

Lesson 2 Background:

Background

In the hot and dry climates found in much of Arizona, outdoor water use for landscaping can consume tremendous amounts of water. Typically 60–90 percent of all water use by single-family residences is for landscape irrigation, and most of this is used to water turf grass. Choosing landscaping that requires less water can conserve significant amounts of water, as well as requiring less time to maintain. **Water-efficient landscapes** center around the efficient use of rainwater and the use of plants that are adapted for arid conditions. **Native species** that evolved in the local environment and are accustomed to its climate are ideal. Landscaping techniques that conserve water, control temperatures, and store available rainfall are now being applied in many areas of the state.

Native Plants

Using native plants not only conserves water, but also helps maintain healthy ecosystems by providing the food and shelter that other native species (insects, butterflies, birds, wildlife, etc.) require. Incorporating **plant guilds**—associations of plants that benefit each other and enrich the entire habitat—is important, as the various species provide “services” to each other.

For example, mesquite trees’ roots harbor colonies of bacteria that fix nitrogen from the atmosphere (convert it into nitrate that is then available for plants’ use). When the mesquite trees’ nitrogen-rich leaves decompose in the soil, they release the nitrate, enriching the soil for other plants. The mesquite provide favorable habitat and carbon for the bacteria, and the bacteria provide surplus nitrate to the plants. Including legume plants (such as mesquite) that can enrich the nitrogen levels of the soil enhances the health of other plants and eliminates the need for chemical fertilizers.



Mulch

Mulch is material like pine needles, leaves, wood shavings, bark, gravel, or rock that helps hold moisture in the soil and controls erosion. Using mulch around plants conserves water by reducing evaporation, cools the soil surface, and makes the spaces between plants more attractive than bare soil

Temperature Control

Controlling the temperature surrounding a building will reduce the amount of water needed for landscaping. Careful placement of shade trees and shade structures will provide cooling for plantings, for outdoor eating areas, and for the building itself. Keep in mind that the building itself will provide shade, but the shaded area will shift as the sun moves across the sky.

The angle and position of the sun in relationship to the building changes with the season as well as the time of day. The hottest part of a building is on the northwest side in the summer, during the afternoon. Heating in the winter begins in the morning on the southeast side of the building.



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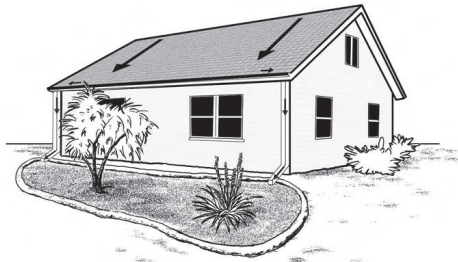
Rainwater Harvesting

Another important aspect of water-efficient landscaping is the efficient use of rainwater. Arizona's native farming cultures have been masters at this for centuries. Since Arizona's rainfall is sporadic in its timing and amount, techniques for utilizing rainwater as efficiently as possible have been vital to human survival in the past, and remain valuable today.

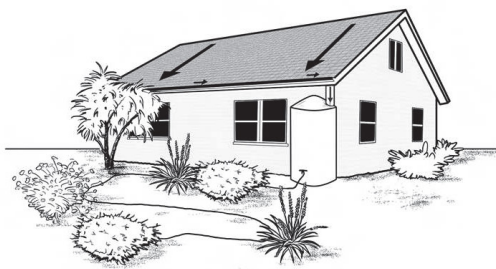
The main principle of efficient rainwater use is to prevent the water from running off the land surface before it has a chance to soak in and **percolate** deeply into the soil. This can be done in a number of ways: by building **check-dams** in small washes where water tends to flow rapidly, by building **swales** on gradual slopes to slow water flow, and by planting vegetation in low areas where water tends to pool. Arizona's monsoon thunderstorms are often characterized by very heavy, localized rainfall that lasts a short period of time. This type of rainfall can result in major **runoff** and **erosion**, especially in areas where the natural topography and vegetation have been altered.

Another key element to consider is the effect that **permeable** and **impermeable** surfaces have on rainwater runoff. Permeable surfaces, such as sand and soil, allow water to percolate through them, which slows the flow of runoff. Impermeable surfaces, such as roofs and streets, produce the maximum volume and rate of runoff. Capturing and storing the rainwater that runs off your roof can be an excellent way to conserve water.

Rainwater harvesting systems can be as simple as having roof gutters that direct water into a **bermed** landscape holding area. In this model, rainwater is used immediately and is not stored in a holding tank. In a more complex system, a **cistern** or rain barrel is used to store rainwater for future use. This is useful in Arizona because most of the precipitation falls during the winter wet season or summer monsoon season, and there are long periods of very little moisture in between. Having rainwater storage capacity can help provide a more predictable supply. Note: rainwater storage systems need to be covered to prevent mosquito larvae and should be labeled as non-potable water.



Two simple rainwater harvesting systems use bermed soil and drainage ditches to direct water from roof to planted areas.



This complex rainwater harvesting system uses gutters and downspouts to direct rainwater from the roof into a storage cistern (rain water barrel). The storage cistern has a hose attached which leads to a drip irrigation system for watering plants.

Artist: Richard Mayes, © Project WET