ASSOCIATED LANDSCAPE CONTRACTORS OF COLORADO
BETTER BY NATURE

Green Strategies for Colorado Landscapes

A sustainable approach to landscape design, installation and maintenance
presented by Associated Landscape Contractors of Colorado

Introduction

These principles are a comprehensive approach to sustainable landscape design, installation and maintenance in order to conserve and protect Colorado resources. These principles are intended to guide professionals and be a resource to landscape consumers. The following pages focus on:

Landscaping in harmony with the natural conditions of Colorado

Reducing waste and recycling materials

Nurturing healthy soils

Conserving water, energy and topsoil

Maintaining landscapes to preserve plant health

Using integrated pest management

Reducing stormwater runoff

Creating and preserving wildlife habitat



Green Strategies for Colorado Landscapes

A well-designed landscape can cost less to build and maintain in the long run by consuming fewer resources. These principles can help landscape designers and contractors assist clients in increasing their property values and generating long-term environmental benefits. The landscape industry is part of the environmental solution. Adopting these principles and practices will increase the health of Colorado's landscapes. Green strategies include the following:

- **Water conservation and management**
- **Plants and planting**
- **Landscape maintenance**
- **Soil**
- **Landscape materials**

Water conservation and management

Water is in short supply in our arid climate and a scarce and precious resource in Colorado. Without responsible irrigation practices, we can waste a lot of water. Watering at the wrong times, with the wrong equipment and over-watering leads to waste. Irrigation practices should reduce these losses and still supply the landscape as much water as necessary. Because rainwater collection is not allowed in much of Colorado, landscape professionals must be experts in irrigation efficiency while creating and maintaining beautiful, regional, water-thrifty landscapes. With a goal of water efficiency, this section focuses on irrigation design, installation and maintenance practices.

Irrigation design/installation

- **Use soil moisture sensors, rain shutoff devices and 'smart' irrigation controllers.** Landscape irrigation technology changes fast. Failure to incorporate technology into irrigation designs will mean more water waste. ■ See page 10, Soils.
- **Design the system for appropriate coverage.** Make sure spacing between heads is correct to avoid overspray. Take water pressure into account to avoid waste.
- **Zone system appropriately.** Use appropriate combinations of drip, microspray, pop-up sprays and rotors to water the plants correctly. ■ See page 4, Plants and planting.
- **Ascertain the possibility in your jurisdiction for non-potable water sources.** Some areas of Colorado permit irrigation from non-potable sources. Check local laws and regulations. ■ See page 3, What is non-potable water.
- **Install a dedicated meter for landscape water use.** Separate irrigation meters allow for monitoring and evaluation of water use in the landscape and can help identify leaks and statistics on landscape water use. Consider adding a water meter onto the irrigation system.
- **Perform an initial audit.** Immediately after the system is installed, check it. Adjust pressure, check coverage and make other adjustments during this test.
- **Procure materials at one time.** Maximize efficiency by following the irrigation design and understanding what materials and tools are specified. Order them all at once to avoid multiple trips to distributors, which wastes time, money and natural resources.

Irrigation maintenance

Well maintained irrigation systems are critical to conserving water. Maintain the system via the following activities.

- **Perform irrigation audits.** Audits will help you find all the ways water is wasted, such as leaks, pressure problems, broken heads or valves, reduced water flow and areas with poor drainage.
- **Check the system regularly and adjust it as needed.** Continual checks for improper pressure, broken or buried heads, water coverage and overspray, and properly working sensors will keep the system efficient. It is also important to adjust the controller based on weather, season


and planting needs. Never 'set it and forget it.'

- **Manage irrigation according to need.** Water only based on the season and plant needs. Weather-based controllers can be a real asset for this. Systems not timed by a smart controller require greater attention. Understand the site, soils, plants, slopes and then, water accordingly. Always avoid watering during the hottest time of the day and when the wind is blowing. ■ See page 4, plants and planting.
- **Be proactive with updates.** New technology is making irrigation better all the time. A proactive eye for controllers, sensors and other new items that can supplement an existing system will save water and money.

When retrofitting or adding new elements, care should be taken to minimize disturbance of existing plants and trees.

- **Use a landscape water budget.** Calculate the water needs of a landscape based on plant types, land area and irrigation system efficiency, and use those calculations to apply water accordingly. Many irrigation controllers have a built-in water budgeting feature.
- **Winterize the system properly.** Shutting off the irrigation system in the fall is important to prevent problems caused by freezing. Improper winterization results in damage that will waste water until the problems are found – which could be months later.

What is non-potable water?

Non-potable water is water that has not been treated for human consumption. It can come from many sources, including:

- Reclaimed or recycled water
- Natural water sources, such as ponds or lakes
- Wells
- Rainwater catchment or harvesting
- Greywater, from dishwashers, shower or laundry use

Typically, when we hear the term "recycled water" or "reclaimed water" it means wastewater that is sent from our home or business through a pipeline system to a treatment facility where is treated to a level consistent with its intended use. It is then routed directly to a recycled water system for uses such as irrigation or industrial cooling. In many areas throughout North America, water for irrigation can come from multiple sources.

Irrigation systems using non-potable water must be clearly identified so that human consumption is avoided. The standard system for identifying non-potable irrigation systems is to use purple-colored irrigation components. Use of purple components may include pipes, valve box covers, sprinkler heads and so forth.

There is some broad use of non-potable water throughout Colorado for irrigation. A park may have a lake or pond that is used for irrigation. Some new developments are watering landscapes via the recycled water described above, and they are noted with purple sprinklers and other elements. Many suburban and rural homes may operate from a well. Rain barrels and other collection tools are not allowed in most places in Colorado. Always check local codes to find out what type of water is available for use in your landscape.

Monitor your plants on an ongoing basis

When plants are first installed, they require more water to become established and to allow the roots to grow deeper into the ground. Once the plants are established and more mature, they won't require as much water. In fact, overwatering plants will negatively impact their growth, appearance and ability to resist pests and disease.

Always reset your irrigation timer on a seasonal basis, as plants do not require as much water in cooler months than in the heat of summer. Also readjust the timer when plants have matured, as they require less water then, too.

Trees and other woody plants typically require additional watering for one or two seasons to become established. This includes winter watering. Sites should be analysed annually to assess current water needs.



Plants and planting

Selecting plants for a site can be challenging because plants are available in countless varieties, forms, colors and textures. When selecting plants, begin with a careful analysis of the environmental conditions of the site. Understanding the climate, soils and other factors will help narrow plant choices by eliminating those not adapted to the local conditions. Selecting plants suited to the local site is a key element in a sustainable landscape.

Landscape design and construction

- **Design using proper grading and drainage practices.** Grading for drainage shapes the landscape to move excess water away from areas where it's not wanted. Direct the water through the landscape to help filter it before it gets to the storm drains. Follow local regulations.
- **Right plant, right place.** Consider plants with low water requirements that are adapted to Colorado's climate. Using appropriate plants reduces the need for fertilizers, pesticides and remedial pruning.
- **Group like plants together.** This practice is called hydrozoning: the groupings of plants are separated into zones based on their water requirements, which allows them to be irrigated efficiently.
- **Never overplant.** Overplanting for an instant effect leads to water and other waste.
- **Avoid invasive plants.** Invasive plants escape into our natural areas, where they can spread rapidly, hurt native plants and wildlife habitats and generate waste. The Colorado Department of Agriculture maintains the list of noxious and invasive plants.
- **Preserve existing and viable well-established trees.** Existing trees generally require less water than newly planted specimens. Be sure to protect plants during renovation/construction to avoid compaction, grade changes and root zone damage.
- **Choose plants that can grow to their natural size and shape.** Plants in a space that is too small or too close to the house or building invite disease, insects and other problems.
- **Design and allocate appropriate space for turf, based on desired functional, recreational and/or aesthetic benefits.** Select turf species that will best meet the requirements and purposes of the lawn area.
- **Turf is usually better suited to larger, relatively flat areas.** Avoid placing turf on long, narrow areas, steep slopes, hard to maintain areas and isolated islands due to difficult mowing and irrigation challenges.
- **Avoid monocultures.** A variety of plants will result in an overall healthier landscape than one that is full of the same type of plants. Consider a mix of plants from seed and plugs.
- **Plant for the long term.** Colorado has dozens of perennial plants that add color and interest to the landscape, without the need to replace them every year. Consider perennials adapted for the region as a longer-term solution for color.
- **Consider plants that sustain beneficial wildlife.** The landscape can provide food, shelter and water to many birds and insects. ■ See page 12, Health benefits.
- **Consider edibles in the landscape.** Incorporating vegetables, herbs and fruits into your landscape makes a garden useful and productive. ■ See page 12, Health benefits.

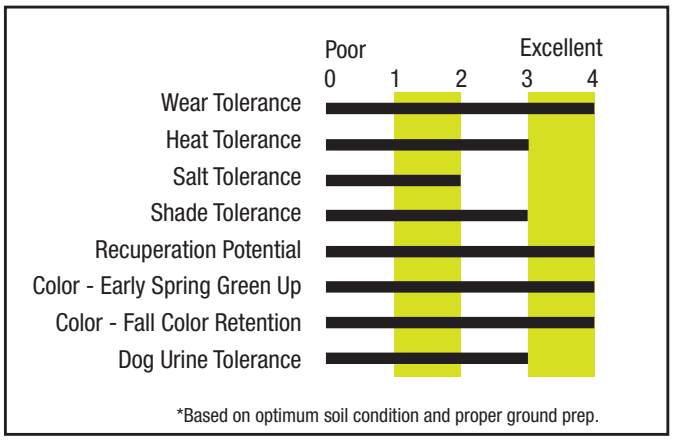

Xeriscape: It's not a garden, it's a system

Years of continuous drought have raised awareness about water use and made Xeriscape more than a passing fad. Consumers continue to request stunning plants and hardscape elements that minimize water use. Xeric landscapes can be lush and beautiful when all seven Xeriscape principles are employed in a landscape. Denver Water coined the term Xeriscape™ in 1981 and still holds the trademark for the word. A group led by Denver Water, including ALCC members, developed the seven Xeriscape principles. What is most misunderstood about Xeriscape is that it's not only using low water use plants or reducing turf grass. All seven principles are designed to work together in a system that benefits the entire landscape.

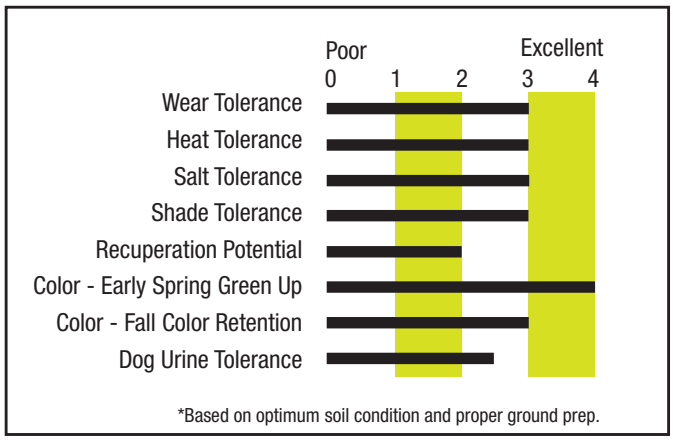
1. **Plan and design the landscape comprehensively.** Start with a site analysis, where drainage, exposures, soil types, views, and existing plants are identified. Next, develop a list of activities and support facilities that need to be included in the design. Continue by diagramming possible locations for the activities from the program, while also allowing for planned traffic patterns and access or screening. Finally, use this information to develop a plan that integrates plants into the overall scheme
2. **Evaluate soil and improve, if necessary.** Improve soil before planting and installing the irrigation system. Soil improvement promotes better absorption of water, improved water-holding capacity and drainage of the soils. It also allows for better oxygen transfer within the root zone.
3. **Create practical turf areas.** Include turf areas where they provide defined functions like for high traffic or recreational areas. Grass is best separated from plantings of trees, shrubs, ground covers and flowers so it can be watered separately. Perhaps some turf areas can be replaced with more water-efficient ground covers and mulches. Alternative plants for certain bluegrass areas may include tall fescue, buffalo grass, blue grama and wheat grass.
4. **Use appropriate plants grouped according to water needs.** Plants with lower water requirements, such as native species adapted to Colorado's climate, should be considered. However, other plants can have a place in xeric designs, even if they require larger amounts of water. The key is to use those plants in appropriate locations and not to interplant them with others that have very different, lower-water requirements. In effect, the groupings of plants are separated into zones based on their water requirements, which allows them to be irrigated efficiently.
5. **Water efficiently with a properly designed irrigation system.** Irrigate according to the condition of the plants, not on a fixed schedule. Well-planned sprinkler systems can save water when properly installed and operated. Turf areas should be watered separately from beds, shrubs and trees. Apply only as much water as the soil can absorb to avoid runoff. Trees, shrubs, flowers and ground covers can be watered more efficiently with low-volume drip emitters. To promote deep rooting, water infrequently, but deeply.
6. **Use mulch to reduce surface evaporation of water and weeds.** Mulches cover and reduce temperature extremes in the soil, minimize evaporation, reduce weed growth and slow erosion. Mulches also provide landscape interest. Organic mulches are typically bark chips, wood grindings or pole peelings. Inorganic mulches include rock and various gravel products. Place mulch directly on the soil or on breathable fabric. Do not use impermeable sheet plastic beneath mulched areas.
7. **Practice appropriate landscape maintenance.** Proper pruning, weeding, mowing, aeration, fertilization and irrigation adjustments and checks are crucial to maximize water savings. Regular maintenance preserves the intended beauty of the landscape and saves water and maintenance costs. Always water according to plant needs and current soil moisture conditions, and not on a rigid schedule.



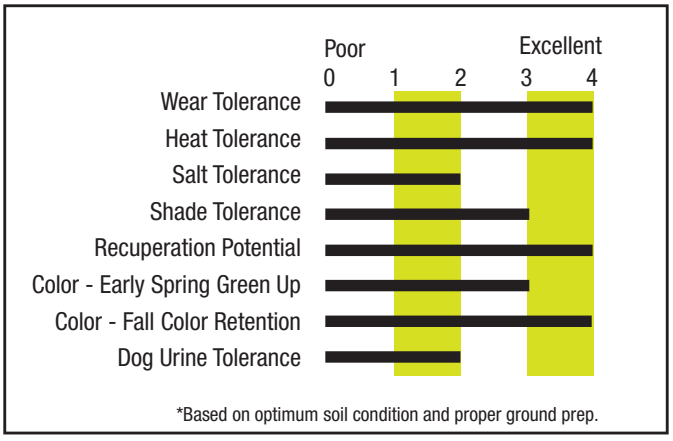
Common turfgrass varieties in Colorado



Bluegrass. Bluegrass is the most commonly used turf in the Rocky Mountain region. Newer improved varieties of Kentucky Bluegrass can offer dwarf-type growing habits and some drought tolerance depending on soil condition. In addition, Kentucky Bluegrass has a strong, deep rhizome structure to aid in fast recovery from wear and tear. It has excellent winter hardiness and summer performance. It can remain green from early spring to late fall under irrigated conditions. Bluegrass is recommended for use in residential or commercial areas, parks, sports fields, golf courses.

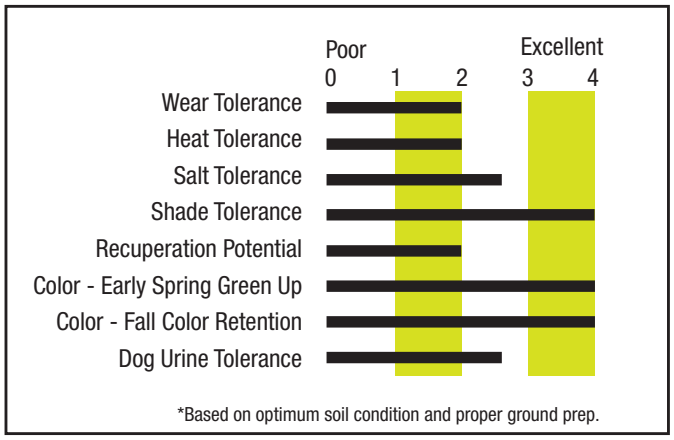


Tall Fescue. Tall fescue is a deep rooted, cool season grass. Most fescues possess dwarf-type growing habits and reduced vertical growth, and are very dense. The extensive root system can offer good drought tolerance depending on soil conditions. This turf grass has a root potential depth of 3-4 feet. Tall fescue does produce short rhizomes but has a bunch-type growth habit. Tall fescue is adapted to a wide range of soil and climatic conditions, but performs best on well drained soils. Tall fescue demonstrates good shade tolerance and can remain green from early spring to late fall under irrigated conditions. Recommended for use in residential landscapes, parks, cemeteries, commercial property and golf courses.



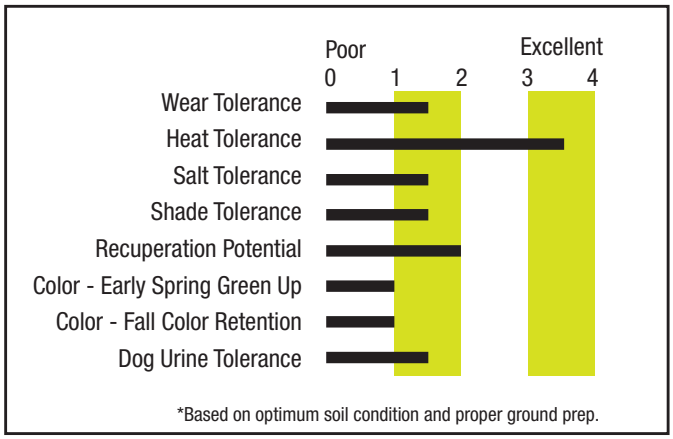
Hybrid Bluegrass (Texas Bluegrass). There are a number of potential advantages to using bluegrass hybrids for lawn and sports turf applications in Colorado. They possess excellent heat tolerance and, in fact, seem to grow better the warmer it gets in the summer. These hybrids produce an extensive root system, which enhances heat and drought resistance. This grass forms large, extensive and aggressive rhizomes (underground stems). Grasses that produce rhizomes are better able to tolerate traffic and will recover more quickly from traffic-induced wear. There is a good amount of anecdotal field evidence that these hybrid bluegrasses require less supplemental irrigation than some of the Kentucky bluegrasses.

Charts courtesy Rocky Mountain Sod Growers Association



Fine Fescue. Fine fescues can be an excellent choice for low maintenance lawns. The term 'fine fescue' collectively refers to at least five different species of fescue (hard, sheep, Chewings, creeping red, slender creeping red) that have very fine, but tough leaves. Fine fescues can do well on rocky, sandy and infertile soils, and those that are moderately salty. Fine fescues have excellent cold tolerance and are among the most shade tolerant of all turf species. Improved fine fescues can be mixed with Kentucky bluegrass for use in lawns that have both shady and sunny areas.

Fine fescues perform best under well-drained and drier conditions and require proper ground preparation. They typically require less fertilization than a typical bluegrass lawn. Fine fescues are used in low to moderate traffic lawns, shady lawns, and low maintenance/low traffic areas on parks and golf courses.



Buffalograss. Buffalograss is a warm-season grass that is green from May to September and is golden brown for the rest of the year. One full year of diligent maintenance is required before maximum results can be achieved. Buffalograss lawns are more easily invaded by weeds than other turf species. This is a warm-season grass species. It is a sod-forming grass that spreads by stolons (aboveground stems) which root at nodes, forming new plants. Buffalograss is native to the North American Great Plains, and displays a wide range of adaptability. Recommended usage: low traffic residential and commercial.

Charts courtesy Rocky Mountain Sod Growers Association



Landscape maintenance

Once landscapes are installed, proper maintenance becomes critical for ongoing health of plant materials and preserving non-living elements of the landscape. Well-maintained plants are more vigorous, survive longer and are less susceptible to storm damage, insects and disease. These problems are much less prevalent over the long-term when plants receive consistent, ongoing care.

Proper maintenance should include continual monitoring and regularly scheduled maintenance as well as preventive measures to protect against disease and pests, when warranted.

Sustainable best practices for maintenance include the following:

- **Water appropriately; never overwater.** Water plants according to season, weather and need and understand the different needs of annuals, perennials, grass and trees. The symptoms of overwatering are very similar to those of drought-stressed plants, so test the soil before you think the plants need water again. See the irrigation sections for specific guidelines on watering the landscape. Plants don't need as much water after they are established. ■ See page 3, Monitor your plants on an ongoing basis.
- **Prune properly and selectively.** Pruning should complement a plant's natural form. Properly pruned trees and shrubs are stronger, healthier and resist pests and weather damage.
- **Mow traditional turfgrasses to a height of three inches, and never cut off more than 1/3 of the total height of the grass.** Cutting off more stresses the grass. Keeping grass at optimal length allows the grass blades to shade the root zone and that helps to retain moisture so you can water it less.
- **Grasscycle.** Leaving grass clippings on the lawn after mowing recycles nutrients back into the turf and saves time and money.
- **Use fertilizers judiciously.** Properly apply fertilizers based on the specific needs of plants and turf. Use the appropriate fertilizer for the plants and always in accordance with the label.
- **Use pesticides and herbicides judiciously.** Accurately diagnose pests and diseases, and apply pesticides and herbicides only when needed in accordance with the label. Employ an Integrated Pest Management approach, which integrates a variety of management tools, with pesticide and herbicide use being the last choice. ■ See page 9, What is IPM.
- **Aerate the lawn.** Aeration opens up the soil to allow oxygen, water and nutrients into the root zone where they are most needed. Because aerating dry lawns can dry them out even more, the soil needs to be moist to get optimum benefits of aerating.
- **Properly maintain flowers, shrubs, ornamental grasses and trees.** This isn't just watering, but also includes managing weeds and pests, pruning, mulching, fertilization, and snow protection.




What is IPM?

An Integrated Pest Management (IPM) program refers to the process of gathering information and selecting the most appropriate corrective action for pest control. It is an all-inclusive approach that uses various practices, tailored to each specific situation or landscape, to suppress pests.

IPM incorporates some or all of the following practices to control a pest population:

Cultural practices. These include selecting sites that are less hospitable for particular pests; site preparation, sanitation and the use of pest-free plants during installation, and the timing of planting.

Biological controls. Biological controls use natural enemies such as parasites or insects. For example, lady bugs control aphids, some nematodes control grubs, and certain wasps control bark infestations.

Physical/mechanical methods. These include mowing and hand-weeding to control pests.

Resistant hosts. Plants that have a natural resistance to pests in Colorado will help repel and control pests.

Pesticides. Pesticides use pathogens to control specific pest populations. Insect growth regulators, microbial pesticides and biological control agents also target specific pests. Use synthetic product pesticides only when justified on a cost/benefit basis.

Effective pest management strategies require an understanding of several factors:

- The interrelationship between the pest, its natural enemy and the host plant or animal
- The life cycle of the pest
- The effects of different control methods on each other and the environment
- How pests are affected by weather and
- Sound landscape management practices such as the seven principles of Xeriscape. It is a system approach.

■ See page 5, Plants and planting.

Prior to treating any problems, take steps to identify and monitor the problem properly. Pests will be reduced by using the most suitable plants, correct pest identification, and regularly inspecting the site to determine and confirm the pests causing damage. Base an action decision on "injury level," i.e., when a pest population is causing an unacceptable amount of damage or the "action level," i.e., when a particular control method should be used to keep the pest population from reaching the injury level. Use the cultural, biological, mechanical, and chemical treatments most appropriate for the situation.

Soil

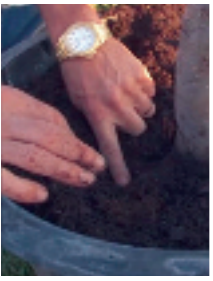
Healthy, productive soil is a key to a sustainable landscape. Even if you select plants that are well suited to the climate, they may not do well if soil conditions are poor or if the plants are not tolerant of local soils. "Feeding" the soil, instead of the plant, creates a better environment for plant roots, which makes it important to improve the soil throughout the life of the landscape. Some communities in Colorado have adopted soil amendment ordinances, so always check local codes for requirements.

- **Test soils prior to planting.** Sandy, loamy or clay soils all need different types of amendments to improve their ability to deliver plant nutrients, reduce erosion and improve drainage/water holding capability.
- **Compost beds and topdress turf regularly.** Soil improvement is a continuous process. The best soils for growing plants are uniform in texture throughout the root zone and have a good balance of minerals, air and organic matter.

- **Protect the soil.** Once amendments are added, keep construction equipment off the prepared surface to avoid compaction and other problems, and protect drainageways from runoff from exposed areas. Also, remove and store topsoil for reuse when possible.
- **Aerate to relieve compaction.** Aerate the lawn and beds periodically to improve the penetration of air, water and nutrients into the root zones of plants and turf. See page 8, Landscape maintenance.
- **Mulch beds regularly.** Applying a layer of mulch 3 to 4 inches deep that covers the surface of the soil will retain moisture, reduce runoff and moderate soil temperatures. Mulch can also help suppress weeds and maintain the attractiveness of the landscape. Check mulched areas at least monthly and replace as needed.

Soil testing

Evaluating soil conditions is an important step when installing or renovating a landscape. A professional soil test can provide valuable information about the pH, nutrient deficiencies and compaction of the soil at a site. Before adding any nutrients to the soil, it is important to determine whether a problem is due to inadequate nutrition, cultural issues, like overwatering, or a physical property, like poor soil texture. The results of a soil test will report on these issues and guide decisions on tilling methods, amendments and/or fertilizers needed to prepare the soil for planting. A soil test can be arranged through the local county extension service. Use a core sampler to get samples from several areas in the landscape before planting. Samples should be at least six inches deep, dry and without excess debris.



Considerations when composting on site

Compost piles are relatively inexpensive and easy to start. An obvious disadvantage is that the pile is not protected from animals and less heat is produced. Compost bins help with heat production, they contain waste and have lids to prevent animals or rodents from causing problems. However, the bins must be turned, which is necessary to aerate and break down waste. Compost tumblers are also available, and can be turned by a crank or by rolling on the ground, so waste breaks down sooner. Tumblers are the most expensive option.

Benefits of composting

Composting is a key component of sustainable practices. It turns waste into useful soil, it keeps waste out of landfills, and it recycles on site with very little energy input. Compost has a host of environmental benefits which include the following:

- It retains moisture.
- It can enhance water quality by improving absorption and minimizing runoff.
- It has been proven to increase yields in edible gardens and fruit trees and increase worm activity in the soil.
- It helps suppress plant diseases.

Better water filtration into the soil can reduce groundwater pollution, miitigate erosion and minimize the use and need for pesticides and fertilizers by providing nutrients naturally. It goes without saying that composting is a key component of sustainable practices.

Compost (and other soil amendments) improve the physical properties of soils. The best amendments increase water and nutrient-holding capacity and improve aeration and water infiltration. Composting on site allows you to control what goes into the pile or bin, and thus what goes back into the soil. A return on investment can be immediate if you compost correctly – and it reduces overall waste by keeping compostable items out of landfills. The average American produces about 1600 pounds of waste per year according to the EPA.



Benefits of composting, continued

Items that should not go into compost include:

- Meat or animal products, as they can harbor bacteria.
- Grains, breads, oils, and fats, which can attract rodents
- Dog or cat waste, as it can harbor parasites
- Toxic, poisonous or non-biodegradeable items
- Diseased plants
- Weeds with strong root systems or that have already gone to seed

Understanding soil moisture is also important when managing a landscape. Professionals and their clients can perform a simple soil moisture test. For example, to see if the lawn needs water, get out a screwdriver and push it into the soil. If the ground is hard and resistant, you need to water. When water starts to run off or puddle, stop watering.

Landscape materials


Many different materials are used for landscape function and aesthetics. "Hardscape" materials are the non-living components of a landscape and are used to create walkways, patios, arbors, walls and other features. There have been great advances in landscape materials and hardscaping practices that are more sustainable than conventional materials. Think about ways to reduce consumption on these items when possible.

- **Consider how existing structures and materials can work in a new plan.** A key to sustainability is not destroying something that can be reused in the first place. Often, existing structures, paving, or walls can be incorporated into a renovated landscape and provide a fun aesthetic.
- **Order only what you'll need and use.** It's tempting to over-order materials "just in case." Conversely, it's common to not order enough, which means spending more resources to retrieve materials. Be diligent in measuring and estimating – this reduces material waste and cost. Work with suppliers to avoid over- and under-ordering.
- **Reduce impervious surfaces.** Permeable surfaces allow water and nutrients to soak into the soil and improve landscape health in general. They also prevent unnecessary runoff and stormwater pollution. Choose porous surfaces over impermeable ones to keep water on site rather than in the gutter. Convert unused hardscape areas into planting areas to reduce the heat island effect and lower energy use and cost.
- **Avoid using materials that may cause damage when produced.** This includes using wood from sustainably certified sources, materials with recycled content and choosing products with the lowest possible VOC content. Consider a product's life cycle when choosing landscape materials. ■ See page 12, Health section.
- **Source locally.** The global/local concept is an important tenet of sustainability. Find rock, wood, gravel and stone from nearby sources – they give a local flair. Transporting materials from other regions or countries is expensive and uses other natural resources.
- **Use energy efficient products.** Decrease power, and energy use and lower operating costs over time by

choosing low-energy lighting, pumps, and equipment. Consider equipment with alternative fuel sources when appropriate.

- **Maintain equipment.** Regular maintenance and repair will keep fuel and replacement costs down.
- **Minimize waste hauling.** Again, reusing materials means less debris to the landfill. Consider materials with long life spans, compost when possible and recycle yard waste and other cleared material, and return pallets and plastic pots for reuse. Also, consider using tarps or burlap bags instead of plastic.

The health benefits of a landscape

Sustainable landscapes can include a number of elements that can benefit human health and wildlife community. Edible landscapes, therapy gardens, and designated wildlife habitats are examples.

- **Design rain gardens through proper grading and drainage practices.** Plants and soil are one of nature's best filters and cleaners. Direct the water through the landscape so it's clean by the time it gets to the storm drains.
- **Choose products that don't pollute the environment.** Volatile organic compounds (VOCs) can hurt the environment by contributing to ozone problems. Choose products with the lowest possible VOC content. It will be listed on the label. Pay attention to chemical use and landscape materials to ensure water isn't inadvertently contaminated.
- **Grow food.** "Local" applies to food as well. Growing your own herbs, vegetables and fruits can reduce food and energy costs and make a landscape more productive. Edible gardens don't have to be a separate feature. Incorporate edibles into beds or containers with companion plants, which can mitigate insect damage and provide an aesthetic value to a landscape.
- **Plants as therapy.** Meditation or healing gardens can be a source of refuge, which may improve mental and physical health. Gardening also offers an opportunity for stress relief and exercise.
- **Healthy landscapes reduce the need for chemicals.** There is a direct connection between the health of well-maintained plants, trees and grasses and the judicious use of pesticides and fertilizers. A healthy lawn that is properly fertilized, mowed and irrigated will typically outcompete most weeds, have fewer insect problems and resist diseases.

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- Green Industry Best Management Practices for the Conservation and Protection of Water Resources in Colorado: Moving towards Sustainability, Green Industries of Colorado (GreenCO)
- Landscape for Life, www.landscapeforlife.org
- Landscape Training Manuals for Installation, Maintenance and Irrigation Technicians, PLANET
- Plant Select® photos
- Rocky Mountain Sod Growers Association
- Sustainable Sites Initiative, www.sustainablesites.org

Glossary of Landscape Terms

Aeration: Process of loosening or puncturing the soil to increase water penetration. Mechanical aerators are used to create holes in turf grass that increase the amount of air, water and nutrients getting into the root zone.

Amendment: Any substance, such as manure, peat or mulch, used to alter the properties of soil and improve soil quality for optimal plant growth.

Backfill: Soil used to fill a planting hole after the plant has been positioned, e.g., amended soil is often used.

Beneficial insects: Sometimes called beneficial bugs, they are any of a number of species of insects that perform valued services like pollination and pest control. Lady bugs are a common example. (See Integrated Pest Management).

Best Management Practices (BMPs): Green Industry Best Management Practices for the Conservation and Protection of Water Resources in Colorado: Moving towards Sustainability, produced by Green Industries of Colorado (GreenCO). These are specific, voluntary practices undertaken to reduce water consumption and protect water resources and the natural environment. The BMPs have been adopted by the State of Colorado and the Colorado Water Conservation Board as the standard for outdoor watering and conservation for the state.

Clay: Very fine soil particles. Clay soils are often called heavy soils and are characterized by slow movement of water through the soil.

Compost: A mixture that consists largely of decayed organic matter and is used for fertilizing and amending soil.

Deciduous: A tree or shrub that loses all of its leaves, usually in the fall.

Disease: A pathogen – such as a harmful organism - that impairs the normal function or development of a plant.

Embodied energy: The commercial energy (fossil fuels, nuclear, etc.) used in work to make any product, bring it to market and dispose of it. It is an accounting methodology aiming to find the sum total of the energy necessary for an entire product lifecycle. This lifecycle includes raw material extraction, transport, manufacture, assembly, installation, disassembly, deconstruction and/or decomposition.

Erosion: Erosion is the process by which soil and rock are removed from the Earth's surface by natural processes such as wind or water flow, and then transported and deposited in other locations.

Evaporation: Water loss from land and water surfaces caused by wind, solar exposure, etc.

Evapotranspiration (ET): The combination of evaporation (water loss from land and water surfaces) and transpiration (water loss from plants).

Evergreen: Plants that do not lose all of their leaves at once (seasonally). Evergreens can be conifers, such as pine trees, or broad-leaved plants, such as holly.

Fertilization: The application of nutrients to promote plant vitality.

Grasscycle: The practice of leaving grass clippings on the lawn to mulch and nourish the soil, rather than bagging them. This procedure not only adds nitrogen back into the lawn, but also shades the soil, which helps prevent weed seeds from germinating and helps soil retain moisture.

Groundwater: Water located beneath the earth's surface in soil pore spaces and in the fractures of rock formations.

Hardscape: "Hard," non-growing, areas within a landscape, such as patios, decks, driveways, paths and sidewalks or walls.

Herbaceous: Plants with soft, non-woody stems. Generally refers to plants that die back to the ground each year.

Herbicide: A substance used to kill plants. An herbicide can be selective (designed to kill a narrow range of plants) or non-selective (designed to kill any plant it contacts). Herbicides, for example, are often developed to kill specific types of weeds.

Hybrid: Cross between two plants of different variety, species or genus. They are usually created to produce plants with specific characteristics, such as disease resistance, unique flower color, etc.

Hydrozone: A distinct grouping of plants with similar water and climatic needs. Grouping plants according to their respective hydrozones is one way to avoid over- and under-watering.

Impervious: Not allowing something to pass through; not penetrable. In landscapes, impervious areas do not allow water to penetrate the soil. Examples of impervious surfaces include concrete, asphalt, stone and brick.

Insecticide: A substance used to kill insects such as grubs and borers.

Integrated Pest Management (IPM): The coordinated use of pest and environmental information with available pest control methods to prevent unacceptable levels of pest damage by the most economical means and with the least possible hazard to people, property and the environment. IPM methods include a combination of strategies involving mechanical/cultural, use of both beneficial and predatory insects and applications of pesticides. (See Beneficial Insects).

Irrigation audit: Procedure to collect and present information concerning the uniformity of water application, precipitation rate, and general condition of an irrigation system and its components.

Irrigation zones: Sections of an irrigation system that operate one at a time to distribute water to landscaped areas. Zones must be created because most sprinkler systems do not have enough water to irrigate the entire property at one time. A programmable timer or controller determines when and how long each of the zones operates.

Landscape evaluation: A review of the entire landscape that can assess conditions and identify problems, such as drainage issues, threats to plant health, etc.

LED lighting: LEDs, or light-emitting diodes, produce more light per watt than incandescent bulbs. LED bulbs typically last more than 15 times longer, use less energy, are more damage resistant and focus light better than traditional incandescent bulbs.

Microclimate: The climate of a specific area in the landscape that has substantially differing sun exposure, temperature or wind than surrounding areas or the area as a whole.

Monocultures: Agricultural practice of producing or growing a single crop or plant species over a wide area and for a large number of consecutive years. In a landscape setting, a monoculture would involve planting just one variety of plants in the landscape, for example, planting only oak trees in a park.

Node: a junction in a plant stem or root where new growth emerges, such as a leaf, root or the next season's growth.

Overspray: Relative to a sprinkler system, water is directed beyond the area intended to be irrigated. The result can be runoff and waste of water resources.

Pervious: Allowing something to pass through. In a landscape, pervious surfaces such as mulch, allow water to pass through and penetrate the soil.

Pest: Something that can negatively impact plants. Weeds, undesirable insects and diseases are all considered pests.

Pesticide: Any substance or mixture of substances intended to prevent, destroy or control any pest, including unwanted species of plants or animals causing harm and vectors of human or animal disease.

Rhizomes: Horizontal underground stems that strike new roots out of their nodes down into the soil and shoot new stems out of their nodes up to the surface. Rhizome activity is a form of plant reproduction. Examples of plants with rhizomes include grasses (Bluegrass and Buffalo grass), iris and day lilies.

Runoff: The portion of rain or irrigation water on an area that is lost without entering the soil.

Sand: Large soil particles. Sandy soils (containing high percentage of sand particles) are characterized by rapid water movement through the soil and can be improved with soil amendments such as manure, peat or mulch.

Silt: Soil particles that are larger than clay and smaller than sand.

Soil structure: The combination of various soil particles (sand, silt, clay) that create a distinctive shape or arrangement. Single particles, when naturally assembled into aggregates, define the characteristics of pore spaces. The addition of organic matter to the inorganic components of sand, silt and clay creates soil structure and determines how different types of soil are described: e.g., clay loam, silty loam, medium loam, etc.

Stolons: Specialized type of plant stem which the plant uses to propagate itself. They are capable of budding to produce clones of the parent plant, thereby allowing the plant to colonize an area of ground with its young. Example: A stolon can be found on the strawberry, a plant which utilizes this method of propagation very effectively. Many grasses also colonize regions in this way, as do some aquatic plants.

Storm water: Any surface flow, runoff, and/or drainage consisting entirely of water from any form of natural precipitation, which is not absorbed, transpired, evaporated or left in surface depressions, and which then flows controlled or uncontrolled into a watercourse or body of water.

Transpiration: The process by which plants emit water vapor through their leaves.

Water budget: An effective tool for designing and maintaining water-efficient landscapes during both normal and drought conditions. Water budgeting identifies the amount of water needed for healthy landscapes. Comparison of actual water used to the water budget provides a basis for adjusting water usage to reduce water waste.

Weed: An unwanted plant, often having an aggressive growth habit that can choke out more desirable plants.

Xeriscape: Xeriscape involves a system of seven basic principles that, when properly implemented, result in landscape water conservation. The concept was developed in Colorado by Denver Water in partnership with the landscape industry.