

Plan and Design:

Like a house, a well-designed landscape should start with a plan, or rather, a series of plans. The first plan is a base plan which shows the major elements of the current landscape, including the footprint of the house, driveway, patios, walkways and all existing trees, shrubs and garden beds. The base plan should also show directions (indicate which way is north), and should include the location of spigots, downspouts and external electrical outlets.

A base plan needs to be drawn to scale. The easiest way to do this is to use graph paper with eight or ten squares per inch (1:8 or 1:10 scale). You'll probably also need a friend or spouse to help hold the tape measure as you work your way around the yard.

Once the base plan is complete, the next step is to make a bubble diagram. This involves taking a copy of the base plan and adding descriptive notations ("bubbles") to indicate such things as views that need to be enhanced, areas that need screening for privacy, and areas that have specific uses. This is the time to decide how you want to use various areas in your yard. For instance, if you like to barbecue, you'll need to include an outdoor cooking area. If you have children or pets you'll need a play area. You may even want a "library" - a private niche where you can retreat with a good book.

The final step is to use the bubble diagram to come up with a well-defined landscape plan, identifying specific site details (fences, trellises, decks, etc.) and a planting scheme. The landscape plan serves as the blueprint for constructing the finished Xeriscape, so you'll want to be as specific as possible when it comes to the type and number of plants. Group plants according to their light and water requirements - don't put plants that like dry conditions in the same area as plants that need frequent watering. Put taller plants in the back of the garden bed, and shorter plants near the front.

Create Practical Turf Areas:

Contrary to what you may have heard, converting your yard to Xeriscape does NOT mean you have to get rid of all the grass. It does mean you need to think about where it makes sense to have grass, rather than just putting turf everywhere. While traditional landscaping in America has always included expanses of lawn, in Colorado's semi-arid climate many grasses need a lot of supplemental irrigation to stay green and lush. That's why it's important to limit grass to areas in the yard that need to be useful lawn.

For instance, areas that get a lot of foot traffic might do better with walkways, decks or patios instead of turf. Heavily shaded areas would do better with a groundcover such as vinca or sweet woodruff, which are more shade-tolerant than turf. Narrow strips such as the tree lawn between the sidewalk and the street are difficult to irrigate with spray heads without also watering the sidewalk and street. Replacing the turf in these areas with drought-hardy plants and drip irrigation will eliminate water waste. And anyone who's ever tried to mow grass on a

steep slope will appreciate how much easier it would be if the grass were replaced with groundcovers and low-water perennials.

In areas where turf is appropriate, select the type of grass that best suits the site. For instance, warm-season grasses such as buffalograss and blue grama are very water-conserving, but not very tolerant of heavy foot traffic during their long dormant periods. A good spot for a warm-season grass might be a sunny front yard where most of the foot traffic is confined to the sidewalk. Cool-season grasses like Kentucky bluegrass are more traffic tolerant but require considerably more water to stay green during the summer. Cool-season grasses would do well in a back yard where children or pets will play.

A useful website is <http://www.westernslopeturf.org>.

Select and Group Plants Appropriately:

There is a misconception among some people that the only plants allowed in a Xeriscape are cactus and other desert perennials. Nothing could be farther from the truth! There are a large number of plants that do well in our semi-arid climate with little or no supplemental irrigation. The trick to waterwise gardening is to put the right plants in the right place.

Different plants have different requirements when it comes to light, soil and water. And every yard contains several different microclimates. You want to put plants in the microclimate that most closely matches their needs. For instance, plants that like sun and dry conditions, such as Ice Plant, Snow-In-Summer and Yarrow, would do best in a southern or western exposure, in areas that get watered infrequently. Plants that prefer cooler sites, such as Sweet Woodruff, Kinnikinnick and Coral Bells, would be happier with an eastern or northern exposure, or in areas that are shaded by other plants. Higher water-using plants would do best in low-lying drainage sites or areas next to downspouts.

To make it easier to irrigate efficiently, plants should also be grouped by sprinkler zone according to their watering needs. Don't put low-water shrubs like Rabbitbrush or New Mexico Locust in the midst of a zone where the majority of plants need regular irrigation. And for the sake of your house foundation, try to limit the plants nearest the house to those that need little irrigation.

Because there is such a large palette of plants that do well in our climate, you can also select plants based on color, texture or fragrance. For instance, you might want to turn one bed into a butterfly garden, and select plants whose blossoms attract butterflies. There are books available to help you with your plant selection.

Improve the Soil:

Soil is the foundation of every landscape. The better the soil, the more successful a Xeriscape will be. Soil is made up of three main types of particles - sand, silt and clay. In Colorado our soils tend to be either primarily clay or primarily sand. Clay soil has a high moisture retention capacity, but it is slow to absorb water and slow to release it. When water is applied too quickly to clay soil, the soil can't absorb it and most of it runs off. Clay soil also tends to be heavily compacted, making it difficult for plants to establish the deep root systems necessary to survive a drought.

Sandy soil has the exact opposite characteristics. It has excellent drainage and lots of air space for root growth, but does a poor job of retaining moisture and nutrients. Water applied to sandy soil tends to percolate quickly down to the water table. This limits the amount of time plant roots have access to the water.

Fortunately there's a way to improve both clay and sandy soil. That's to amend it by adding lots of organic material, such as aged compost and/or manure. The ideal way to do this is to spread three to five inches of organic material over the top of the existing soil, and rototill as deeply as possible (a depth of six inches is considered sufficient.)

Once a landscape has become established it is much harder to improve the soil. Organic material can be applied to garden beds and worked in by hand. Existing lawns can be top-dressed. This involves spreading a very thin layer of compost (no more than 1/4 inch) over the lawn and letting it slowly sink to the soil level. Over the course of several years regular top-dressing will help build an organic base.

One important note: some native plants prefer soil that is low in organic matter. Before amending the soil, check with the local Cooperative Extension Office to find the best soil preparation practices for specific plants. To find your local office, check the phone book or visit their website, www.ext.colostate.edu

Mulch:

Mulch is an essential component of gardening in a semi-arid climate like ours, for several reasons. Mulching minimizes evaporation. It cools plant root zones, which reduces the amount of water plants lose through evapotranspiration. It reduces weed growth, and it helps control erosion. Mulch also adds a finished look to the garden.

There are two basic types of mulch - organic and inorganic. Organic mulch is wood-based, such as pole peelings, chipper chips, cedar chips, and deco bark. Organic mulch will decompose over time and improve soil texture, but it will need to be replaced periodically. It's an ideal choice in new gardens, where plants are much smaller than their mature size. The mulch will fill in the empty spaces and slow weed growth. As the plants mature and spread, they'll cover the mulched area so you won't have to keep replacing the mulch.

Inorganic mulch is stone-based. Types of inorganic mulch include cobblestone, river rock, pea gravel and lava rock. Inorganic mulch rarely needs to be replaced, but it tends to retain and radiate heat so it's not the best choice to go along the sunny side of a house. It works best in a more formal setting where the rock will remain visible even when plants are mature.

Organic mulch should be applied directly on top of the soil in a three to four inch layer. Inorganic mulch may be applied on top of the soil or over a weed barrier fabric, and should be layered two to four inches deep. [NOTE: never apply mulch over black plastic. Plastic doesn't allow moisture or air to penetrate, and can kill useful organisms in the soil.]

Efficient Irrigation:

Once you've installed a Xeriscape, it's important to water it efficiently. Efficient irrigation is the planned management of water in the landscape to prevent waste and over use. In order to achieve this goal you must understand both the plant water requirements and the operating specifications of the irrigation equipment. **BASIC PRINCIPLES** Although irrigation systems can range from a new automatic system to a sprinkler attached to the end of a hose, there are some basic principles that will allow you to be more efficient with your water use.

The best time to water is during the morning or evening hours. Watering in the middle of the day when wind and evaporation rates are highest is not very efficient. Most of the water applied between 10 am and 6 pm barely reaches the plant due to evaporation and wind.

Keep water close to the ground. Avoid the oscillating type of sprinkler that sends water high into the air. Stationary sprinkler heads (spray heads) that keep the water fairly low or sprinklers that move horizontally from side to side (rotary heads) are less prone to evaporation and wind drift. Drip, micro-sprays, bubblers or emitters are the most efficient for watering flowers, shrubs and trees.

Design your sprinkler system or plan your hose placement so that a given zone or hose placement waters plants with similar watering requirements at the same time. For automatic sprinkler systems, never mix different irrigation methods on the same zone. All methods, fixed spray head, rotary head and drip emitters apply water at different rates. Trying to irrigate plants with different water requirements at the same time or mixing irrigation methods will result in either over-watering some plants or under-watering others.

Check your system regularly for leaks, broken or misaligned heads and make the repairs promptly.

Your irrigation schedule should be changed at least once a month to reflect seasonal changes in water requirements.

SCHEDULING Scheduling your irrigation run times can often be one of the most confusing things about watering your landscape. Fortunately, when boiled down to the basics it can be fairly easy. Plant water requirement can vary greatly depending on the choices you make in the design process. Using the information discussed in the **Select and Group Plants Accordingly** section will allow you to irrigate plants with similar watering needs more

efficiently. Once you know the plant water requirements the operating specifications of the irrigation system will determine how long to water in order to meet the plants needs. Determine your irrigation schedule by establishing the irrigation application rate of each zone or hose end sprinkler. The application rate is how much water your sprinkler system applies to your landscape in a given amount of time. Application rates are usually defined as inches per hour (in/hr). There are two ways to determine the application rate of your sprinklers. A rough estimate of your application rate can be found by determining your sprinkler type and consulting the manufacturers catalog or website. The preferred and most accurate way is to perform a "catch can test". To perform this test simply place three or more identically sized empty cans at various distances from the sprinklers within a given zone, preferably in a grid pattern. Turn the sprinkler zone on for 15 minutes, after turning off the sprinkler system determine the total amount of water collected and divide by the number of cans used. This will tell you how much water is being applied in 15 minutes. To convert to inches per hour simply multiply times 4. Once you have completed this test you will know how long you need to run your sprinklers to meet the water requirements of your landscape. Example:

You have a sprinkler zone irrigating Kentucky bluegrass that you've determined has an application rate of 1.5 inches per hour. If you live in the front range, in late July, Kentucky bluegrass requires approximately 1.5 inches of water per week. If you do not live in the front range area, check with your local county extension office, they will have information as to the amount of water Kentucky bluegrass requires.

Divide the plant water requirement by the sprinkler application rate and multiply by 60 minutes to determine the number of minutes per week you need to run your sprinkler system to meet the plant requirement. $1.5 \text{ in/hr} \div 1.5 \text{ in/week} = 1 \text{ hr/week} \times 60 \text{ minutes} = 60 \text{ minutes per week}$ In this example you would want to run this particular sprinkler zone for 60 minutes per week to meet the plant water requirement of 1.5 inches per week. Other factors to be considered when scheduling irrigation run times are distribution uniformity and soil type.

Distribution uniformity is a measurement of how evenly your sprinkler system applies water across the entire zone. Distribution uniformity is measured as a percentage with 65% expected for spray sprinklers and 70% expected for rotary sprinklers. Sprinkler systems with high uniformity have to apply less water to meet plant water requirements. Sprinkler systems with low uniformity have to apply more water to compensate for areas where water is not being applied uniformly. Increasing distribution uniformity will allow you to apply less water and irrigate your landscape more efficiently.

Soil types are important in irrigation scheduling because not all soil types accept water at the same rate. Clay soils can typically accept water at rates less than .25 inches per hour, whereas sandy soils can accept water at rates over 1 inch per hour. Knowing your soil type allows you to schedule your irrigation so that runoff is less likely to occur. With clay soils you will have to employ a technique called **cycle and soak** to avoid runoff. If you water for 20 minutes and runoff occurs after 10 minutes, you should schedule your irrigation to run for 10 minutes, wait at least one hour for the water to soak in and then schedule the irrigation system to water the last 10 minutes. The easiest way to determine when runoff will occur is to run your irrigation system and time how long it takes before water begins to runoff. Make note of this so that you can schedule your irrigation accordingly. Read the **Improve the Soil** section to learn about the benefits of soil amendments.

NEW TECHNOLOGY There are many new technologies available to help you manage the amount of water you apply to your landscape. Increased Uniformity **Sub-Surface Drip Irrigation** – Ideal for narrow strips of turf (less than 10 feet wide) and dense planting beds. Irrigation water is applied where it is needed, at the root zone.

www.netafim.com

www.rainbird.com

High-Uniformity Nozzles – Several manufacturers sell nozzles designed to increase the uniform application of water by sprinkler heads. Nozzles with multiple rotating streams, called rotary nozzles, have proven to increase uniformity.

www.hunterindustries.com

www.rainbird.com

Scheduling ET (Evapotranspiration) Controllers – These controllers monitor the local weather and adjust your irrigation run times accordingly. They receive their information via either satellite paging or from an on-site weather sensor. The initial set-up of these controllers can be complicated as you need to know information such as plant type, soil type, application rate, slopes and more. Most controllers feature default values to help the average homeowner. These controllers should be used in conjunction with an efficient irrigation system meeting minimum Distribution Uniformity standards.

www.hunterindustries.com

www.weathertrak.comwww.smartline.comwww.irritrol.com

www.toro.com

Soil Moisture Sensors – These devices measure the amount of moisture in the soil and adjust your irrigation run times accordingly. They are typically an add-on device to your existing irrigation controller. The moisture in the soil around your plant material can often be an accurate measurement of the need for irrigation. Again, these devices should be used in conjunction with an efficient irrigation system.

www.baselinesystems.com

www.irrometer.com

Rain Sensors – This is a device that automatically shuts down the irrigation controller when a specified amount of rain has been measured. When the sensor has dried out, the irrigation controller will automatically resume at the next scheduled start-time. Landscape plants can and do benefit from seasonal rainfall. By stopping or preventing the irrigation controller to run when it has rained, thousands of gallons of water can be saved. These are a great add-on that are fairly inexpensive.

www.hunterindustries.com

www.rainbird.com

www.toro.com

An excellent website for further information on turf irrigation management is
<http://www.westernslopeturf.org>

Maintain the Landscape:

No garden is completely maintenance-free. Like more traditional landscape, Xeriscapes require regular maintenance to look their best. This includes pruning shrubs and trees, deadheading perennials, aerating, mowing and fertilizing lawns, and controlling pests.

Pruning

Regular pruning keeps plants looking good and promotes plant vigor. Also, many shrubs bloom on new wood, so pruning is necessary in order to have flowers. The best time to prune most shrubs and trees is in the winter to early spring. Prune dead or unwanted branches slightly away from the trunk, on the outer edge of the branch collar (a ring of compressed bark at the branch crotch). Leave the entire branch collar in tact, to allow new bark to form over the cut.

Deadheading

Deadheading means removing spent flowers before they mature into seed heads. Deadheading makes the garden look more attractive, helps prevent unwanted, self-sown seedlings, and encourages the plant to produce more flowers. Many plants, including valerian, catmint and salvia, will bloom repeatedly during the summer if deadheaded.

Aerating

Regular core aeration will reduce thatch buildup and loosen the soil. This promotes better root growth, and allows water and fertilizer to move into the root zone. Core aeration can be done with a core aeration machine or a manual aeration device. The plugs can be left on the lawn to disintegrate or can be added to compost piles. Core aeration is best done twice a year, in spring and late summer.

Mowing and fertilizing

Lawns should be mowed to a height of 2-3", and should be mowed frequently enough so that no more than 1/3 of the grass height is removed at any one time. Make sure the mower blades are sharp, and don't water when the grass is wet. Fertilization schedules will vary according to the type of grass involved.

Controlling pests

The most effective way to control garden pests is through Integrated Pest Management (IPM). There are four steps to IPM - discovering the problem, identifying the cause, monitoring the situation, and managing the problem through a variety of techniques, including using disease-resistant plant, spraying insects with water, using sprays of BT bacteria to manage caterpillars, and using pesticides or herbicides.

Your local Colorado State University Extension office is a great source for more information on this topic.