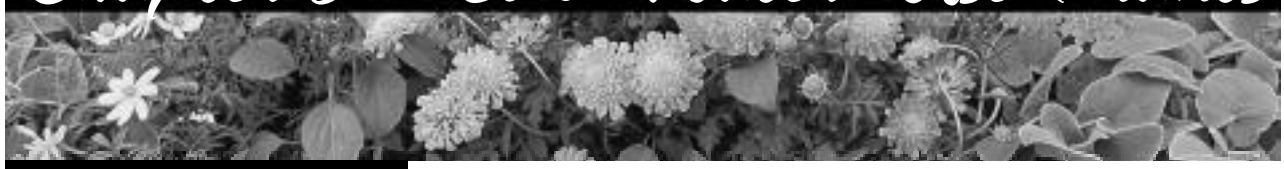
Chapter 6 Low-Water-Use Plants



Chapter Contents

Xeriscape Principle

Whenever possible, choose native and other low-water-use plants. Group plants with similar water needs together into specific zones for the most efficient use of water.

Key Concepts

Plant "zones," plant communities, native plants, adapted plants.

Teacher's Notes

A delightful palette of waterwise plants thrives in New Mexico's landscapes. These plants are as beautiful as "traditional" landscape plants, plus they offer the extra benefit of using less water. To maximize water efficiency, plants with similar water needs should be grouped together in specific irrigation "zones." (For example, all of the high-water-use plants should be located in the same irrigation zone, so they can be watered independently of the low-water-use plants.) Plants should also be matched to the soil, sun, and water characteristics of the site's microclimates. Taking advantage of cooler microclimates created by walls and shade trees is a good way to provide areas of interest and diversity.

In the **Problem to Solve**, students are asked to help Sandra Phillips and her family redesign a mature landscape with the appropriate plants. A diagram has not been provided for this project. Instead, students will have to determine from Ms. Phillips's letter how the front yard might look. Students can have the choice of writing their results in paragraph form or using diagrams to display their results. Both options will require an explanation of their choices.

Teacher's Notes, continued

There are two levels of Project Cover Sheets. For Level 1, students are given the criteria for the new plants. For Level 2, students will have to pull the information from Ms. Phillips's letter. In addition, the teacher should use the expectations of the students' project results to differentiate between the lower grades and the upper grades. (A more complex and detailed project should be required for the higher-level thinkers.)

There is no single correct answer for this project. However, make sure that the students address the needs of the family and provide sound reasoning for their plant choices. The solution to the problem can include information from previous chapters such as **Soil Improvements**, **Efficient Irrigation,** and **Mulching.** However, students should focus on the plant choices.

Assessment of Problem to Solve

In **Problem to Solve: Sandra Phillips' Xeriscape Plants,** the students will be identifying plants for a sunny yard in western New Mexico. Students should be able to assess Ms. Phillips's needs and preferences from her letter and determine climatic variables based on geographic location. The variables they will need to determine include annual rainfall amounts, temperature variations, and altitude. Ms. Phillips has already identified her soil as sandy. Using plants from *Desert Blooms: A SunScape Guide to Plants for a Water-scarce Region* (accessible online at http://www.uc.usbr.gov:2525/dblooms/), *The Complete How to Guide to Xeriscaping* (see Appendix F for ordering information), or websites listed in Appendix I, students should identify a list of five to 10 plants that would work in Ms. Phillips' landscape. All of the plants should be low- to moderate-water-use plants, require low maintenance, like full sun, tolerate sandy soils, and be hardy enough for western New Mexico. Make sure students include plants that bloom or add color at different times of the year. At least one plant should provide cut flowers for Ms. Phillips, and one plant should be a colorful groundcover for Mr. Phillips.

By this point, students should be able to incorporate some of the things they have learned from other chapters. The Phillips' landscape would benefit from soil amendments and mulching. An irrigation system is optional; however, to lower the maintenance requirements, the students could suggest an automated drip irrigation system for the first two years to establish the plants. They may also want to consider two zones in the landscape. A low-water-use zone would be appropriate for some of the hardier plants and a moderate-water-use zone would be appropriate for some of the flowering plants being used for cut flowers. A high-water-use zone would not be appropriate for this landscape.

If desired, students could make some

(continued on next page)

Assessment of Problem to Solve, continued

recommendations for the backyard lawn. A sprinkler system would work for irrigation, or students could check the rainfall and soil condition to see what would be appropriate for the area where the Phillips family lives.

The easiest way to check the students' work is to have them develop a chart that includes plant name, water requirement, exposure to sun, soil type preferred, temperature or geographical range, plant type, and blooming period. (See below.)

Plant Name	Water Requirement	Exposure to Sun	Soil Type Preferred	Temperature or Geographical Range	Plant Type	Blooming Period/ Comments
Iceplant	Low	Full	Well drained	Freezes in hard winter; plant below 6000 feet	Ground-cover	Evergreen; summer blooms

Here is a partial list of acceptable plants. There are many more that would also be acceptable.

Groundcovers:

Iceplant (Hardy Yellow, Hardy Purple, or Shrubby)
Trailing Yellow Dalea
Yellow Rockrose


Hardy Purple Iceplant

Cut Flowers:

Purple Coneflower
Hardy African Daisy
Prairie Coneflower (Mexican Hat)


Purple Coneflower

Other:

Maximillian Sunflower
Red Hot Poker
Century Plant
Spanish/Desert Broom
Red Barberry
Chaparral/Russian Sage
Apache Plume
Cliffrose


Chaparral & Century Plant

Teacher's Notes, continued

Notes on the Activities

Leaves of My School – Students gather leaves from different habitats on the school grounds and make a poster explaining the different water requirements of these habitats. Students should be able to differentiate between leaves from high-water-use habitats (large, green leaves and lush grasses) and more xeric habitats (small, thin, grayish leaves with fine hairs to reflect sunlight and reduce heat buildup).

Art in the Garden – As an introduction to the aesthetics of plants and to encourage students to look at the parts of plants in detail, students investigate a wildflower field close to the school. From the diagrams in the lab, students should be able to identify accurately the arrangement and margins of leaves. Students can be evaluated on participation and the accuracy of their plant identification.

Lost Water – Students investigate transpiration through a three-day lab experiment. Students will discover that high-water-use plants lose water primarily through their leaves and low-water-use plants have very low water loss. There are several ways that desert plants adapt to extreme heat, dryness, and the unpredictability of available water. Desert plants have small leaves that do not present a broad, flat surface to the sun's rays. Stomata[1] for gas exchange are on the underside of the leaf and usually close in the daytime and open at night in order to decrease water loss. The gray color and whitish hairs on leaves reflect the sun's rays and decrease heat buildup. Since the leaves are small, if extreme drought conditions prevail and the plant is forced to drop leaves, it takes less energy to replace small leaves than to replace larger leaves. Many desert

Teacher's Notes, continued

plants (e.g. cacti) have water-storing roots, photosynthetic stems, and expandable stems to store water. Chemical compounds released into the soil keep other plants from growing too close and competing for water.

Dripping Blooms – Students research various flowers in order to design a flower garden. Students will be asked to group flowers by compatibility and to explain the reason behind their garden layouts. Some of the factors the students should include in their reasoning are:

- exposure to sun
- exposure to water
- exposure to wind
- plant compatibility (plants that can be grouped together because they have similar growing requirements, or they complement each other in a symbiotic relationship).

Adapted to the Desert – In two separate experiments, students learn how plants adapt to living in the desert. The Apple Water Loss exercise demonstrates that the more surface area an apple has exposed, the more water is lost. Students should make the connection between the water loss of the exposed apple and large leaves on high-water-use plants. In "Pet Plant" Care, students design a 24-hour care program for a wet sponge in order to minimize water loss. The students then carry out their plan. Students should use components they learned in previous chapters, especially the mulch chapter, to minimize loss.

Where Are You From? – Students research the differences between native and non-native or introduced species of plants and pinpoint the origins of the plants on a map. (Use the recommended resources and the Internet for research information.) This activity can be treated as a standard research project or expanded in many ways to examine the migrations and uses of plants.

A Desert Blooms in My Garden – Students pick a habitat (e.g., central New Mexico, dry, full sun) and are asked to research and determine the plants that will grow best in that habitat. The results of their research will be a poster board that can be displayed around the school. Students have an opportunity to explore the palette of plants available for xeriscapes and to educate others. This is not an activity that can be graded easily, but it can be made more quantitative by requiring a certain number of shrubs, perennials, trees, etc.

Complementary Activities

The following activities complement the **Problem to Solve** for this chapter:

- ✓ **2-2: Holes in the Soil**
- ✓ **3-3: Too High, Too Low, Just Right**
- ✓ **4-3: A World of Mulches**
- ✓ **5-3: Deep, Deeper, Deepest**

Background Information: A Wonderful World of Plants

Plant selection is probably the most enjoyable principle of xeriscaping. The process of selecting plants offers a chance to express individual creativity and personal taste. In order to choose plants that best suit the needs of a landscape, keep the following in mind:

- Are the plants adapted to an arid environment?
- Are the plants native or non-native species?
- What plants work best in groups or communities?
- What plant type will work best in each specific location?

There are many choices when it comes to selecting plants for a xeriscape garden. The objective is to carefully match the needs of each plant to the spot in the landscape. For best results, either select a plant whose growing requirements match the microclimate or create a microclimate to meet the needs of the plant. For example, a well-drained area on a south-facing lot would typically require a sun-loving, low-water-use plant. However, if a large tree were planted in a sunny location, its shade could create the microclimate preferred by some shrubs and groundcovers.

Adaptations to an Arid Environment

In the high deserts of New Mexico, the climate is arid and sunny with hot summers. Winter temperatures fluctuate greatly depending on altitude. The plants that have survived here are the plants that have adapted to New Mexico's low precipitation rates, generally alkaline soil conditions, and sometimes drastic temperature ranges. New Mexico's plant palette is an example of Charles Darwin's theory of survival of the fittest; only the plants that have the tools to survive in New Mexico are still here. Some of the special characteristics that plants have used to survive these conditions include:

- smaller leaves (generally, the larger the leaf of a plant, the more water the plant uses)
- lighter coloration that reflects light well
- fuzzy and very fine leaves that limit evaporation
- low-growing profile to stay out of drying winds
- aromatic oils and resins that help retain moisture
- waxy coating on leaves to prevent moisture loss
- chemical secretion through roots to discourage plants that would compete for water
- deep root systems to get to the moisture deep in the ground
- wide-spreading root systems to intercept maximum moisture from brief rainfalls
- dormant seeds that wait for long periods of time until moisture is available and then germinate quickly
- stomata on the bottom of the leaf, which open at night and close during the day to help prevent moisture loss
- leaves that hang so that there is not a broad face toward the sun.

Native vs. Non-native

Xeriscape plants need to be adapted to the local rainfall, soil, climate, and pests. They should also be able to survive hardships, such as drought, disease, and predators. The best xeric plants can usually survive in a landscape with minimal care. In fact, sometimes the conditions in a created landscape

Background Information: A Wonderful World of Plants (continued)

are too favorable and native plants can get overgrown. Many native plants have the added attraction of providing food for wildlife.

Native plants are plants that originated or occur naturally in the area. However, "native" has become a subjective term. Weather conditions have changed significantly over the centuries, and plants were introduced to new areas by migrating animals and eventually migrating people. So, when shopping for "native" plants, be aware that the list can vary from one nursery to the next.

Non-natives are plants that have been introduced to an area from another part of the world. Many of these plants were introduced from areas that have a similar climate to New Mexico and, consequently, grow very well here. For example, the Spanish broom *(Spartium junceum)*, is a woody shrub with fragrant yellow blooms in the spring. It is very drought- and heat-tolerant and does well in poor soils. It is native to the Mediterranean but has adapted to the southern and central portions of New Mexico. Plants that are native elsewhere but are doing well in local conditions are often called "adapted." Both adapted and native plants can be used successfully in a xeriscape.

A potential problem with non-native plants is that they can sometimes escape cultivation and take over an ecological niche while crowding out native plants. When a plant is taken out of its original environment, it is also taken away from the controls that mitigate it. Without these controls, plants can become invasive. That is what has happened with salt cedar (*Tamarix chinensis* and *Tamarix ramosissima*) in New Mexico. With its adaptation to saline soils and its highly invasive root system, salt cedar has invaded the bosque[2] and crowded out slower-growing native plants like the cottonwood. For more information about invasive plants in the area, contact the local Cooperative Extension Service Agent with New Mexico State University, Appendix B.

Plant Communities

In nature, plants live in communities. Each plant in the community is dependent in some way on the other plants. Some smaller plants depend on larger plants for shade or protection, and certain plants can emit chemicals that are used by neighboring species. The community as a whole is dependent on environmental conditions such as soil, rainfall, location, and sunlight.

A forest is a great example of a plant community. The taller trees capture most of the sunlight and slow the pounding rain. The plants on the forest floor then benefit from the shade offered by the larger trees and are protected from torrential downpours. In addition, the larger trees provide enrichment to the soil from the dropped leaves and plant matter. The smaller plants in turn use their root systems to stabilize and aerate the soil for the taller trees. There are many microcommunities that can be recreated in a garden. Try to observe the local plants that grow together in the wild. Then, in a xeriscape, try to recreate the conditions that allow each plant to thrive.

When building plant communities, remember the principles of zoning. Plants should be zoned together according to their water needs. The low-water-use zones should not include any high-water-use plants that would suffer from under-watering.

Background Information: A Wonderful World of Plants (continued)

Types of Plants

There are many different types of plants. Each category has a useful application in a landscape.

Perennials are a mainstay of traditional gardens. A perennial is a flowering plant that will live for many years. It may die back in the winter, but it will regrow from its roots (and sometimes from its branches) every spring. Perennials tend to be tough, persistent plants. Many perennials are well-suited to low-water conditions and thrive in xeriscapes.

Annuals are flowering plants that last only one season. Most annuals will produce seeds that sprout each spring, giving birth to a new generation of plants. Annuals usually grow quickly, primarily because they must live their entire life cycle in one growing season. Annuals are popular because of their long flowering season.

Bulbs are a springtime delight. Think of bulbs as an underground storage device that contains everything needed to grow a plant — roots and the energy needed to grow shoots and leaves. Bulbs are usually planted in the fall and flower early in the spring to escape the heat and drought conditions of the summer. They can be scattered throughout the landscape to provide a spot of color before the ground is warm enough for summer flowers. Be careful to buy nursery-grown stock, because some bulbs are being "hunted" close to extinction.

Wildflowers are ideal in a more casual garden. They are adapted to the natural conditions of the area, and the right mix of wildflowers can provide season-long color. Be careful to buy nursery-grown stock and seed, because some wildflowers are being "hunted" close to extinction.

Ornamental grasses are grasses that are used as a single plant, not as turf. Consequently, ornamental grasses are allowed to grow to their natural shape and height. They require little maintenance and water, are generally disease- and pest-free, and can provide beautiful focal points in all seasons.

Desert accent plants provide a contrast to softer landscape plants such as perennials and wildflowers. These plants include agave, yuccas, cacti, and other succulents. Like trees and shrubs, they can provide an interesting focal point in a landscape. But unlike trees, they usually do not add much height.

Background Information: A Wonderful World of Plants (continued)

Groundcovers are plants similar to a lawn that grow close to the ground, spread to cover an area, and help to conserve water by shading the soil. They are an important design element of the xeriscape because they can take the place of grass while requiring less water and less maintenance. Groundcovers provide a green look in areas where it would be impractical to maintain grass. In the process, they also provide a dense root mass that controls erosion and prevents the growth of weeds. Some groundcovers can be used in areas with mild foot traffic.

Trees and shrubs (bushes) are the backbone of a landscape design. They provide the most dramatic shapes and large masses of texture and/or color during seasonal changes. Trees and large shrubs also provide shade, creating many microclimates for other types of plants. (Because of the low humidity in New Mexico, shade can give a 10° to 15° F temperature differential to the soil under it, which cuts water evaporation significantly.) Tree and shrub roots tap into deeper subsoil and reach moisture that shallow-rooted perennials cannot reach. Trees and shrubs also provide windbreaks from prevailing winds and reduce evaporation from surrounding soil.

Vines are useful for their ability to cover large areas on arbors and trellises and provide shade. They can add visual interest and bright seasonal color (or simply stay green). Vines provide rapid vertical growth while using little surface area in the landscape.

FINAL THOUGHT

The concept of xeriscaping begins to come together when we look at plant communities, not merely at individual plants. By grouping plants of similar water, soil, and sunlight needs together in a specific "zone" in the landscape, a plant community is created that will thrive – providing color, texture, and visual interest for years to come.

FOOTNOTES (PAGES 212-215)

[1] Stomata – opening at the epidermis, especially on the underside of leaves, through which gases and water vapor pass

[2] Bosque – "forest" in Spanish; in New Mexico the term has been adapted to mean the cottonwood forests surrounding river areas

Problem to Solve: Sandra Phillips' Xeriscape Plants

McKinley County Extension Agent
5002 W. Historic 66
St. Route 2, Box 59
Gallup, New Mexico 87301

Dear County Extension Agent,

I have moved into a house with a yard that is mostly grass that we would like to partially convert to a xeriscape. We would like to keep the lawn in the back of the house for the children's play space and convert the front.

There is a beautiful ash tree that shades the front south corner of the house from the afternoon sun and a silver lace vine that is taking over the north corner of the front yard. However, the rest is grass that can be removed.

We love flowers and would like to add season-round color in the front, but we want all the plants to be low- or moderate-water-use. We do not want to have to do very much maintenance, as we like to spend our time with the children and not in the yard. I would enjoy having some flowers to cut for vases and my husband really likes colorful groundcovers.

The front yard faces to the west, getting all of the afternoon sun, and is about 25' deep and 40' wide. The soil looks pretty typical for this area, mostly sand, and could probably use some amendments. There is currently no irrigation system.

What plants and other recommendations can you provide us?

Sincerely,

Ms. Sandra Phillips

Sandra Phillips' Xeriscape Plants: Project Cover Sheet

Use the information you have learned from the activities, handouts, and reference books to help Sandra Phillips solve her landscape problem.

Provide Ms. Phillips with a list of recommended plants and why you are recommending them. Suggest any placement or groupings that you think might be helpful. Include any advice you can from other chapters: Soil, Irrigation, Mulch, and Turf.

Your completed packet will include the following items:

_____ A list of plants for Ms. Phillips' yard, including their mature height, their water requirements (high, moderate or low), and why they were chosen

_____ A diagram or written explanation of your proposed placement of the plants

_____ Additional suggestions on soil, irrigation, mulch, and turf

_____ Leaves of My School poster and journal pages

_____ Art in the Garden artwork

_____ Lost Water Student Worksheet

_____ Dripping Blooms Student Worksheet

_____ Adapted to the Desert Student Worksheet

_____ Where Are You From? report

_____ A Desert in My Garden poster

Sandra Phillips' Xeriscape Plants: Project Cover Sheet

Use the information you have learned from the labs, handouts, and reference books to help Sandra Phillips solve her landscape problem.

First consider the preferences that Ms. Phillips has indicated in her letter. It might be helpful to list them before looking for plants for her site. Using this information, create a drawing of her current yard.

Your completed packet will include the following items:

_____ A diagram of the Phillips' existing yard

_____ A list of Ms. Phillips' requirements for her new yard

_____ A list of recommended plants for Ms. Phillips' yard, including their mature height, their water requirements (high, moderate or low), and why they were chosen

_____ A diagram or written explanation of the landscape you are recommending, including what is to be removed and where the new plants are to be placed

_____ Additional suggestions on soil, irrigation, mulch, and turf

_____ Leaves of My School poster and journal pages

_____ Art in the Garden artwork

_____ Lost Water Student Worksheet

_____ Dripping Blooms Student Worksheet

_____ Adapted to the Desert Student Worksheet

_____ Where Are You From? report

_____ A Desert in My Garden poster

Sandra Phillips' Xeriscape Plants: Tips For Getting Started

As you try to solve the yard problem for Ms. Phillips, consider the following facts:

- She has an existing ash tree in the south corner and silver lace vine in the north.
- She loves flowers and would like to have some to cut for vases in the house.
- She wants as close to year-round color as possible.
- She wants low- to moderate-water-use plants.
- She does not want a lot of maintenance.
- Her husband likes colorful groundcovers.
- She has children at the house.
- The yard gets afternoon sun.
- The area to be landscaped is 25 feet by 40 feet.
- The soil is mostly sand.
- There is currently no irrigation system.

1. Using this information, sketch out a diagram of the existing yard.

2. Research the rainfall amounts and temperatures ranges in Ms. Phillips' area.

3. Focus on what Ms. Phillips wants in her landscape and the rainfall and temperature ranges in the area. Review a plant list to see what matches can be made.

4. After coming up with a short list of possibilities, separate the plants into high-, moderate- and low-water-use.

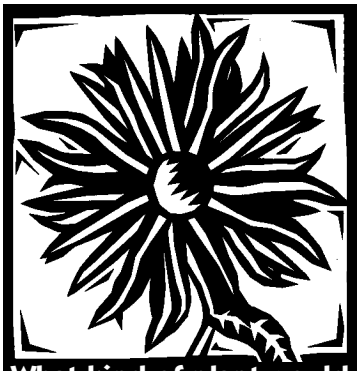
5. Create a diagram or a written explanation of the landscape you are recommending.

6. Include any additional recommendations you feel are necessary on soil, irrigation, mulch, and turf.

There's More Than Marigolds Out There

Selecting plants for a landscape is probably the most enjoyable part of xeriscaping. The process of choosing plants offers you the chance to express your individual creativity and personal taste. No matter what the growing conditions are in the landscape, there are many suitable plants from which to choose.

The objective of plant selection is to assess the site and pick the plants that thrive in the existing conditions. The most important conditions to consider are soil type, exposure to the sun, precipitation, and microclimates. For example, a well-drained area on a south-facing lot would typically require a sun-loving, low-water-use plant (or plants). But the specific plants you select are up to your personal preference (and, of course, the preference of the homeowner).



What kind of plant would you put under a tree? In the full sun? Where would you put a drought-tolerant plant?

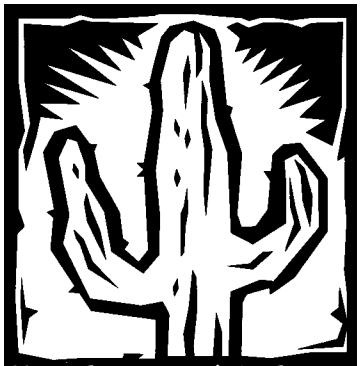
In order to choose plants that are best suited to the conditions of the yard, keep the following in mind:

- Are the plants adapted to an arid (dry) environment?
- Are the plants native or non-native species?
- What plants work best in groups or communities?
- Is the mature size of the plant suitable for the space? (Don't put a huge tree in a tiny spot in the yard!)

Adaptations to an arid environment

It takes special characteristics to adapt to arid environments such as those found in New Mexico. A desert plant might have one or more of the following characteristics to allow the plant to survive under what seem like very difficult climatic conditions.

- smaller leaves (generally, the larger the leaf of a plant, the more water the plant uses)
- lighter coloration that reflects light well
- fuzzy and very fine leaves that limit evaporation
- low-growing profile to stay out of drying winds
- aromatic oils and resins that help retain moisture
- waxy coating on leaves to prevent moisture loss
- chemical secretion through roots to discourage plants that would compete for water
- deep root systems to get to the moisture deep in the ground
- wide-spreading root systems to intercept maximum moisture from brief rainfalls
- dormant seeds that wait for long periods of time until moisture is available and then germinate quickly
- stomata[1] on the bottom of the leaf which will open at night and close during the day to help prevent moisture loss
- leaves that hang so that there is not a broad face toward the sun.



How does Darwin's theory of survival of the fittest explain the plants in the desert?

When choosing plants for your landscape, watch for these water-saving characteristics.

[1] Stomata – opening at the epidermis, especially on the underside of leaves, through which gases and water vapor pass

There's More Than Marigolds Out There (continued)

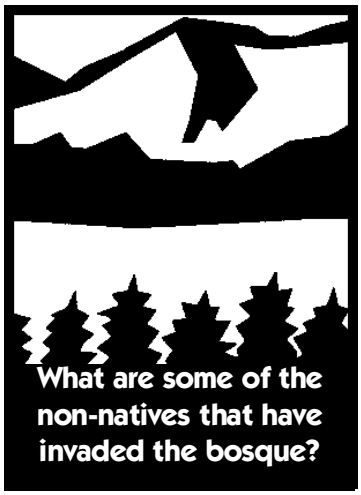
Native, Adapted, and Non-Native

Plants used in a xeriscape need to be adapted to the local rainfall, soil, climate, and pests. They should also be able to survive hardships such as drought, disease, and predators. Xeriscape plants can usually survive in a landscape with minimal care. In fact, sometimes the conditions you create in a landscape are too favorable and native plants can get overgrown.

Native plants are plants that originated or occur naturally in your area. However, "native plant" means different things to different people. How long does a plant have to be in one place to be native? Does it mean in the time of the dinosaurs, when New Mexico was tropical? Or does it mean just centuries ago when humans first inhabited the area? Obviously, the climate conditions have changed significantly over the centuries, changing which plants could survive. In addition, plants are continually introduced to the area by migrating animals and even migrating people. So, when shopping for "native" plants, be aware that the definition can vary from one nursery to the next.

Non-natives are plants that have been introduced to an area from another part of the world. Many of these plants were introduced from areas that have a climate similar to New Mexico and have adapted quite well. Adapted plants can add color and excitement to your landscape. Non-native plants that are not adapted to the conditions in New Mexico should be avoided. These plants would require too much assistance to survive in a xeriscape.

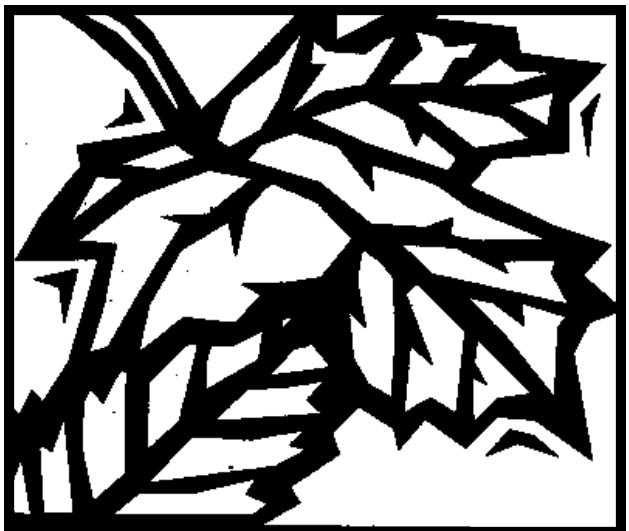
Whenever you introduce a non-native plant into an ecosystem, you must be careful to observe its behavior. Non-natives have been known to escape a controlled environment such as a landscape and take over an ecological niche belonging to native plants. When a plant or any species is taken out of its original environment, it is also taken away from the controls that mitigate it. Without these controls, plants can become invasive.



What are some of the non-natives that have invaded the bosque?

Plant communities

In a natural environment such as a river basin or a forest, plants live in communities. Just like people, each plant in the community is dependent in some way on the other plants. For example, some smaller plants depend on larger plants for shade or protection, and certain plants can emit chemicals that are used as nutrients for the neighboring plant. These relationships promote growth patterns. Try to observe the plants that grow together in the wild. Then, in the xeriscape landscape, try to recreate the conditions that allow each plant to thrive.



What are some of the ways plants depend on each other?

There's More Than Marigolds Out There (continued)

Types of plants

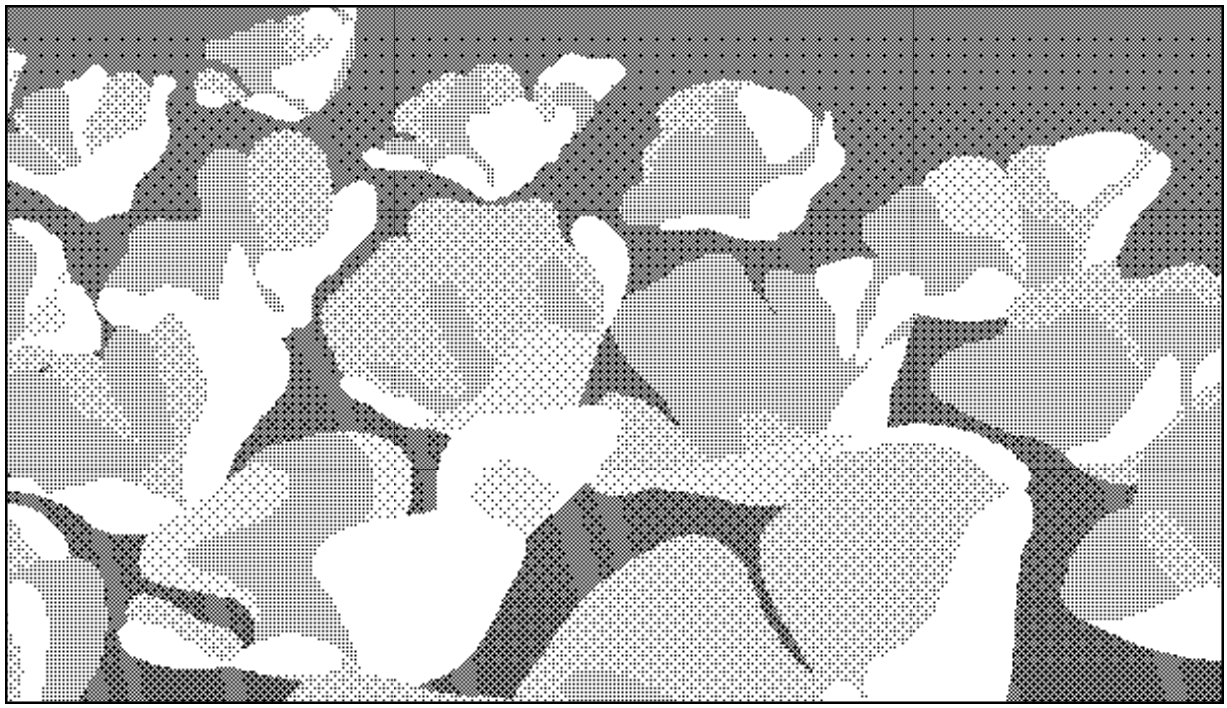
There are many different types of plants. Each category has a specific shape, size, or growing characteristic that makes it useful in a landscape. Consider the benefits of each category before deciding which types of plants to include in your landscape.

Name some examples of each of the plant types.

- **Perennials** are a mainstay of traditional gardens. A perennial is a flowering plant that will live for many years. It may die back in the winter, but it will regrow from its roots (and sometimes from its branches) every spring. Perennials tend to be tough, persistent plants. Many perennials are well-suited to low-water conditions and thrive in xeriscapes.
- **Annuals** are flowering plants that last only one season. Most annuals will produce seeds that sprout each spring, giving birth to a new generation of plants. Annuals usually grow quickly, primarily because they must live their entire life cycle in one growing season. Annuals are popular because of their long flowering season.
- **Bulbs** are a springtime delight. Think of bulbs as an underground storage device that contains everything needed to grow a plant — roots and the energy needed to grow shoots and leaves. Bulbs are usually planted in the fall and flower early in the spring to escape the heat and drought conditions of the summer. They can be scattered throughout the landscape to provide a spot of color before the ground is warm enough for summer flowers. Be careful to buy nursery-grown stock, because some bulbs are being "hunted" close to extinction.
- **Wildflowers** are ideal in a more casual garden. They are adapted to the natural conditions of the area, and the right mix of wildflowers can provide season-long color. Be careful to buy nursery-grown stock and seed, because some wildflowers are being "hunted" close to extinction.
- **Ornamental grasses** are grasses that are used as a single plant, not as turf. Consequently, ornamental grasses are allowed to grow to their natural shape and height. They require little maintenance and water, are generally disease- and pest-free, and can provide beautiful focal points in all seasons.
- **Desert accent plants** provide a contrast to softer landscape plants such as perennials and wildflowers. These plants include agave, yuccas, cacti, and other succulents. Like trees and shrubs, they can provide an interesting focal point in a landscape. But unlike trees, they usually do not add much height.
- **Groundcovers** are plants similar to a lawn that grow close to the ground, spread to cover an area, and help to conserve water by shading the soil. They are an important design element of the xeriscape because they can take the place of grass while requiring less water and less maintenance. Groundcovers provide a green look in areas where it would be impractical to maintain grass. In the process, they also provide a dense root mass that controls erosion and prevents the growth of weeds. Some groundcovers can be used in areas with mild foot traffic.

There's More Than Marigolds Out There (continued)

- **Trees and shrubs (bushes)** are the backbone of a landscape design. They provide the most dramatic shapes and large masses of texture and/or color during seasonal changes. Trees and large shrubs also provide shade, creating many microclimates for other types of plants. (Shade can give a 10° to 15° F temperature differential to the soil under it, which cuts water evaporation significantly.) Tree and shrub roots tap into deeper subsoil and reach moisture that shallow-rooted perennials cannot reach. Trees and shrubs also provide windbreaks from prevailing winds and reduce evaporation from surrounding soil.
- **Vines** are useful for their ability to cover large areas on arbors and trellises and provide shade. They can add visual interest and bright seasonal color (or simply stay green). Vines provide rapid vertical growth while using little surface area in the landscape.



Final Thought

Selecting plants is the fun part of xeriscaping. A xeriscape really begins to take shape when we select plants that will work well together, in plant communities, rather than as individual plants. By grouping plants of similar water, soil, and sunlight needs together in a specific "zone" in the landscape, a plant community is created that will thrive — minimizing water needs and providing color, texture, and visual interest for years to come.

Leaves of My School

Main Question:
How are leaves different?

Objectives:

- To apply knowledge of botany and ecology
- To develop ability to observe items closely and classify them

Subjects: science

Time:
1 to $1\frac{1}{2}$ hours for preparation; 10 minutes each group for presenting

Vocabulary:
habitat, morphology

Advance Preparation:
- None

Setting the Stage:

- Review the information about New Mexico's habitats that students learned in Activity 1-2: Are All Habitats Identical?.
- Review leaf morphology and the characteristics of plants from different habitats.

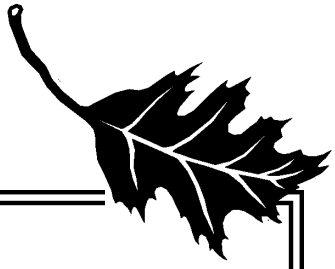
TEACHER TIPS:
To split activity into two classes, students can gather leaves during one period, refrigerate them overnight, and mount them the next day.

An alternative approach is to gather leaves in advance and have the students group the leaves into categories. Students could then hypothesize which habitats the leaves came from and make a trip around the school grounds to test their hypothesis.

Materials:

- 4 blunt scissors
- 4 poster board
- 4 baggies
- 4 paper bag
- 4 tape and glue sticks
- 4 markers

Leaves of My School



Collecting Samples

1. Group students into pairs. Each pair receives a paper bag, several baggies, a marker, and scissors.

2. Gather leaves from each habitat identified on the school grounds. Put leaves from one habitat in a baggie and label it with a habitat name and location on school grounds. Be sure to be gentle with plants and take only one leaf from each plant.

3. Mount leaves on poster board, grouping them according to habitats. Under each group of leaves, write a brief paragraph explaining the amount of water available in that habitat and how those plants are adapted to live in that habitat.

4. Present the poster to the class.

Sample Habitats on School Grounds

Habitat	Location	Description
Grassland	soccer field	all Bermuda grass, full sun
Landscaped	front entrance	mostly shade, drip irrigated, well mulched
Wooded	edge of school property	next to bosque, sun and part shade, large variety of plants

Extension:

- Compare leaves of houseplants (which usually come from tropical habitats) and desert plants.
- Research the different habitats identified and find out what plants are found in those habitats in other parts of the world. Do the plants show the same general adaptations to their habitat as the plants in New Mexico?
- Study some of the plants gathered in more detail by looking at them through dissecting microscopes or magnifying glasses.
- Get slides of plant tissue to look at through microscopes.

Art in the Garden

Main Question:
What do you consider beautiful?

Objectives:

- To identify the variety of wildflowers found in your area
- To identify the parts of a plant

Subjects:
science, art

Time:
45 minutes for each activity

Vocabulary:
stem, petal, stamen, pistil, root, single leaf, compound leaf

Advance Preparation:

- Find an area near the school that has many kinds of wildflowers or flowering plants and arrange a field trip to visit the site.
- Invite a speaker from a wildflower club, a local university, local Master Gardeners, or county extension office to describe different wildflowers for the students.
- Cut blueprint paper into pieces for each student.

Setting the Stage:

- Review with students the parts of a flower and types of leaves and leaf margins.
- They are to investigate what they find beautiful. Let them use their own definition of beauty.

Materials: for each student

- 4 clipboard
- 4 drawing paper
- 4 plant identification brochures and books (See Appendix F for available publications)
- 4 blank overhead transparency sheets
- 4 pencil
- 4 magnifying glass
- 4 blueprint paper (available at hobby and art stores)
- 4 collected leaves

Teacher Tip:
This activity is best done in spring or a few days after a rainfall when wildflowers are in bloom.

Art in the Garden

A. Wildflower Drawings

1. Pass out clipboards, drawing paper, magnifying glasses, pencils and plant books. Go to the field site.
2. Locate several flowers and examine them with a magnifying glass.
3. Choose one flowering plant.
4. Draw the flowering plant.
5. Identify the plant parts on the drawing. Include stem, petal, stamen, pistil, root, and single leaf or compound leaf.
6. Collect different leaves and petals for sun art.
7. Return to the classroom. Use the plant books and resources to identify the plant.
8. Add any interesting information that was discovered through the research to the drawing.

B. Leaf Sun Art

1. Distribute blueprint paper and a transparency sheet to each student.
2. Have students arrange leaves and petals on paper (yellow side up) and cover the leaves with the transparency.
3. Go outside to a place with full sun.
4. When the paper around the leaves turns blue, take the papers inside and remove the leaves and petals.
5. Identify and label the leaf types (simple or compound) and leaf margins. (See **Figure 1**.)

Extension:

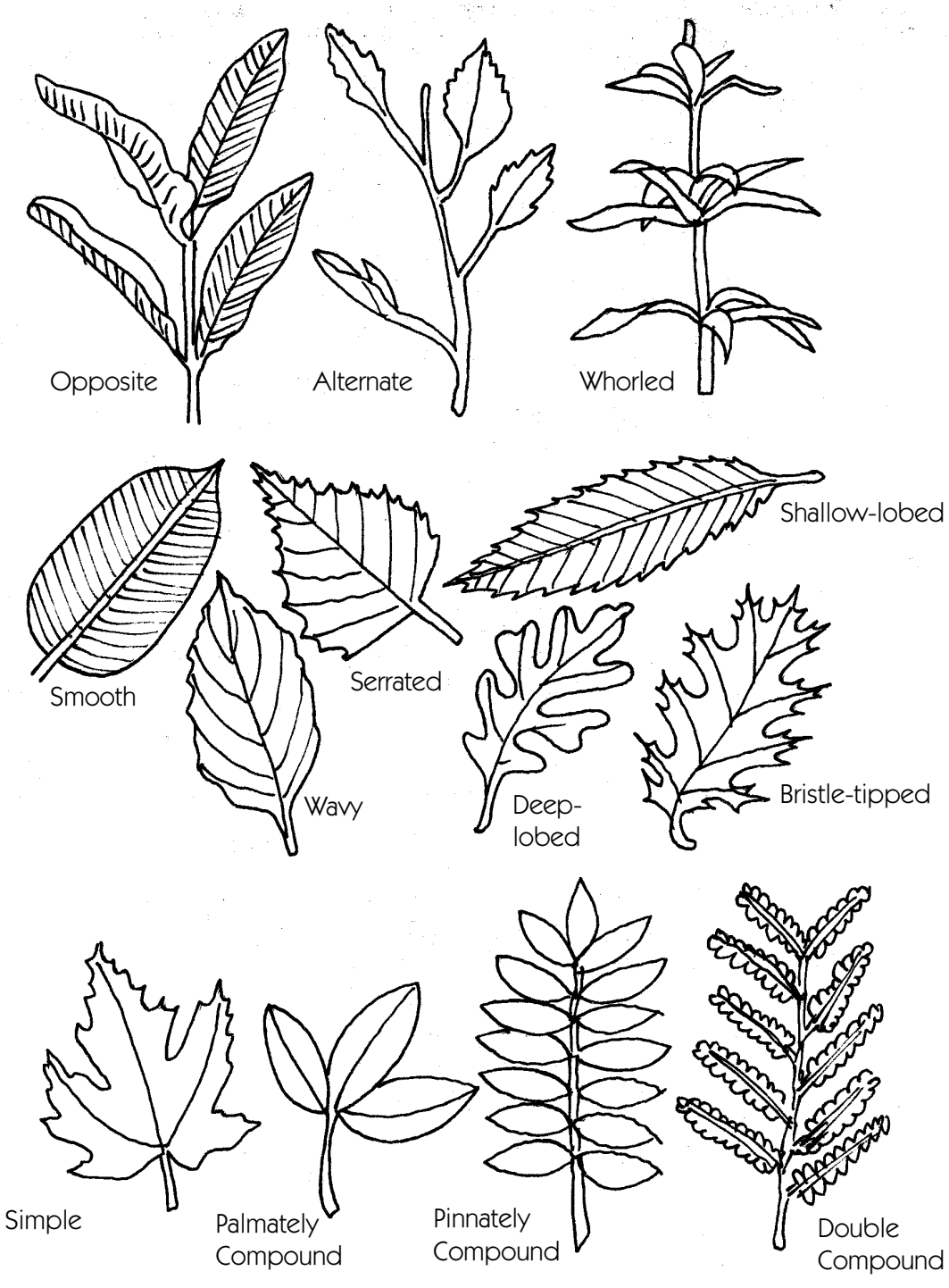
- Set up a grid with sticks and string, and count the number of different wildflowers in a one meter by one meter area.
- Use drawings and leaf prints to make cards.
- Make collages of leaf prints and flowers.

Activity Tip:

If blueprint paper is not available, use tissue paper. Lay the tissue paper over the leaf and use crayons or colored pencils to make rubbings of leaves (remember to turn leaves upside down to get an impression of the ribs). Try using different colored paper and crayons.

Art in the Garden

Figure 1: Types of Leaves



Lost Water

Main Question:
What is transpiration? Do all plants lose water at the same rate?

Objectives:

- To determine how water is lost from a growing plant

Subjects:
science, language arts

Time:
30 minutes to set up; 10 minutes per day for observation for 3 days; 30 minutes on final day to finish worksheet

Vocabulary:
transpiration, stomata

Materials: (a set of the following items for each group of students):

- 4 8 pots or paper cups
- 4 4 cacti or other low-water-use plants
- 4 4 broadleaf plants (high-water-use)
- 4 soil
- 4 6 large plastic bags
- 4 graduated cylinder

Advance Preparation:

- Get 4 plants that are high-water-use and four (such as cacti) that are low-water-use. Alternatively, students could grow their own plants.
- The soil will be the same for all pots or cups. Any soil is acceptable.

Setting the Stage:

- Ask students how water is lost to the environment. Do all plants lose water at the same rate? What are the consequences of water loss?
- Define transpiration and explain its role in the water cycle.

Teacher Tips:
Most tropical houseplants can be used for high-water plants.

The volume of water collected in the plant only (numbers 3 and 7) + the volume of water collected in the pot only (numbers 4 and 8) in theory should equal the volume of water collected in the wrapped plant and pot (numbers 2 and 6).

Lost Water

Experiment

1. Label pots or cups 1 through 8.
2. Make three or four small nail-size drainage holes in the bottom of the pot or cup.
3. Fill pots with soil and plant one plant in each pot. Numbers 1 through 4 will be the low-water-use plants and numbers 5 through 8 will be the high-water-use plants.
4. Start with 200 ml of water.
5. Water the first pot until water comes out of the holes in the bottom.
6. Record the amount of water that was applied.
7. Repeat steps #4 through #6 for each plant.
8. Cover pots or plants with plastic bags as indicated in the table below.
9. Close bags with twist ties.
10. Set pots in a warm place where they will get bright light, but not direct sunlight.
11. Observe plants over three days and record observations.
12. At the start of each day, collect the water at the bottom of the plastic bag. Pour it into a graduated cylinder and record the volume of water collected. Keep separate records for each plant.
13. Pour the water down the sink after data is recorded.

Pot	Plastic Wrapping
1 & 5	None (control)
2 & 6	Wrap plant and pot
3 & 7	Wrap plant only
4 & 8	Wrap pot only

Extension:

- Determine whether water is lost through the top or the bottom of the leaves. Apply petroleum jelly to the top of one leaf and the bottom of another. Observe the plant over 1 to 2 weeks.

- Stand celery stalks up in water colored with red food coloring to see how water flows up the stalk of a plant.

- Test critical wilting point by setting a celery stalk out in the air until it starts to wilt. Stand celery stalk up in water to rehydrate. Leave the stalk out of water for progressively longer periods of time before rehydrating it until it reaches the critical wilting point (stalk can't be revived). Graph the results. Discuss how cycles of drying/re-wetting could affect desert plants.

- Hypothesize what other plants may be high- and low-transpiration plants. Test the hypothesis.

Name

Student Worksheet

Lost Water

A. Low-water-use plant_____

Pot No.	Volume of Water Applied	Volume of water lost			Observations
		Day 1	Day 2	Day 3	
1					
2					
3					
4					

B. High-water-use plant_____

Pot No.	Volume of Water Applied	Volume of water lost			Observations
		Day 1	Day 2	Day 3	
5					
6					
7					
8					

(continued on next page)

Name

Student Worksheet

Lost Water

1. Where was the most water lost — from the soil and roots or from the plant?

2. Did low-water-use or high-water-use plants lose the most water?

3. Where did the water in pots number 3 and 7 (wrapped plant only) come from?

4. Define transpiration in your own words.

Dripping Blooms

Main Question:
Do all plants require the same amount of water?

Objectives:

- To determine the water requirements for different plants
- To group plants according to requirements for water, sun, and shade
- To design a flowering garden reflecting the results of research

Subjects:
science, art, language arts, math

Time:
1 hour research; $1\frac{1}{2}$ hour design

Vocabulary:
annual, perennial, herbs, companion planting, staking

Advance Preparation:

- If adequate books are not available in the classroom, arrange library time or computer lab time for research.
- This project can be done in pairs or groups.

Setting the Stage:

- Ask students if they have ever had a garden. What did they raise? Did all of the plants have the same requirements for growth (light, water, fertilizer, soil type)?
- How would a student go about learning the best way to raise plants?

Materials:

4 seed catalogs
4 metric rulers
4 colored pencils
4 gardening references
(see Appendices F and G for resources)

TEACHER TIP:
Activity can be completed in one period if students design gardens at home.

Dripping Blooms

A. Background Research

1. Using available materials (books, videos, Internet, seed catalogs), research the growth requirements for the plants listed on the Student Worksheet.
2. Enter the information on the Student Worksheet next to the correct plant.
3. Potential information to enter into the "Other Information" column:
   - What other plants it likes to be next to (companion planting)
   - When to harvest the plant or how to collect seeds, leaves, or flowers for drying
   - Whether the plant is an annual, biennial[1], or perennial
   - When it blooms
   - What color it blooms

B. Garden Design

1. Based upon the information gathered in Table 1, make a list of plants that should be grouped together.
2. Using the garden site plan, design a flower garden by placing flowers in their compatible groups and in compatible locations. Remember to implement zoning for plants that require different amounts of water.
3. Write a paragraph explaining the garden design, including why plants are in a particular group, why particular plants are located in a certain part of the garden, and how often various groups of plants should be watered.

Extension:

- Present plans to the class.
- Design a drip irrigation system to water the flower garden.
- Instead of using the garden plan given in this exercise, the class can choose a site at the school and study the site to determine physical and chemical parameters. Then students design and plant a garden to fit that site, and evaluate how well their design worked and what they would do differently next time. They can also carry out ongoing monitoring of soil temperature, pH, etc., and test different types of mulches.

Activity Tip:

For information on how to design a drip system, see Irrigation Basics, A Guide to Smart Water Use from the Office of the State Engineer and Activity 3-4: Design-A-Drip.

[1] Biennial – lasting or living for two years

NAME

Student Worksheet

Dripping Blooms

Use your research to complete the table.

Flower Characteristics

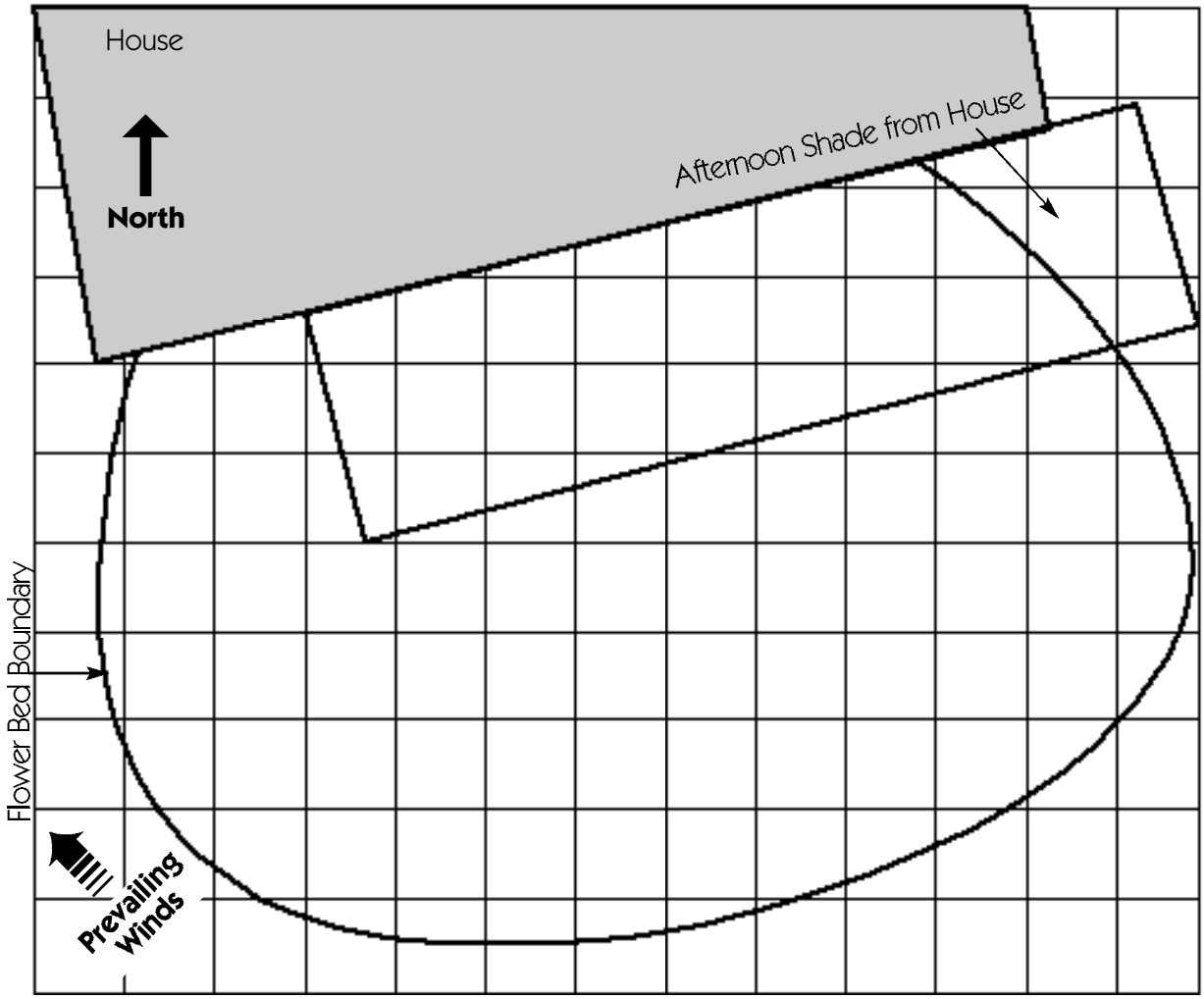
Plant	Water Requirement*	Sun/Shade Requirement**	Height	Width	Other Information
Mat Daisy					
Moonshine Yarrow					
Giant Hyssop					
Armeria					
Gaillardia					
Coreopsis					
Chocolate Flower					
Blue Flax					
English Lavender					
Mexican Evening Primrose					
Rocky Mt. Penstemon					
Rosemary					
Sunflower					
Plumbago					
Threadgrass					

*High, medium or low
**Full sun, part sun, part shade, full shade

NAME

Student Worksheet

Dripping Blooms



Explain Your Garden Design:

Scale: 1 sqaure =1 square foot

Adapted to the Desert

Main Question:
How can we prevent plants from losing so much water?

Objectives:

- To identify the adaptations plants have made to desert environments
- To test the effect of exposed surface area on water loss
- To test hypotheses about how plants conserve water

Subjects:
science, language arts, math

Time:
30 minutes to set up; 10 minutes a day on day 2 and day 5; 30 minutes wrap-up

Vocabulary:
stem, petal, stamen, pistil, root, leaf

Advance Preparation:

- None

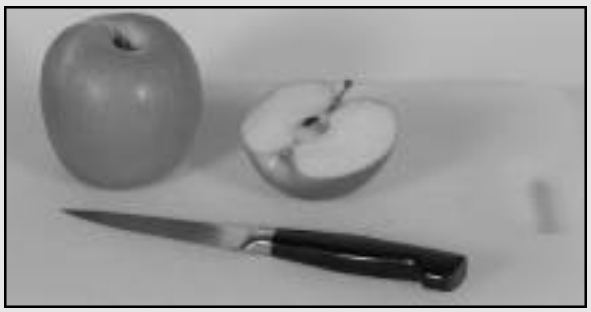
Setting the Stage:

- Ask students to identify the problems of living in a desert.
- What are some adaptations that students have noticed in plants and animals?

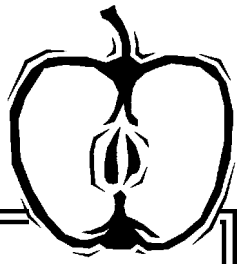
Materials for each student:

4 apples (3 per group) + 1 class control
4 knife
4 sponges
4 balance scale

TEACHER TIP:
This activity can be done in a single class period if the class only does the prediction and plan.



Adapted to the Desert



A. Apple Water Loss

1. Give each group four (4) apples.
2. Peel apple #1 and weigh it.
3. Record weight.
4. Peel apple #2 and cut into two or three large pieces. Weigh all of the pieces together.
5. Record weight.
6. Peel apple #3 and cut into four or more small pieces, as decided by the group. Weigh all of the pieces together.
7. Record weight.
8. Weigh apple #4 without peeling or cutting. This is the control.
9. Make a prediction about which apple will dry out the fastest and why.
10. Leave apples in an exposed area. Do not disturb.
11. After two days, weigh the apples and record the weight.
12. After five days, weigh the apples and record the weight.

B. "Pet Plant" Care

1. Give each student a sponge. Allow students to decorate their sponges with markers. Encourage them to name their "pet" sponges.
2. Saturate the sponge with water.
3. Weigh the saturated sponge. This represents a plant with its stored water.
4. Write a plan for how to care for the "pet plant" over the next 24 hours to help it conserve as much water as possible. Use what was learned in other chapters of this curriculum. The pet plant must be exposed to full sun for at least four hours during the day in order to photosynthesize. It cannot be kept in a plastic container, as it needs air to breathe.
5. Make predictions for the amount of water loss expected.
6. Carry out the plan, keeping a record of observations over the 24-hour period.
7. Weigh the sponge at the end of the 24 hours and determine the percentage of water lost.
8. Share the results with other students.
9. As a class, discuss how the information gathered could apply to plants living in deserts.

Extension:

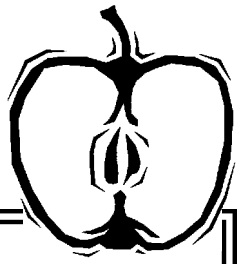
- Bring in an euphorbia[1] from Africa (available from local nurseries or home improvement store garden centers) to show how totally unrelated plants have evolved a similar array of characteristics to adapt to desert environments. This concept is called convergent evolution.
- Research adaptations that animals have used to conserve water. Are any of them the same as the adaptations that plants use?

[1] Euphorbia – a large genus of plants that have a milky juice

Student Worksheet

NAME

Adapted to the Desert



Apple Water Loss

1. Hypothesis:

2. Data Table

Apple	Treatment	Initial Weight	Weight at Two Days	Percentage Water Loss at Two Days	Weight at Five Days	Percentage Water Loss at Five Days
1 (class control)	Whole apple, peeled					
2	Large pieces					
3	Small pieces					
4	Unpeeled apple					

Calculate the percentage (%) water loss for each treatment after 2 days and after 5 days, using this equation:

$$\text{Percentage (\%) water loss} = \frac{\text{Initial weight of apple - Final weight of apple}}{\text{Initial weight of apple}} \times 100$$

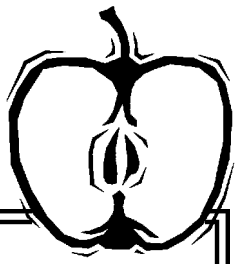
3. Was the rate of water loss the same for all apples?

(continued on next page)

Student Worksheet

NAME

Adapted to the Desert



4. Which apple lost the least water? Why?

5. Which apple lost the most water? Why?

6. Why did you convert the data to percentages of water lost, rather than just comparing the weights of the apples?

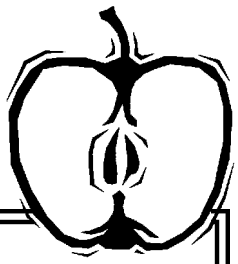
7. Was your hypothesis correct? Why or why not?

8. How does the apple's water loss compare to plants in New Mexico?

Student Worksheet

NAME

Adapted to the Desert



Pet Plant Care

1. 24-hour plan for care:

2. Hypothesize about how well you expect your plan to work:

3. Data Table

Initial weight of sponge	
Final weight of sponge	
Volume of water lost	
% water loss	

Calculate the percentage (%) water loss from the sponge using this equation:

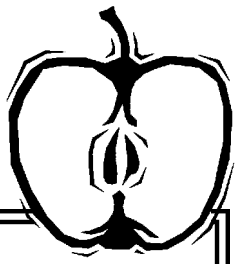
$$\textbf{Percentage (\%) water loss} = \frac{\textbf{Initial weight of sponge - Final weight of sponge}}{\textbf{Initial weight of sponge}} \times 100$$

(continued on next page)

Student Worksheet

NAME

Adapted to the Desert



4. How effective was your plan?

5. If you repeated this experiment, what would you do differently?

6. How would you modify your plan if you were using plants instead of a sponge?

Where Are You From?

Main Question:
Does a plant have to be native to be used in a xeriscape?

Objectives:

- To trace the origins of various species of plants around the school
- To categorize plants as native and introduced species
- To evaluate the pros and cons of introducing new species

Subjects:
science, language arts, social studies

Time:
1 to $1\frac{1}{2}$ hours for research; 10 minutes per student group for presentations

Vocabulary:
native, exotic, introduced, invasive

Advance Preparation:

- Obtain a list of plants found around the school, or have students survey and identify plants.
- Determine if plants are native or introduced. A partial list of plants that have been introduced to New Mexico is located at the end of this activity.
- Schedule library or computer lab time for research.
- Research to find stories about early plant explorers to read to the class such as "Tasty Brazil Nuts Stun Harvesters and Scientists," *Smithsonian Magazine*, April, 1999. See Appendix M: References for book and article suggestions.

Setting the Stage:

- Give students the list of plants and ask them to guess which plants are native and which are introduced (non-native).

Materials:

- 4 list of plants around the school or neighborhood
- 4 plant books
- 4 string
- 4 Internet
- 4 world map

Where Are You From?

A. Preliminary Research

1. Have each student or student group select one introduced plant from the list to research.

2. Prepare an oral and written report about the assigned plants. Reports should include:

   - Origins of the plant;
   - How the plant was introduced into local area;
   - Benefits and liabilities of having the plant in local area;
   - A description of the original habitat;
   - Water requirements and soil preferences of the plant; and
   - How the plant is being used in landscapes.

B. Class Presentation

1. Present the information to the class.

2. On a wall of the classroom, hang pictures of introduced plants around a world map. Stretch string from the picture of the plant to its country/region of origin.

3. Compare the habitats of the introduced plant to the habitats in New Mexico.

Extension:

- Collect articles on the problems of introducing new species into a wild habitat. Examples could include salt cedar in the western U.S. and kudzu in the eastern U.S. Develop a case study of one of these species, including a plan for how to control the introduced species.

- Investigate state and federal laws for introducing exotic species.

- Visit a local nursery and categorize plants there as native and introduced. Talk to nursery personnel about attempts to provide native plants for landscapes.

Where Are You From?

Partial List of Plants Introduced in New Mexico

Scientific Name	Common Name	Origin
Baccharis pilularis	Coyote Bush	California
Berberis aquifolium	Oregon grape holly	Pacific Northwest
Brahea armata (Erthea armata)	Mexican blue palm, Blue hesper palm	Baja California, Mexico
Caesalpinia gilliesii	Desert bird-of-paradise	South America
Convolvulus cneorun	Bush morning glory	Europe
Dalea capitata	Trailing yellow dalea	Mexico
Euphorbia rigida	Gopher plant	South Africa
Fraxinus oxycarpa	Raywood ash, Claret ash	Australia
Gazania spp.	Gazania	South Africa
Merrima aurea	Yellow morning glory vine	Baja California, Mexico
Nandina domestica	Heavenly bamboo	China
Pennisetum setaceum	Fountain grass	South Africa
Potentilla fruticosa	Shrubby cinquefoil	Northern U.S.
Prosopis chilensis	Chilean mesquite	South America
Punica granatum	Pomegranate	Old World
Quercus suber	Cork oak	Mediterranean
Rosa banksiae	Lady bank's rose	China
Rosmarinus officinalis	Rosemary	Mediterranean
Salvia clevelandii	Chaparral sage	Southern California
Senna nemophila	Desert cassia	Australia
Spartium junceum	Spanish broom	Mediterranean
Verbena rigida	Sandpaper verbena	South America
Vitex agnus-castus	Vitex/Chaste tree	South Europe

Source: Desert Blooms CD

A Desert Blooms in My Garden

Main Question:
How does habitat affect plant choices?

Objectives:

- To describe various habitats in New Mexico
- To understand which plants fit in which New Mexico habitats

Subjects:
science, art

Time: 1 to 2 hours

Vocabulary:
groundcover, perennial, annual

Materials:

- 4 poster board
- 4 colored pencils
- 4 various plant books, brochures and resources (See Appendices F and G for suggestions)
- 4 scissors
- 4 **Habitat Grab Bag**

Advance Preparation:

- Obtain copies of gardening books that contain plant lists. (Note: the Desert Blooms CD is accessible online at http://www.uc.usbr.gov:2525/dblooms/.)
- Using the **Habitat Grab Bag** page that follows, make a copy of the pages, cut out the habitats, and place into a bowl or hat to make a grab bag listing different habitats. There should be enough for each student or student group.
- Obtain information on how New Mexico is divided into regional habitats. (Information can be found in *The Enchanted Xeriscape* brochure from the New Mexico Office of the State Engineer. Also refer to Are All Habitats Identical? in **Chapter 1: Water Views** for information provided by the National Geographic Society.)
- Visit the Rio Grande Nature Center in Albuquerque to see plant sizes, combinations, etc. (See Appendix K for a list of xeriscape demonstration gardens and their locations.)

Setting the Stage:

- Ask students if they have seen any native gardens they like. Describe them.

Activity Procedure

A Desert Blooms in My Garden

Habitat Assignments

1. Have each student or group of students pull a habitat out of the grab bag.

2. Using gardening books, look for plants that are adapted to the habitat selected.

3. Print or draw pictures of appropriate plants. Be sure to include all types of plants (trees, shrubs, flowers, groundcovers, etc.)

4. Group the plant pictures on a poster board according to their water-use zones.

5. Or, instead of #4, draw an outline of a landscape onto the poster board and arrange the plants into a landscape. Include the house, sun exposures, and any other elements desired.

Extension:

- Design an elevation of the ideal garden. An elevation is a ground-level view of the landscape (as opposed to, say, an aerial view.) Color the pictures and label the habitat. Write a short paragraph explaining the design.

- Display the posters in the school library or at a local nursery.

- Photograph groupings of plants around the neighborhood.

- Research medicinal and dye uses of the plants selected.

- Research species of the plants selected to see if they have relatives that live in other habitats.

- Find examples of the plants selected and sketch what they look like in different seasons.

- Research the life history of one of the selected plants.

Student Worksheet

Name

A Desert Blooms in My Garden

Habitat Grab Bag – (Copy and Cut)
Blank spaces can be used for habitats of your own design.

Full Sun North Mountains	Sun/Partial Shade Southern New Mexico
Dry Shade Central New Mexico	Full Sun Southern New Mexico
Sun/Partial Shade Central New Mexico	Dry Shade North Mountains
Full Sun Central New Mexico	Sun/Partial Shade North Mountains
Dry Shade Southern New Mexico	

Name

Student Worksheet

A Desert Blooms in My Garden

Habitat Grab Bag – (Copy and Cut)
Blank spaces can be used for habitats of your own design.

RESOURCES:

Desert Blooms: A SunScape Guide to Plants for a Water-Scarce Region is a searchable plant guide on a CD-ROM. It includes detailed information with great pictures for plants that should and should not be used in the landscape. The plant list is for the El Paso, Texas region, so check for temperature ranges before choosing a plant. This information is also accessible online at http://www.uc.usbr.gov:2525/dblooms/.

The Complete How to Guide to Xeriscaping published by the City of Albuquerque includes a list of recommended plants for Central New Mexico. See Appendix F for ordering information.

Healing Herbs of the Upper Rio Grande: Traditional Medicine of the Southwest by L. S. M. Curtin was first published in 1947 to preserve traditional information on the plants and their lore from Native Americans of northern New Mexico. Available from a variety of sources.

The following books provide valuable New Mexico plant lists: ***Natural By Design, New Mexico Gardener's Guide,*** and ***Plants for Natural Gardens,*** all by Judith Phillips; and ***The Xeriscape Flower Gardener*** by Jim Knopf.

http://weather.nmsu.edu/AbqPlantList/index.html – searchable database for low-water-use plants for the Southwest

http://www.hort.usu.edu/natives/index.html – searchable database with pictures of drought-tolerant plants for the Intermountain West

http://www.blm.gov/education/weed/weed.html – This site about noxious (invasive) weeds is from the U.S. Bureau of Land Management education site. It includes classroom activities, tips on how to get involved in hands-on learning at the community level, and extensions and resources.

http://horizon.nmsu.edu/ddl/wqnaturalhist_k.html – a National Museum of Natural History activity where participants become curators and research plants and cultures for the museum.

http://www.treenm.com – Tree New Mexico (TNM) is a grassroots non-profit program dedicated to planting trees on public lands and providing environmental education to the state of New Mexico. The TreePath Program is their classroom education program for fifth graders.

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