

Chapter 1: The Fundamentals of Waterwise Landscaping

A manual about rainwater harvesting in New Mexico would not be complete without a discussion of the basic principles and techniques of waterwise landscaping (also known as dryland landscaping or xeriscaping). By applying waterwise principles to your landscape, you will not only get the most out of the available water supply, you will also enjoy the beauty and diversity of native and other low-water-use plants.

The term *xeriscape* is derived from the Greek word *xeros*, meaning “dry.” The goal of xeriscaping is to create a visually attractive landscape that uses plants selected for their ability to thrive in local climates. In New Mexico, this means using plants that can grow with very little (or no) water, other than what nature provides.

There are seven basic principles of xeriscaping and dryland gardening:



1. Planning and Design. A beautiful xeriscape starts with a good design. The physical characteristics of the site must be considered, as should your needs and aesthetic preferences. The design of a landscape, especially a roof-reliant landscape that includes a cistern system, is such an important topic that Chapter 4 delves into it in detail.



2. Soil Improvements. New Mexico’s soils typically lack the organic matter necessary to provide sufficient plant nutrients and water retention. Native plants tend to need less organic matter than adapted plants, but most plants benefit from the addition of some organic matter, such as compost, into the soil.

Compost helps sandy soils retain water and helps clay-dominated soils drain faster. When water mixes with compost in soil, the resultant carbonic acid dissolves the 18 essential elements typically found in compost so that plant roots can more easily take up these nutrients. Compost also aerates the soil so that plant roots can maintain their optimal moisture content. In these improved conditions, the insects, microorganisms and mycelium found in healthy soil can thrive, so plants can establish themselves quickly in the landscape.

Perhaps you have already been diligently making compost with your kitchen scraps and yard waste in a convenient, shaded and wind-protected corner of your garden. Maybe you’ve even added rabbit, chicken or horse manure, or some other source of nitrogen to your compost pile. Chances are, however, that you may need to either import compost (to mix into your existing soil) or bring in some premixed topsoil.

But don't give plants (especially native plants and other plants that like "lean" soil) too much of a good thing. Roots pampered by too-rich soil are likely to be stunted when they grow to the outer edges of the imported soil and hit the hard edge of existing native soil. Those pampered plants will not be as hardy, particularly in drought or precipitation-only conditions.

Smart roof-reliant landscapers understand that the best time to complete the soil-building part of the project occurs when cistern excavation equipment is onsite, particularly when installing a new landscape. With impressive efficiency, a backhoe can often handle much of the excavation, importation and mixing processes of soil improvement. Heavy equipment can also efficiently remove layers of cement-like caliche, which sometimes plague New Mexico's soil.

If it is not practical to use heavy excavation equipment to mix compost into your soil, consider renting a jackhammer to loosen up hard soil. Rototillers are also helpful when mixing compost and other organic matter into the soil.



Appropriate Turf Areas

3. Appropriate Turf Areas. Xeriscapes in New Mexico tend to minimize turf areas because traditional Kentucky bluegrass lawns are not native to our desert and dry mountain climates, and they use prodigious amounts of water. Small turf areas, particularly those using drought-tolerant grasses such as buffalograss and blue grama, can provide appropriate play areas for outdoor activities. However, it is not recommended to use cistern-based systems to irrigate turf areas, so this roof-reliant landscaping manual does not deal with lawn applications.



Low-Water-Use Plants

4. Low-Water-Use Plants. Choosing appropriate plants for your local area and for the specific conditions on your property is a key element in creating a roof-reliant landscape. For example, the range of waterwise plant options near Red Bluff Reservoir (elevation just under 3,000 feet) in southern New Mexico is very different from the plant palette for the village of Truchas (elevation just over 8,000 feet) in northern New Mexico. Local plant nurseries, landscape designers and other landscape professionals, horticulturists, native plant societies, local master gardeners and county extension agents can be invaluable resources for information about the types of plants that are appropriate for your landscape.

To conserve water, choose native and low-water-use plants whenever possible. Understanding the particular needs of your plants is also crucial. Soil conditions, sunlight requirements, water and spatial needs (i.e., the sizes and shape of root zones and branching habits) will all affect the long-term success of your roof-reliant landscape.

Xeriscaping uses the concept of plant "zoning" or grouping. By grouping plants with similar water needs together in specific "zones," the landscape can use water more efficiently. Low-water-use plants should be grouped together, away from the high-water-use plants. (See page 41 for a complete description of plant zoning.) Also, take advantage of warm or cool "microclimates" (the small areas of different climatic conditions around a property that typically occur near walls, shade trees, etc.).

Using microclimates as places to group plants with similar needs is a great way to create areas of interest and diversity in the landscape. (See Figure 1-1.)

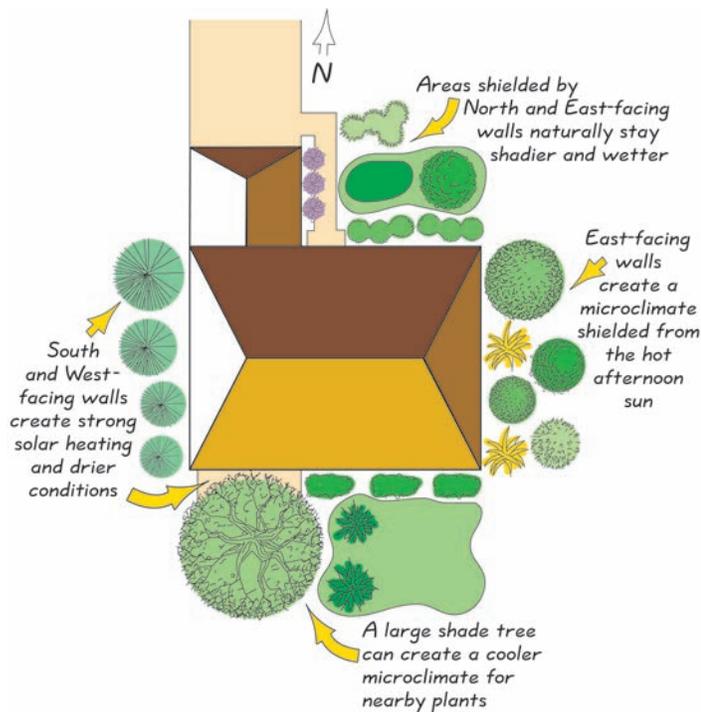


Figure 1-1: Microclimates are small areas in a landscape that typically occur near walls, underneath shade trees or by another landscape feature.

From a plant-choice standpoint, other kinds of useful information come into play, too. Is a particular tree species a shade tree or an ornamental tree? Does a species of flowering perennial bloom in spring, summer or fall? Will this shrub grow tall enough and densely enough to block the wind when you are sitting at a table on your patio? Will this flower's fragrance make you smile or sneeze?

A roof-reliant landscaper must also consider these additional plant characteristics: (1) whether a species can be established in three to five years, (2) whether a species will typically, once established, bounce back from drought and (3) whether a particular species can survive with precipitation water only. The Office of the State Engineer is developing a statewide xeric plant list, *Waterwise Plants of New Mexico*, that will be helpful in this regard. Email waternm@state.nm.us or visit <http://www.ose.state.nm.us> (click on Water Use and Conservation).

Efficient Irrigation



5. Efficient Irrigation. It doesn't make sense to design a roof-reliant landscape that uses water inefficiently. A well-planned and well-maintained irrigation system significantly reduces a landscape's water use, which is especially important when relying on rainwater harvesting for most or all of its irrigation water. For the most efficient use of water, irrigation zones should be designed so that low-water-use plants receive only the water they require. Low-volume drip emitters are the most effective mechanism to deliver water to the root zones of most trees, shrubs and perennials. Chapter 10 covers the distribution of water to the landscape in detail, including drip irrigation, the most efficient watering method.

Mulch



6. Mulch. After building healthy soil by adding compost and planting water-thrifty plants in the appropriate locations, you will want to further conserve water and promote plant health by spreading a thick layer of mulch over your improved soil. Mulch does five critical things for soil: it shades, insulates, prevents erosion, adds

nutrients (especially if fibrous mulch such as shredded bark is used) and obstructs weed growth.

Shading the soil with mulch prevents water loss due to evaporation and also provides habitat for important microorganisms.

Insulating the soil from ambient air temperatures prevents plant stress caused by the rapid temperature changes that can occur in the high deserts of New Mexico. Soils and plant roots do not respond well to intense heat or cold, so having a blanket of insulation in the form of a thick layer of mulch keeps soil at a more constant temperature. This is equally important in winter and summer.

From a soil-erosion standpoint, mulch can help prevent wind from blowing the soil away. Mulch can also help prevent erosion caused by major storm events. Even though its effects are usually less visible than those from storm-water-induced erosion, wind-induced erosion can have a larger negative impact on our fragile soils because of the frequent (sometimes daily!) blowing that unprotected, exposed soil receives.

Simply by creating a microclimate suitable for microorganisms, even inert mulches such as gravel will help to increase the nutrient level in soil. While organic mulches (such as bark, straw and pecan shells) will provide more nutrients than inert mulches, they tend to need replenishing on an annual or biannual basis. By contrast, inert mulches can sometimes last years before needing to be replenished.

Typically, the thicker the mulch, the more effective it will be as a weed barrier. Smaller and low spreading plants may be mulched two inches deep until they grow larger, while larger trees and open areas (including pathways) should have a minimum mulch depth of four inches.

If perennial weeds are a problem, a water-permeable commercial-grade weed barrier, such as landscape fabric, can be placed underneath any type of mulch. (Remember, do not use nonpermeable plastic as a weed barrier.) Weeds that grow out of any mulch can sometimes be difficult to control, but weeds that grow out of gravel mulches can be extremely

difficult to extract. Rock and gravel mulches should be weeded often, before weeds can establish large root systems.

Gravel and stone mulches have many benefits, but they can reflect light in a manner that is often too bright, and these mulches can create “heat islands” if overused. Breaking up stone-mulched areas with one or two organic mulches can improve the aesthetics of your roof-reliant landscape. The most interesting and perhaps most important waterwise aspect of stone mulch is that it can create moisture; condensation collects underneath the rocks when there is a change in ambient air temperature in a short period of time.

The smallest form of stone mulch is called crusher fines, which are extremely small pieces of commercially available gravel. They are often not much bigger than grains of sand and are typically rolled or tamped into place. They provide a clean, relatively natural look since their color often resembles the ochre tones that we recognize in our native soils.

Other common mulch materials include bark, wood chips and pecan shells. A less commonly used mulch, straw, is one of the more effective mulches for retaining moisture and providing nutrients for your soil. Contrary to popular belief, straw will almost never blow away if properly laid, and the aesthetics of straw are quite natural because the sun quickly bleaches out the bright yellow hue of a newly opened straw bale.

Bark mulch and pecan shells help soil retain moisture, and they add nutrients to the soil as they decompose. Compared to gravel, these mulches are lightweight and easy to install. However, in areas with strong winds these lighter-weight materials will be the most likely to blow away.

The types of plants selected for the landscape can help you determine what kinds of mulch to use. Less heat-tolerant, more moisture-loving plants prefer fibrous mulches, while xeric (sun- and heat-loving plants) prefer gravel and stone mulches. For example, many desert wildflowers grow much more vigorously and live longer when mulched with crusher fines or small pebbles.



Proper Maintenance

7. Proper Maintenance. Although xeriscapes and dryland gardens are low maintenance, they are not no maintenance. Keeping your roof-reliant landscape healthy through a well-timed program of pruning, fertilizing, weeding and pest control will ensure that your landscape develops beautifully and keeps growing for many years to come.

The Importance of Erosion Control

If you go through the steps of creating a roof-reliant landscape using the seven basic xeriscaping principles highlighted above, it is important to take the necessary precautions to prevent your precious soil from eroding away during heavy storm events. Grade your garden in such a way that moisture can percolate into the soil, preventing the soil from migrating downhill.

Unless your property is completely level (and very few properties maintain a consistent elevation from one end to the other), you will want to grade your planting areas so the velocity of the storm water that flows during a high storm event is significantly reduced. One way to do this is to form “plant pockets,” as opposed to “tree wells,” around your plants. As shown in Figure 1-2, tree wells are completely circular, while the plant pockets, or “mini-swales,” are designed to accept storm water.

The small berm making up the pocket is placed on the downhill side of the plant or tree such that no part of the berm blocks nearby storm water runoff. Conventional tree wells divert this runoff away from plants while simultaneously increasing the velocity and mass of the storm water, which can quickly create serious erosion problems. Properly placed plant pockets slow the water down, minimize erosion and allow time for infiltration to take place at the plant's root zone.

Ideally, plant pockets should be situated in a fish-scale pattern (depicted in Figure 1-2 below) so that none of the soil near your plants erodes during large storm events. Consider using the spoils from your native soil excavation for building your plant pockets. Just be sure not to allow moisture to back up against any structures.

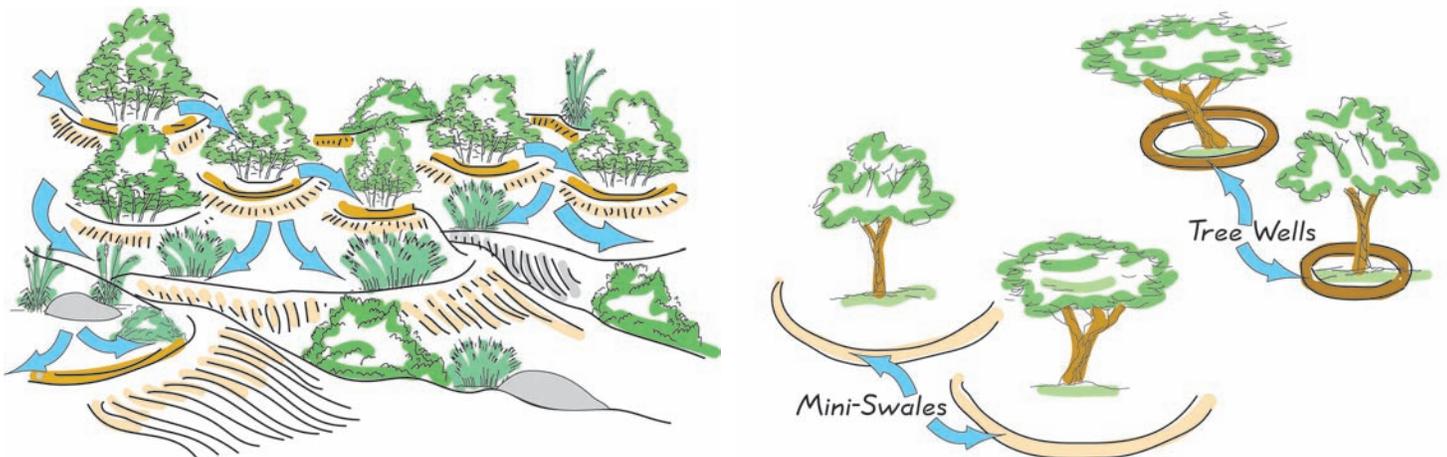


Figure 1-2: Mini-swales or plant pockets (left) are designed to hold some storm water near plants. Tree wells (right) completely circle the root area and can be filled with irrigation water.



Figure 1-3: Retaining walls are an effective way to create terraces to control erosion and create spaces for plants.

If your property is steep enough and your finances allow, you can also build retaining walls to hold back some of the soil that you excavated to make room for compost and mulch. The resulting terraces will control erosion and serve as more highly engineered planting pockets. If terraces do not fit within your budget but your erosion potential is significant, on-contour earthen swales and straw bale swales can be used in some cases.

An on-contour earthen swale is a ditch dug along points on a slope that are all at the same elevation above sea level. Points on the same contour line can be determined by using one of a number of simple devices, including laser levels, tripod levels, water levels or A-frame levels. The dirt from your ditch is then placed on the downhill side of the ditch in the form of an on-contour berm. On either end of their berms, swales turn upslope in order to control the runoff that causes erosion.

In the event that your site is too steep for earthen swales, you can install straw bales and other permeable barriers that can reduce soil erosion on a slope. As you establish plant material next to these barriers, the root systems of your plants strengthen the soil in the vicinity of the barriers. Over time, all of these barriers disappear, leaving healthy plants and soil behind.

NOTE: The above information about xeriscaping is not intended to be a comprehensive resource. For more about dryland gardening and the traditions of land use in desert environments, see Appendix 8.



Figure 1-4: Workers install a straw bale swale.