies, that minimizes hazards to people, property, and the natural environment. More discussion on pollinators and sustainable landscape practices can be found in Class 6: Pollinators. In addition to reducing the use of harmful chemicals, it is also important to carefully follow labels and the manufacturer’s instructions for proper application.
- › Water contamination. Stormwater runoff from built environments is the leading cause of water pollution in urban areas. Many pollutants are introduced into the landscape for maintenance purposes or are the outcome of poor maintenance practices. Sustainable landscapes limit the use of materials that can introduce pollutants into our waterways and also manage stormwater in a way that it can be cleansed and reused on-site

### Stormwater Pollutants

Stormwater pollutant	Source	Impact
<b>Sediment</b>	Erosion from disturbed or bare soil	Sediment reduces water quality and degrades aquatic habitat.
<b>Nutrients</b>	Animal waste, fertilizers and failing septic systems	Nutrients, metals, and other pollutants can attach to, and are transported by, sediment.
<b>Bacteria</b>	Animal waste, combined sewer overflow systems and failing septic systems	Elevated nutrient loads reduce water quality and degrade aquatic habitat by stimulating algal blooms, lowering dissolved oxygen levels in water bodies, and reducing water clarity. Nutrients also increase water treatment costs.
<b>Temperature</b>	Replacing vegetation with dark and impervious surfaces such as roads, driveways, and roofs and lack of shade trees	Significantly impacts populations of fish, particularly cold-water species of salmon and trout, by lowering dissolved oxygen levels in water bodies.
<b>Metals</b>	Pesticides, herbicides, roofing materials, tires, break dust, automobile engine wear, fuel and asphalt paving	Harmful to the health of humans and wildlife, even at low levels.
<b>Chloride</b>	Deicing salts commonly applied to roads, sidewalks, and driveways	Contaminate soils and water, and harm vegetation and aquatic wildlife

## Air pollution

Developed landscapes make up a significant portion of our cities and as such effect Air pollution. Air pollution changes the chemical composition of the atmosphere, and in doing so impacts human health, and land and water ecosystems. Plants capture and remove air pollutants. Maintenance practices that damage or shorten the life of vegetation reduce the ability of plants to provide clean air and numerous other ecosystem services. In addition, many landscapes depend on the regular use of mechanical lawn and garden maintenance equipment that emit considerable amounts of carbon monoxide, volatile organic compounds, and nitrogen oxides.

Air Pollutant Table				
Pollutant	Description	Example Source	Human Health Impacts	Environmental Impacts
Carbon monoxide (CO)	Colorless, odorless, poisonous gas	Incomplete combustion of fossil fuels, including emissions from small engines typically used for lawn and garden applications.	Reduces the delivery of oxygen to the body's organs and tissues.	Contributes to the formation of smog and ground-level ozone.
Nitrogen Oxides (NO <sub>x</sub> )	Group of highly reactive gases known as nitrogen oxides that include NO <sub>x</sub> , N <sub>2</sub> O, and others.	Fertilizers and combustion of fossil fuels from land-based non-road engines, such as construction equipment.	Inflammation of the airways and reduced lung function; cause of bronchitis, pneumonia, and lower resistance to respiratory infections.	A greenhouse gas that contributes to global climate change, acid rain, eutrophication, ground-level ozone, and fine-particle pollution.
Volatile Organic compounds (VOCs)	Gases from solids or liquids.	VOCs are emitted from diverse sources including solvents, automobiles, construction equipment, fertilizers, and pesticides.	Eye, nose, and throat irritation; headaches, loss of coordination, nausea; damage to the liver, kidneys and central nervous system. Some VOCs can cause cancer in animals and are suspected or known to cause cancer in humans.	Contribute to the formation of ground-level ozone.



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### Human health and well-being

Our homes, work environments, and communities are better when we provide opportunities to connect with nature. Access to nature — whether it is views of trees and other green space or opportunities for rest or physical activity — boosts our mental and physical health. Researchers looking at the impacts of nature on human health and well-being have shown benefits of increased work productivity, lower stress levels, increased social interaction and improved mental health. Landscape maintenance examples with human health and well-being impacts include:

- › Easy access to nature for mental restoration and physical activity. Landscape maintenance is essential to the ease of use and safety of site users. Gardens that are perceived as being dangerous or do not provide inviting spaces for visitors are less likely to be used.
- › Noise reduction. The sounds of lawn mowers and other garden maintenance equipment can be found most days in almost any landscape during the growing season. Loud noises can impact our mental well-being and disturb rest. Without the proper use of ear protection, lawn equipment such as mowers, edge trimmers or leaf blowers can also damage hearing. In addition, noise can frighten wildlife and reduce habitat.

## Lesson 13

### Discussion

- How can we make our landscapes more inviting?
- What landscape characteristics or amenities make you want to spend time outdoors?

**INSTRUCTOR GUIDANCE:** We are less likely to use spaces that do not feel safe. Many people have a biophobia, or a fear of nature, whether it be snakes, insects, or prickly plants. Biophobia is the opposite of biophilia, which is the innate need and connects to nature. Densely vegetated landscapes and uneven walking surfaces can also bring out fears of falling or stranger danger. Garden design and maintenance strategies that help provide a sense of safety include clear sight lines to entrances and exits, walking areas free of low branches or tripping hazards, and low vegetation located on either side of pathways. It can also be helpful to educate yourself and others regarding the benefits of wildlife in the garden. Learn to distinguish between harmful and/or helpful snakes and insects, their habitats, and behaviors.

## Lesson 13

### Discussion

- What snakes and insects are commonly found in our local landscapes.
- Are they harmful and/or helpful?

**INSTRUCTOR MATERIALS –** Prior to teaching this section, the instructor should prepare a short presentation including images and a basic overview of potential insects and reptiles that may be harmful and/or helpful and can be found in local landscapes.

### Economic considerations

When thinking about sustainable practices, it is important to remember the interdependency between the environment, human health, and the economy. The economic benefits associated with landscape maintenance are most easily found when materials or maintenance hours are reduced. All too often maintenance practices do not reflect the needs of the landscape, but rather a set schedule that is determined by seasons or by habit. This results in the unnecessary use of materials and man-hours. Sustainable landscape maintenance considers both the short and long-term goals of a garden and is informed by careful observations and monitoring of garden conditions. Landscape maintenance examples with economic impacts include:

- › Water conservation. As our population continues to grow, cities are placing enormous demands on our water resources. Landscapes can be significant users of fresh water, 30% - 60% depending on the climate. Sustainable landscape maintenance practices can reduce water use. Conserving water resources contributes to the economic stability of a region and benefits other ecosystems that also rely on fresh water supplies such as lakes, rivers, and streams.
- › Reduced mowing. In warm weather months, turf grass grows quickly and requires on-going maintenance. Limiting the amount of turf grass in your landscape and increasing the height at which the grass is mown can reduce maintenance thereby providing both economic savings and environmental benefits.
- › Recycling green waste. Leaves, branches, and plant clippings can be mulched or composted on-site to provide valuable soil amendments. Recycling green waste materials in your landscape avoids costs and environmental impacts of purchasing, disposing and transporting garden materials.



## Sustainable Landscape Maintenance Plan

### Project

In this class, students will develop a sustainable landscape maintenance plan for their landscape or a garden of their choice. The plan will reflect what the students have learned in this maintenance module and will be shared with the class for idea development and support. Use the Landscape for Life maintenance worksheet to guide you through the development of the plan.

**STUDENT HOMEWORK: SUSTAINABLE LANDSCAPE MAINTENANCE PLAN – PART ONE: EXISTING MAINTENANCE.** For part one of the homework, students will fill out section A of the maintenance plan worksheet, which lists the maintenance tasks and hours currently required to maintain their landscape. If the landscape is not yet installed, students can record the maintenance practices they anticipate the garden requiring.



Recommend a short break while instructor prepares for Lesson 14: Sustainable Landscape Maintenance Practices

# Lesson 14

## Sustainable Landscape Maintenance Practices



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### Overview

Sustainable maintenance works with nature to support and nurture the living systems that make up our gardens. It strives to diminish negative impacts by reducing water consumption, reusing or recycling waste, protecting air and water quality, and minimizing the use of fossil fuels. Below we will discuss sustainable landscape maintenance practices to meet this goal.

## Plants

- › Right plant right place. Vegetation in a sustainable garden works with nature. It is adapted to the conditions - soils, light, water availability and hardiness zone - of the site. Careful selection of plants can minimize the use of fertilizers, pesticides, and irrigation. It can also reduce plant replacement costs. A more detailed discussion of vegetation and selecting the right plant for your site can be found in Lesson 6: The Role of Plants in Sustainable Gardens and Lesson 7: Successful Plant Practices.
- › Follow proper pruning techniques. Proper pruning can enhance the beauty and health of vegetation. Pruning removes unhealthy, damaged or undesirable growth. When done correctly, pruning can also enhance the development of flowers and fruits.

*Poor pruning practices can deform, weaken or kill vegetation. In most cases, it is better not to prune than to do so incorrectly. Before pruning, develop a plan and identify the purpose of the maintenance. It is important to work slowly and take the time to step back and see results. In this section, we will discuss proper pruning techniques that encourage sustainable plant growth.*

- › When to prune. In general, the best time to prune most plants is in the late winter or early spring before the growing season begins. During these dormant months, disease and pests are typically less active and it is easier to see the structure of deciduous plants. It is important to note that there are exceptions, and it is best to research each plant and its growth and bloom habit prior to pruning.
- › Pruning equipment. The best pruning equipment is easy to handle, sharp and disease free. When possible, use manual equipment to avoid the release of air pollutants. Always clean equipment after each use. When pruning diseased plants equipment needs to be disinfected prior to reuse. A disinfectant solution can be made by mixing 1 part bleach or rubbing alcohol with 3 parts water. When disinfecting, tools should be soaked for at least 5 minutes and rinsed with clean water. To extend their use, store tools in a dry location and oil blades regularly. Wood handles can be treated with a paint, varnish or linseed oil.

### Student Show and Tell

#### Activity

Bring your favorite garden tool to class. Be prepared to explain why you like the tool and how you use it in your landscape.



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- › Dead and diseased wood removal. It is best to start by removing dead or diseased wood and other plant parts. This often reduces the total number of cuts required and can open up the canopy to the point where no additional pruning is needed. Cut the problem limbs back to a strong central leader or branch. It is important to prune in the correct location to avoid damage to the plant. Trim trees and shrubs at the branch collar, which is located at the base of a branch and is often visibly swollen. All diseased wood should be properly disposed of in a location away from the landscape. To avoid the spread of pathogens, do not use diseased vegetation as mulch or in compost.

Rejuvenate pruning involves cutting vegetation down to ground level to promote vigorous new growth. It is most commonly used with shrubs and perennial flowering plants.

Many perennials can be pruned after the plant blooms and begin to decline. Rejuvenate pruning can extend plant life and encourage additional blooming. Examples of native plant that often benefit from this practice include coreopsis or the purple coneflower (*Echinacea* spp.)

Rejuvenate pruning of shrubs typically occurs in the late winter or early spring before new growth begins. It is often used when shrubs have not been regularly or properly pruned and cannot be corrected with thinning. The results make an obvious impact on the landscape. Plants are smaller, typically flower more abundantly, and in some cases such as the red-twig dogwood, the pruning results in new stems with brighter colors. Examples of native shrubs that benefit from this practice include mock orange (*Philadelphus* spp.) or toyon (*Heteromeles arbutifolia*).

Not all plants respond well to rejuvenate pruning and it is important to do your research. This pruning practice is not recommended for vegetation that is stressed or in poor health, as the rootstock may not be strong enough to generate new growth.

Corrective pruning removes sections of a plant that are poorly located. Examples include rubbing branches, weak or narrow crotches, branches that obstruct visibility or trees with more than one central leader. It also includes the removal of water sprouts, which typically occur along branches near pruning sites and suckers that grow from tree trunks or roots.

Consider the natural shape of vegetation prior to pruning. To reduce maintenance and undesirable results, it is best to work with nature and the natural growth habit of plants.

## Lesson 14

### Discussion

**INSTRUCTOR MATERIALS** - Prior to teaching this lesson, prepare a short presentation that provides examples of common native trees, shrubs, perennials, and grasses used in local landscapes. Discuss the best pruning time and techniques for the vegetation. Share local resources for pruning such as educational materials from garden clubs and horticultural extension services.

## Tree Staking

### Demonstration

**INSTRUCTOR DEMONSTRATION** - Demonstrate how to properly stake a tree in a near-by landscape. In the field, invite students to participate in the exercise. If a demonstration is not possible, show a video in class of proper staking techniques.



### Mechanical Protection

Staking is a practice used to provide additional support to plants, most commonly young trees. Staking helps stabilize plants while roots grow. Most properly planted trees with a sturdy trunk and healthy root system, do not need the additional support provided by stakes. Good candidates for staking include bare-root trees, top-heavy trees with a small root ball, and young trees located in a very windy location. When needed, staking should only occur for a short period of time, typically one growing season or less. Leaving stakes in place for too long can result in weak trunks and root systems.

To determine whether or not a tree needs to be staked, gently push the trunk back and forth. If the soil at the base of the tree shifts or heaves, staking may be beneficial. To properly stake a tree, place metal or wood stakes upwind from the direction of the prevailing seasonal winds. Stakes should be placed firmly in the ground outside the root ball but within the mulch planting area. Loosely tie a wide strap made from a soft material such as a cloth or an inner tube tire. The tie should be placed as low as possible and no higher than  $\frac{2}{3}$  the height of the tree. Avoid using materials such as wire or strings that can cause abrasion or girdle the tree. When finished, the tie should be loose and allow some movement of the trunk.

## Recommended Planting Times

### Presentation

INSTRUCTOR PRESENTATION. Discuss the recommended planting times in your region for trees, shrubs, perennials and other vegetation. In your presentation include the advantages and disadvantages of planting in different seasons and identify climatic conditions such as frost or drought that may damage vegetation.



### Strengthening plant resilience

- › Improve light availability. Gardens are living systems that change over time. When plants grow and increase in size, the amount of light available to surrounding vegetation can decrease. Plants that typically grow in full or partial sun often become weak and spindly when they do not receive enough sunlight. Gardeners can increase the amount of light reaching a garden by selectively pruning overhead branches or other vegetation blocking the sun.
- › Thin plants for improved air circulation. One common temptation when gardening is to over plant. By placing vegetation close together, the illusion of a mature landscape can be created. Over planting often leads to plant competition and an environment that favors mold and the quick spread of other diseases or infestations. Sustainable gardeners consider the growth rate and mature size of vegetation and make choices that limit waste and the spread of disease. In situations where a garden has become overgrown, plants can be thinned. This may include completely removing vegetation that are spaced too closely or removing the top 1/3 of perennial plants or shrubs. Thinning will increase air circulation and light levels resulting in more healthy growing conditions.
- › Plant at the proper season. To reduce plant stress and failure it is important to plant during the proper season. Local climatic conditions and plant types (trees, shrubs, perennials) dictate the best times for planting. Prior to planting, it is important to familiarize yourself with the growing requirements of a plant and the typical weather patterns of your area.

In general, the best time to plant trees and shrubs is when they are dormant and soils are not frozen. This minimizes potential damage from handling and moving the vegetation. It also allows the plant time to begin establishing its root system prior to leafing out. Perennials can typically be planted any time when air temperatures are moderate, soils are not frozen, and rainfall is ample. It is always important to remember to water newly planted vegetation, as root balls can dry out more quickly than the surrounding soils and young root systems often need additional support.



CLEMENT

Manage pests and disease. Sustainable landscapes minimize pesticide use. Integrated Pest Management (IPM) is an effective and environmentally sensitive approach to pest management. IPM programs combine knowledge of the life cycle of pests with available pest control methods to determine the most economical and least environmentally toxic approach. To develop an IPM plan for your landscape follow these steps:

- 1) Identify the key landscape disease and pests in your region. Learn to identify the life cycle of pests and early warning signs.
- 2) Conduct a site assessment and identify unhealthy planting situations such as overly wet soils, lawns in deep shade, or overplanted and crowded planting beds. Prioritize areas of concern and determine the best options for alleviating problem scenarios.
- 3) Identify existing plants that are the most prone to insect or disease problems and monitor on a regular basis.
- 4) Establish a monitoring schedule for each area of your garden that supports the early detection of pests and disease. Monitoring can be as simple as visually inspecting the plants for signs of pests or pest damage.
- 5) Determine how much damage or infestation you are comfortable allowing before treatment is required. This is known as the Action Threshold and will inform whether you start treatment or continue to monitor.

- 6) Develop a control strategy. This may take many forms including removing problem plants, applying biological controls or treating with organic or synthetic pesticides.
- ▶ Biological control of insects is the suppression of pest populations by living organisms or their byproducts. This often includes the introduction of the pest's natural enemies such as the ladybug, which aggressively hunt aphids or nematodes that attack a wide variety of insect pests.
  - ▶ Botanical insecticides are derived from chemicals produced by plants. Even though the products are natural, they range widely in toxicity. Examples include nicotine, neem oil, and pyrethrum.
  - ▶ Organic and synthetic pesticides. When selecting pesticides for use in the garden it is best to start with a least toxic approach and identify all the organisms that will be impacted. This is important for bees and other beneficial insects that can be inadvertently harmed by pesticides. For a list of organic pesticides that minimize negative impacts on bee populations see Xerces Society for Invertebrate Conservation Organic-Approved Pesticides in the resource section.

In addition to IPM, gardeners can also minimize pesticide use by selecting vegetation that is resilient and resistant to disease and pests. Problematic scenarios can often be avoided by placing the right plant in the right place.

## Lesson 14

### Discussion

**CLASS DISCUSSION:** What are the most problematic plant species in your yard? What plants are the most prone to insect and disease? What plants are good replacements?

**INSTRUCTOR PRESENTATION.** Provide a short presentation of the most common landscape pests and diseases in your region. Include images illustrating different stages of infestation and IPM strategies for control.



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## Water

- › Supplemental watering. Newly planted vegetation often requires supplemental watering during the establishment period. SITES® defines the establishment period as a maximum of three years for trees, two years for shrubs and one year for herbaceous cover. Supplemental water may also be needed during times of drought. It is important to water vegetation slowly and deeply to avoid wasteful runoff and encourage root systems that extend down into the soil profile. Plants with deep roots are more resilient to drought. A sustainable garden minimizes the use of potable water and takes advantage of alternative water sources such as rainwater and a/c condensate. For more information about sustainable water, practices see Lesson 4: The Role of Water in Sustainable Gardens and Lesson 5: Successful Water Practices.

- › Landscape irrigation. Water supports our environment and sustains our lives. Every industry and every household need it. Around the world water shortages are increasingly becoming a major concern. In the U.S., 36 of the 50 states anticipate freshwater shortages in the next decade. Landscape irrigation can use a significant amount of water. Sustainable landscapes see all water as a valuable resource. Reducing potable water use in the landscape is a multi-prong approach that includes:
  - › selecting vegetation that can thrive within the local climatic conditions
  - › soil stewardship
  - › the reuse of harvested rainwater or a/c condensate
  - › the thoughtful and responsible application of irrigation
- › Many irrigation systems are set on regular schedules that run without consistent oversight. This leads to unnecessary and wasteful water use. Instead of schedules, irrigation practices should be determined by soil moisture, plant health, and pending weather. It is also important to select plants that can easily thrive within the available precipitation of the region. For regions with limited water, drought-tolerant vegetation is often a good first step, however proper irrigation practices that reflect the true needs of the vegetation are equally important. All too often vegetation in our landscapes is overwatered. Sustainable landscapes reduce maintenance costs by being good stewards of water. For a more in-depth study of sustainable water strategies that reduce potable water use see Lesson 4: The Role of Water in the Landscape and Lesson 5: Successful Water Practices.

**Materials**

- › Apply mulch. Mulch can help prevent erosion and shade soils to conserve moisture. It can also minimize soil compaction in areas of high foot traffic. When applying mulch, it is important to avoid placing around plant stems or trunks which can encourage decay and rot. Over time mulch can become hydro-phobic, shedding water rather than allowing it to soak into the soil. To help avoid this problematic scenario, periodically rake mulch to break up the surface. Organic mulches such as pine fines, pine needles, and composted leaves help improve the organic matter content of the soil. The benefits of mulch and compost are discussed in more detail in Lesson 3: Successful Soil Practices
- › When spreading mulch, it is important to remember that approximately 70 percent of native bee species nest in the ground. Ground nesting bees prefer undisturbed bare areas of soil for nesting. Mulch can prevent bees from coming into contact with the soil and excavating a tunnel. To support bees in your garden leave small patches of soil bare in areas that are not often used by people or pets and do not need to be protected from erosion. More discussion of bees can be found in Lesson 11: The Role of Pollinators in Sustainable Gardens.



**Use sustainable materials**

- › When replacing or adding materials in the landscape, it is important to consider the materials manufacture process and transportation requirements. Things to consider when selecting materials include:
- › Use minimally processed materials such as uncut stone or wood. The environmental and human health impacts of materials typically increase with each manufacturing phase. Materials that have reduced manufacturing and processing requirements often pose fewer environmental and health risks.
- › Salvage, reuse, recycle on-site materials and debris. Homeowners can minimize negative impacts of materials and product manufacturing by salvaging and reusing landscape materials. Recycling keeps materials in the manufacturing loop and avoids creating landfill waste.
- › Identify local materials and sources. Using locally produced materials reduces the fossil fuels required for shipping and supports local businesses.
- › Purchase materials with recycled content. Materials can contain either post-consumer or pre-consumer recycled content. Post-consumer items are preferred because they are made from materials that were once consumer items and have been diverted from the landfill. Pre-consumer recycled content typically comes from the manufacturing process and can often be easily recycled.
- › A more detailed discussion of materials selection can be found in Lesson 8: Selecting Materials for Sustainability and Lesson 9: Successful Materials Practices.

## Soil

- › Soil as healthy system. Improve and maintain healthy and fertile soil - Soils are the foundation of a sustainable landscape. Healthy soils support vegetation, build groundwater supplies, and absorb and cleanse stormwater. Soil health is dependent on thoughtful stewardship and informed landscape maintenance practices. Prior to amending, soil tests should be taken to understand the existing soil conditions and whether or not amendments are needed. It is also important to understand the growing requirements of the vegetation and select plants that can thrive in local soils. Often times, native vegetation from the eco-region in which the landscape is located are best suited to local soil conditions. Compost is one of the best soil amendments, as it supports healthy soil biota that in return makes nutrients available to vegetation, increases the water holding capacity of the soil, and provides numerous other benefits.
- › Soil fertility. Soils contain essential nutrients and living organisms collectively called soil biota, that are fundamental to plant growth and resilience. Prior to fertilizing a garden, it is important to test soils and identify deficiencies. For more information on soil fertility and how to support a diverse soil food web see Lesson 3: Successful Soil practices.



**Diminish negative impacts**

- › Landscape maintenance often requires the use of valuable resources that can result in negative impacts. The goal of a sustainable landscape is to minimize negative outcomes to the greatest extent possible. Maintenance practices that meet this goal include:
- › Reduce fuel usage which minimizes greenhouse gas emissions.
- › Select and use alternative fuel equipment where possible such as hand tools instead of gas powered edger or hedge trimmer.
- › Reduce the area of lawn that requires frequent mowing. Turf grass has little habitat or food value for wildlife and can require significant irrigation, fertilizers applications, and maintenance. Turf grass is best suited for areas that are intended for use by people and pets. Sustainable landscapes limit turf grasses to specific high use areas and use more diversified plant selections in other locations to support habitat and beauty. It is also helpful to raise your mower height. Longer grass blades will help keep out pesky weeds and will shade the soil reducing moisture loss.
- › Use non-mechanized tools/equipment. Landscape maintenance can be a great way to get physical activity. Tools such as push manual reel mowers, hand trimmers, and rakes can raise your heart rate while also reducing the environmental impacts of air pollutants. List non-mechanical tools that can replace mechanized equipment and discuss their use.

## Lesson 14

### Exercise

**SUSTAINABLE LANDSCAPE MAINTENANCE PLAN – PART TWO:** In class, students will complete their sustainable landscape maintenance plan. Working separately or in small groups, students should fill out section B of the maintenance plan worksheet, which lists the short and long-term goals of the landscape and the proposed maintenance tasks and hours estimated to maintain their landscape. If the landscape is not yet installed, students can record the maintenance practices they anticipate the garden requiring. This information can be shared with the class for idea generation and refinement.

**Conclusion**

Thoughtful maintenance is key to the success of a garden. Sustainable maintenance works with nature to support and nurture the living systems that make up our gardens, and strive to diminish negative impacts by reducing water consumption, reusing or recycling waste, protecting air and water quality, and minimizing the use of fossil fuels. As stewards of our landscapes, we can make meaningful impacts that enhance the beauty of our garden and its ability to provide ecosystem services.



# Sustainable Landscape Maintenance Plan

Name: \_\_\_\_\_

## Section A

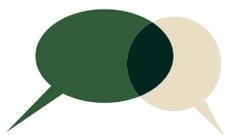
Current Maintenance Task	Hours/ Month
Mowing grass	
Raking Leaves	
Planting	
Pruning trees and shrubs	
Pruning perennials	
Hand watering	
Pulling weeds	
Dead heading perennials	
Spreading mulch	
Spreading compost	
Spreading fertilizers	
Applying herbicide	

Current Maintenance Task	Hours/ Month
Mowing grass	
Raking Leaves	
Planting	
Pruning trees and shrubs	
Pruning perennials	
Hand watering	
Pulling weeds	
Dead heading perennials	
Spreading mulch	
Spreading fertilizers	
Applying herbicide	
Monitoring for IPM	

## Section B

### Short-term maintenance goals

### Long-term maintenance goals



Class Wrap-up: Closing Questions or Comments

## Resources: Maintenance

### Tree pruning

“Pruning Landscape Trees (How-To) - UK College of Agriculture, Food and Environment  
[https://www.youtube.com/watch?v=C\\_6vKc8mt\\_A](https://www.youtube.com/watch?v=C_6vKc8mt_A)

### Tree staking

“How to stake a tree” KSREVideos  
<https://www.youtube.com/watch?v=8fFNftCOG28>

### Tree planting

“How to plant a tree in your yard” Texas A&M Forest Service  
<https://www.youtube.com/watch?v=5Dmmaemw4jo>

### Shrub pruning

“How to prune a shrub” – Utah State University Extension  
<https://www.youtube.com/watch?v=LSxO1PCcH8s>

### Winter Perennial Care

“Winter Perennial Care” – OK Gardening Classics  
<https://www.youtube.com/watch?v=cSHogJTxXyl>

### Pruning perennials and deadheading perennials

“Pruning perennials and deadheading perennials” – Doug Green  
<https://www.youtube.com/watch?v=PfFhGFXt0J0>

### Xerces Organic-Approved Pesticides: Minimizing Risks to Bees, [xerces.org](http://www.xerces.org)

<http://www.xerces.org/wp-content/uploads/2009/12/xerces-organic-approved-pesticides-factsheet.pdf>

### OMRI Product list – [directory of organic products](https://www.omri.org).

<https://www.omri.org/omri-lists>

### Landscape maintenance tools

Better Homes and Gardens: Top Tools for Maintaining your Garden  
<http://www.bhg.com/gardening/yard/tools/top-tools-for-garden-maintenance/>

### Consumer Reports: [Maintaining your lawn and garden equipment](https://www.consumerreports.org/cro/2013/07/maintaining-your-lawn-and-garden-equipment/index.htm)

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### Arizona Certified Landscape Professional: [How to Select, Use and Maintain Landscape and Garden Equipment](https://www.azlca.com/uploads/documents/how-to-select.pdf)

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