XERISCAPE™

a guide to developing a water-wise landscape

Cooperative Extension
The University of Georgia College of Agricultural and Environmental Sciences

TABLE OF CONTENTS

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a guide to developing a water-wise landscape

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INTRODUCTION

Today Georgia is facing a serious water supply problem in several urban areas as population growth places an ever-increasing strain on available water supplies.

From 1995 to 2005, Georgia's population grew by more than 1 million, and it is projected to increase another 2 million by 2015. In 2007, more than two-thirds of our state's population lived in just 26 of 159 counties. These counties are all in and around urban areas. As urban areas grow, so does the competition and demand for water resources.

Increasing demand for water results in periodic water shortages and restrictions on outdoor water use. Periods of limited rainfall or drought make the problem worse. Recently, in some highly populated areas, water supply problems and restrictions on outdoor water use have occurred even during times of normal rainfall.

Figure 1 compares water use and population growth in Georgia from 1950 to 2000. While demand for ground water has increased slightly, demand for surface water has increased 10-fold. About 75 percent of Georgia's water supply comes from surface water, while only 25 percent comes from ground water.

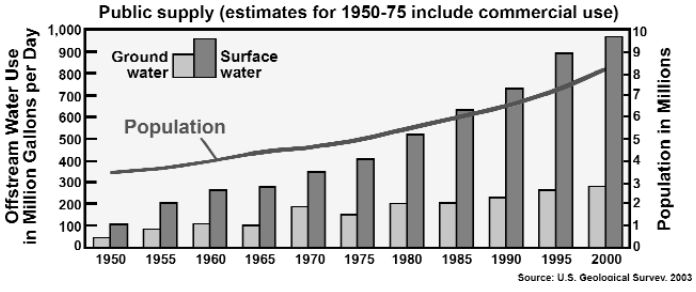


Figure 1. *Water use and population growth.*

Household water use increases dramatically during the summer months when irrigation water is applied to the lawn, garden and landscape. In some households, water use may be as much as 100 percent higher in summer than in winter.

Tremendous amounts of water may be used outdoors. A typical portable lawn sprinkler, for instance, applies about 300 gallons of water per hour of operation. Some residential landscapes receive several times this amount of water two to three times a week during the summer. As a result, much water is lost to evaporation or run-off, or it is simply wasted when plants are given more water than they need.

In this publication, you will be introduced to Xeriscape™, quality landscaping that conserves water and protects the environment.

The term Xeriscape (pronounced zera-scape) was coined in Colorado in 1981 in response to a prolonged drought. It derives from merging the Greek word "Xeros," meaning "dry," with the word "landscape."

Today, Xeriscape programs exist in more than 40 states throughout the United States. The National Xeriscape Council's headquarters is in Atlanta, Ga.

Xeriscape-type landscaping is a package of seven common-sense steps for making a landscape more water-efficient:

1. Planning and Design
2. Soil Analysis
3. Appropriate Plant Selection
4. Practical Turf Areas
5. Efficient Irrigation
6. Use of Mulches
7. Appropriate Maintenance

Each of these steps is a good gardening practice. However, the more of them you implement, the more water efficient your landscape becomes.

A Xeriscape-type landscape can reduce outdoor water consumption by as much as 50 percent without sacrificing the quality and beauty of your home environment. It is also an environmentally sound landscape, requiring less fertilizer and fewer chemicals. And a Xeriscape-type landscape is low maintenance — saving you time, effort and money. Any landscape, whether newly installed or well established, can be made more water efficient by implementing one or more of the seven steps. You do not have to totally redesign your landscape to save water. Significant water savings can be realized simply by modifying your watering schedule, learning how and when to water, using the most efficient watering methods and learning about the different water needs of plants in your landscape.

Let's look at each of the Xeriscape steps in more detail.

STEP 1: PLANNING AND DESIGN

Whether you are developing a new landscape or renovating an existing landscape, proper planning and design are important. You may wish to start thinking immediately about what plants to use, but first you must solve any environmental and physical problems in an attractive and practical manner. Think about the various areas of your landscape in terms of how they should be developed for different uses and how much space you should allot to each area.

As you plan each area, consider several different arrangements. For example, is a fence, wall or hedge more appropriate for screening and/or security? How much space is needed for active recreation, a vegetable garden or for patio entertaining? Only after these decisions are made should you begin thinking about what plants to use.

Begin With a Base Map

A base map is a plan of the property drawn to scale on graph paper showing the location of the house, its orientation to the sun, other structures on the site, unusual features such as stone outcroppings and existing vegetation. See figure 2.

Accuracy in the base map will help you determine if your site will accommodate all of your plans. Later it will help to determine the quantity of any construction materials and plants needed. For additional information on preparing a base map, refer to Extension Leaflet 124, *Developing a Site Plan*, or talk with your county Extension agent.

Catalog Site Characteristics

Next, lay a sheet of tracing paper over the base map and label it “Site Analysis.” See figure 3. Use arrows to indicate the direction of desirable views you want to emphasize and undesirable views you want to screen. Use arrows to indicate the drainage patterns of the property, including any low spots or eroded areas. Make plans to correct potential drainage problems before planting. This may require regrading, bringing in additional soil, building retaining walls or shaping terraces. Any changes in the existing landscape should be subtle so that the natural character of the landscape is retained.

Incorporate as many of the natural elements of the site into the design as possible, such as existing trees

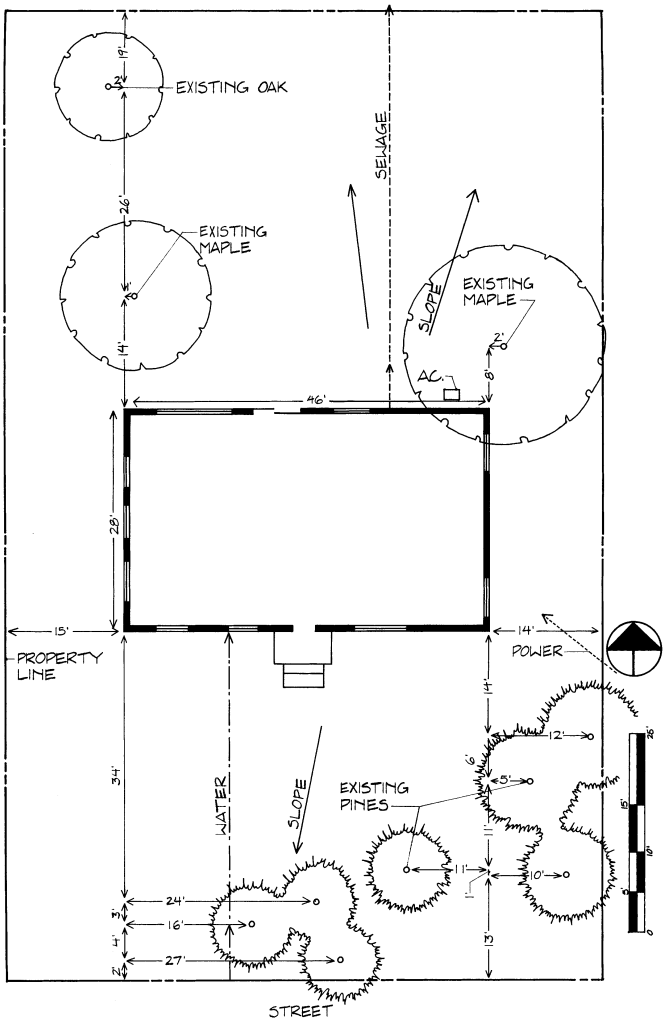


Figure 2. *Base map of property*

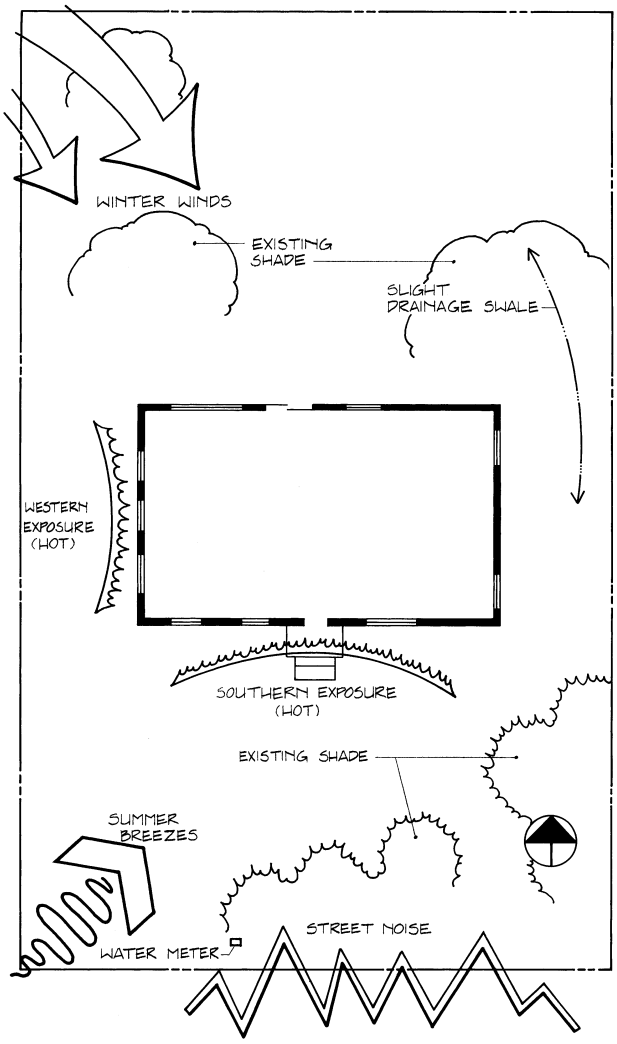


Figure 3. *Site analysis of property*

and shrubs. Undisturbed native plants will not require water for re-establishment and may be more water efficient than new plantings.

Note the orientation of the home (i.e., north, south, east, west). This will help determine where to put plants best suited for sun or shade. Areas exposed to direct afternoon sun are likely to dry out more rapidly than those in the shade. In these locations, your plan should include drought-tolerant plants, some method of providing supplemental water or cultural practices that will help conserve moisture.

Incorporate Shade Into the Design

Shade from trees or structures in the landscape keeps the landscape cooler and reduces water loss while creating a comfortable living environment. Refer to figure 4. A shaded landscape can be as much as 20°F cooler than one in the full sun.

Figure 4. *A shaded landscape may be 20°F cooler than a landscape in full sun.*

Figure 5 compares the heat exchange in an unshaded parking lot where the soil surface is covered by pavement with a tree in dry soil and a tree in moist soil.

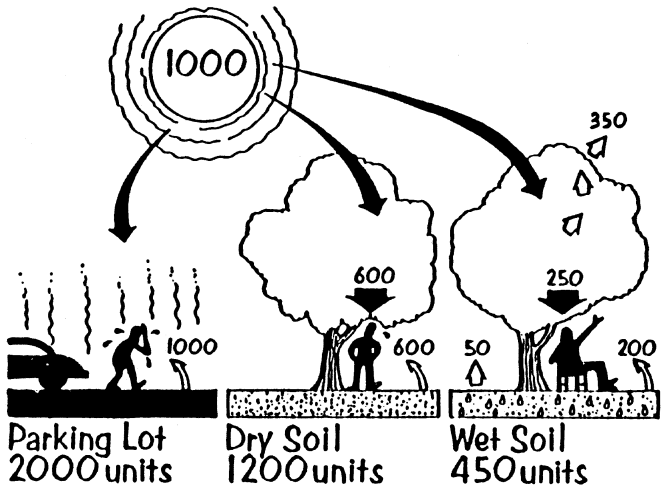


Figure 5. *Effects of shade on water loss*

A person standing in an open parking lot is bombarded with 1,000 heat units from the sun and another 1,000 heat units reflected from the paved surface. Walking beneath a shade tree provides immediate relief from the sun because the tree acts like an umbrella, blocking light and heat (passive shade). If the tree is growing in moist soil, it will not only block heat but will also dissipate heat by evaporative loss from the leaves (active shade). A moist soil surface also evaporates heat and reduces heat load further. Therefore, a moist landscape with trees can contain one-fourth as much heat as a parking lot in full sun and one-half as much heat as a bone-dry landscape.

In addition to paved areas, shade prevents heat build-up from other hardscape surfaces, such as brick or stucco walls and gravel walks. Whenever possible, try to shade these surfaces.

Just as we perspire and lose moisture through our pores, plants transpire and lose moisture through their leaves. A mature oak tree, for example, can dissipate as much heat as four home central air conditioners running 24 hours per day. This evaporative water loss from leaves has a cooling effect on the environment and reduces water loss. Therefore, effective shading makes the landscape more water-efficient, the main objective of Xeriscape planning.

Effective shade management in a Xeriscape-type landscape involves using shade to block sunlight from striking the soil surface, to intercept, scatter and reflect radiant energy to protect paved surfaces or masonry structures from direct sunlight. Effective shade management also involves managing wind currents that influence heat flow in the landscape. In addition to trees, structures like trellises, arbors, walls or fences can provide shade. A vine or espalier on these structures improves their shading and cooling effect. See page 19 for a suggested list of vines.

Plan for Different Use Areas

To begin your plan, overlay the base map and site analysis sheet with another piece of tracing paper. On this sheet indicate the *public, private* and *service* areas of your landscape. See figure 6. Consider how these areas will be developed based on space requirements for each activity.

The *public* area is the highly visible area that most visitors see, such as the entry to the home. In a traditional landscape, this area typically receives the most care, including the most water. Therefore, the careful design of this area is important for water conservation. This area can be designed to require minimal water and maintenance without sacrificing quality or appearance.

The *private* area of the landscape, usually the backyard, is where most outdoor activity occurs. It is generally the family gathering area. It may also include a vegetable garden or fruit orchard. The landscape in this area needs to be functional, attractive and durable, but it also should be designed to require less water than the public area of the landscape.

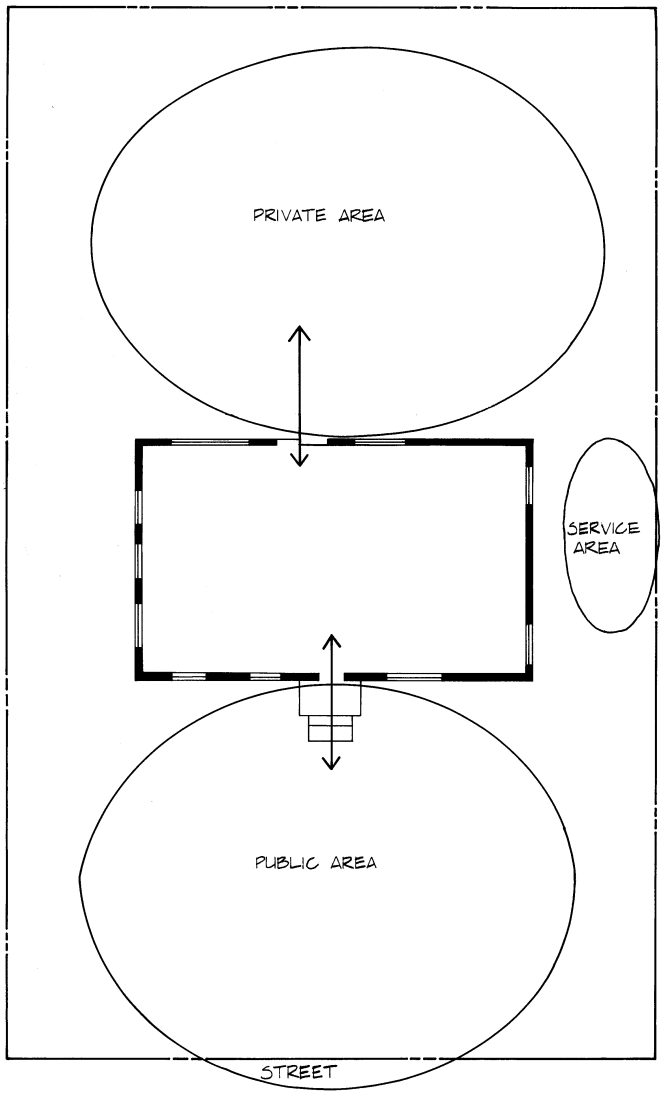


Figure 6. *The basic use area of a typical residential lot*

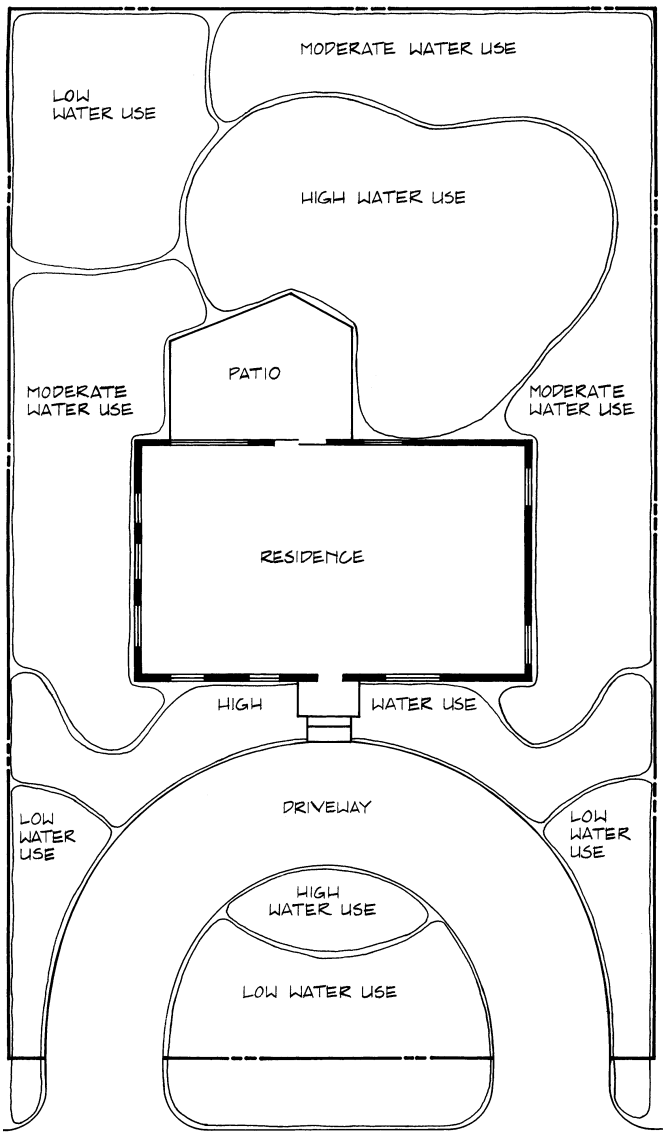


Figure 7. *Diagram of water-use zones of property*

The *service* area is the working or utility area of the landscape, an area usually screened from view and containing such items as garbage cans, outdoor equipment, air-conditioning units or a doghouse. In terms of routine maintenance, this area would be designed to require the least care and water of the three areas.

Establish Water-use Zones

In addition to dividing the landscape into use areas, a Xeriscape plan further divides the landscape into three water-use zones: *high* (regular watering), *moderate* (occasional watering) and *low* (natural rainfall). See figure 7. An individual landscape may include several of these zones. High water-use zones are small, highly visible areas and highly maintained areas of the landscape, such as the public area and the area around the patio where plants are watered regularly in the absence of rainfall. In the moderate water-use zones, established plants are watered only when they turn a gray-green color, wilt or show other symptoms of moisture stress. Possible plants for this zone include azalea, dogwood, redbud, Japanese maple and many herbaceous perennials.

In the low water-use zones, plants are watered by natural rainfall and would not be irrigated. For greatest water conservation, design as much of your landscape as possible into low water-use zones. Most people are surprised to learn that the majority of our woody ornamental trees and shrubs, turfgrasses, some herbaceous perennials and even some annuals, like vinca and verbena, grow well in low water-use zones where they are not irrigated once they are established. See tables at the end of this publication for additional selections.

Expect a slight loss of quality during extended dry periods, but don't be alarmed. Some plants will literally shut down during drought and cease growing. Bermuda grass will go dormant and turn brown during drought, then bounce back with the first rains. Learning to accept this "less than perfect" appearance during dry periods is one of the most difficult obstacles to overcome in a water-conserving landscape.

One exception to the water zone rule is newly planted ornamental plants and turfgrasses. These plants require regular irrigation during the establishment period (8 to 10 weeks after planting), regardless of their intended water-use zone.

To maximize water savings, concentrate seasonal color beds in areas of the landscape where they can be watered and maintained. Avoid scattering a number of small color beds throughout the landscape.

Now, add a new overlay of tracing paper to the base map and sketch your desired water-use zones. The landscape is beginning to take shape and you can visualize the form of the various beds, but construction materials and plants have not yet been identified.

Develop a Master Plan

Once you have settled on a design scheme and a water management arrangement, give form and definition to the various spaces in your plan. With the identification of planting spaces as well as edging materials, groundcovers and paving, the master plan begins to take form. This is a plan showing the final product of your efforts. Straight lines or smooth flowing curves are best — tight curves or unnecessary bends can be maintenance problems. Use right angles and avoid acute angles that are difficult to maintain and irrigate. Remember that simplicity in the design will ensure easy maintenance and water-use efficiency. A prototype master plan is shown in figure 8.

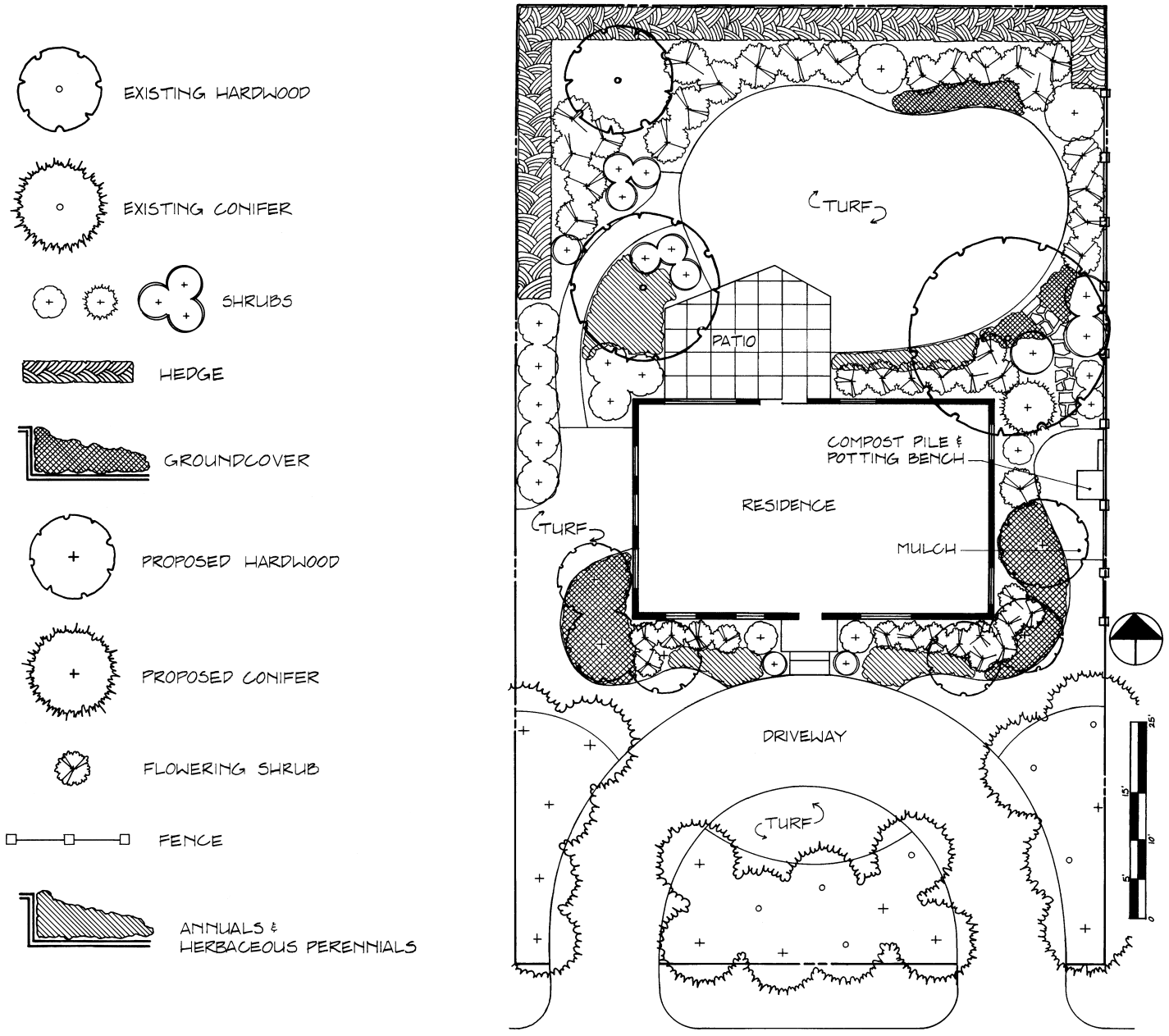


Figure 8. *Master plan for incorporating Xeriscape principles. Note how the character of this landscape is very similar to that of a traditional landscape.*

Fit Plants to the Design

Once you achieve the style and overall effect you desire, select plants to fill the assigned spaces. Select plants that complement and accent the good features of the architecture and construction materials rather than overpower them.

Group plantings to conform to the shape of plant beds. Avoid rigid formal, geometric plantings as much as possible. A good approach for most residences is to place the larger plants at the corners with some height at the entrance and low plantings in between. Such arrangements focus attention on the entrance. For a pleasing visual effect, use odd number groupings (1, 3, 5) when possible. Use bands of low-growing plants or ground covers to tie together and unify groups of taller shrubs.

Place plants at the proper spacing in the landscape to ensure easy maintenance and more efficient use of water. See the tables on pages 19 to 31 for information on mature height and spread of commonly used plants or ask your nurseryman or Extension agent about the plant. Spacing plants far enough apart is extremely important so that they can achieve their mature size without being crowded. Over-planting by placing plants too close together not only increases your costs but also results in long-term maintenance problems and increases the potential for water stress. For additional information, refer to Georgia Extension Service Leaflet 135, *Spacing Plant Materials: Ground Covers*; Leaflet 134, *Spacing Plant Material: Shrubs*; and Leaflet 127, *Spacing Plant Material: Trees.*

Select plants that have a size and form that conform to their location without having to be sheared or frequently pruned to keep them in bounds. Plants, like people, grow in all shapes and sizes. If left unpruned, some plants will be tall and thin; others will stay short and spreading. Some will be irregular with open branching; others will be compact with dense foliage.

Choose plants with the same shape and ultimate size as the space you want to fill. For example, to plant an area in front of low windows, 2 feet above the ground, select spreading low-growing shrubs with an anticipated height of not more than 2 feet. Refer to pages 21 to 22 for a suggested plant list. Avoid using too many kinds of plants, because the landscape will look like an arboretum and will lack unity. For the typical home, three to five different shrubs, in addition to ground covers and trees, are recommended for the basic plantings around the house. For more information on selecting plants for Xeriscape-type landscape, as well as a suggested plant list, see "Appropriate Plant Selection" on page 9 and "Durable Plants for Xeriscape-type Landscapes," pages 19 to 31.

Renovation of an Existing Landscape for Improved Water Conservation

Figure 9 depicts before and after views of a typical residence renovated for water conservation.

The before view illustrates a rather dull landscape with foundation shrubs ringing the house, a hedge along three sides and some native trees along the rear of the property.

The redesign of the residence shows expansion of the shrub beds in the public and private areas of the landscape to provide seasonal interest, variety and reduced maintenance. Shade-tolerant ground covers are used under the existing trees on the left side of the front and right rear of the property. A large area in the left rear of the property was made a natural mulch play area for children. Note how the water-use zones changed during the redesign of the property.

Tables 1 and 2 show an economic comparison of the landscape shown in figure 9 before and after renovation. Changes in water use zones were projected to save more than 29,000 gallons of water a year. This equated to annual savings of $66.12 on water, $46.40 on sewage and $237.00 on landscape maintenance. Although the landscape renovation cost $1,245 in plants and supplies, the annual savings brought a total return on investment within three years. Therefore, a water-wise landscape saves not only water but also money!

Table 1. *Surface area by water-use zone before and after renovation*

	Square Feet	
Zone*	***Before***	***After***
Low	0	3,403
Moderate	5,788	3,538
High	3,662	2,509
Total Irrigated Area	9,450	6,047

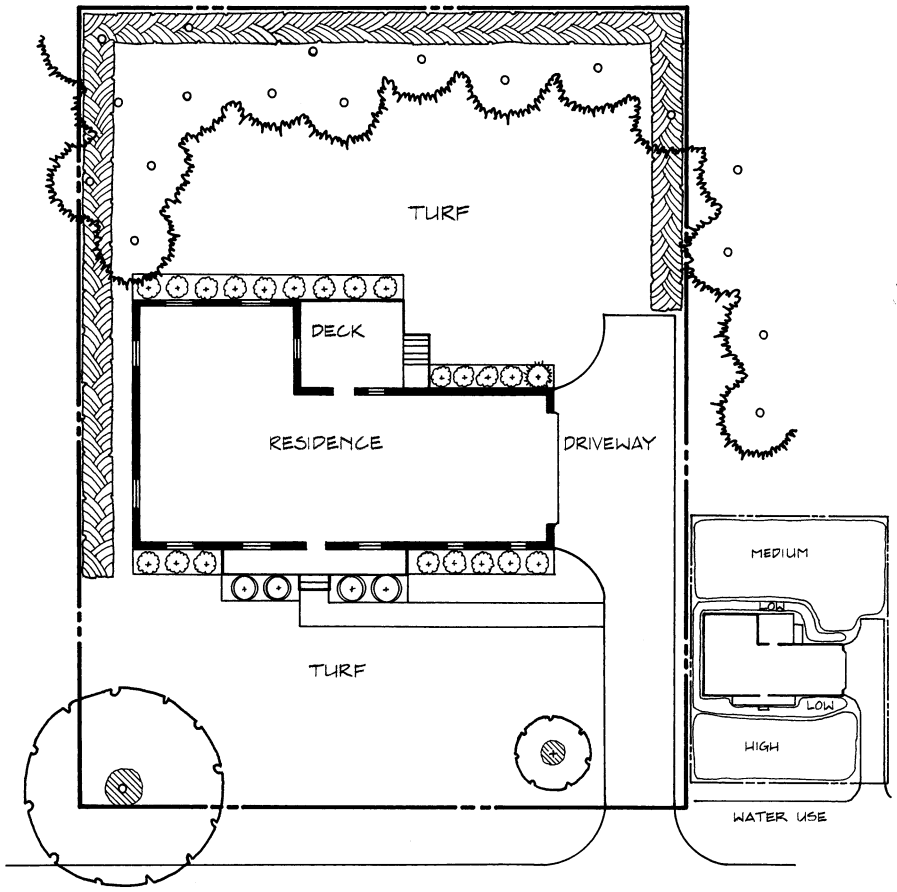
* Low = not irrigated; moderate = irrigated occasionally; high = irrigated regularly

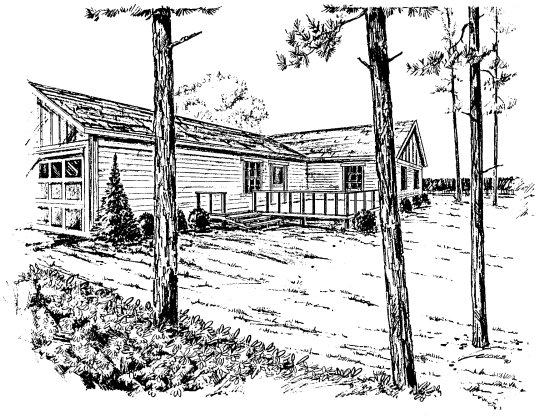
Table 2. *Estimated annual water use and annual cost of water, sewage and landscape maintenance before and after renovation*

	Before	**After**	**Savings**
Water use (gallons)	81,437	51,723	29,714
Est. annual water cost	$199.68	$133.56	$66.12
Est. annual sewage cost	$140.94	$94.54	$46.40
Est. annual maintenance costs	$660.00	$423.00	$237.00
Overall cost	$1,000.62	$651.10	$349.52

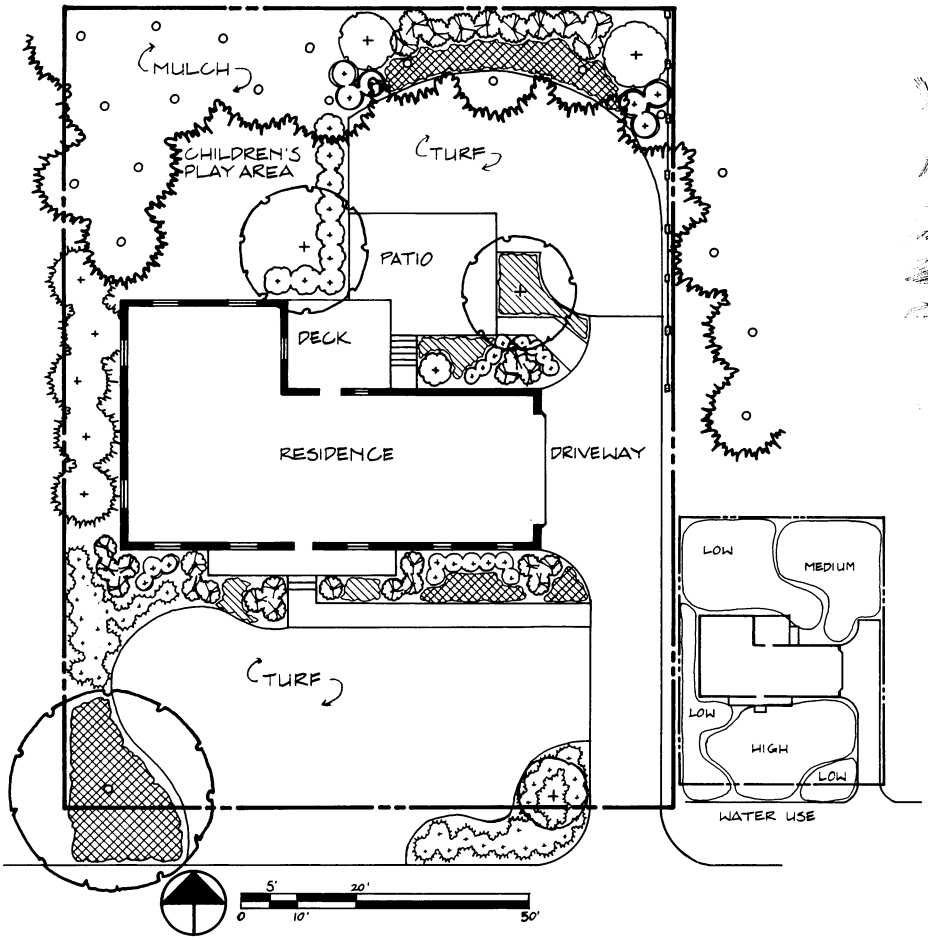
Additional examples of Xeriscape-type renovations are shown on pages 32 to 39.

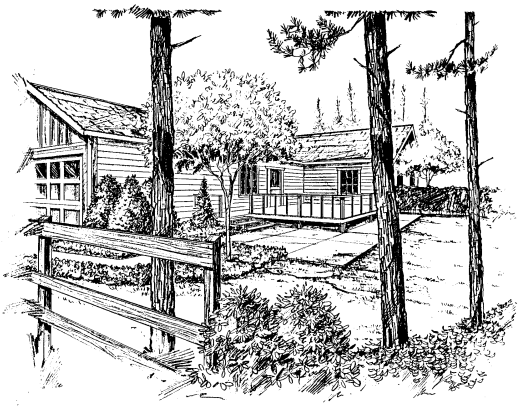
The alteration of an existing landscape to conserve water does not have to be as elaborate as that shown. In many instances, it may be as simple as relocating a few shrubs or flowering trees to more environmentally suitable locations on the property or improving the shape of plant beds to simplify irrigation. Considerable savings can result by converting irrigated areas to ground covers or natural mulch areas. Simply changing management practices and watering habits without making any physical changes in the landscape often can save large amounts of water. For each 1,000 square feet of landscaped area converted from an irrigated to a nonirrigated area, you can save an estimated minimum of $60 per year on water and sewage costs.





BEFORE





AFTER

Figure 9. *Before and after Xeriscape retrofit showing changes in water-use zones and view of backyard*

STEP 2: SOIL ANALYSIS

Inspect Your Soil

A thorough analysis of both the physical and chemical characteristics of the soil is important when developing a water-wise landscape. Georgia has a wide variety of soil types, ranging from well-drained coastal sands to poorly drained clays. Each soil has its own unique structure and texture, drainage pattern, pH, nutrient content and need for amendments and fertilizer. To complicate matters, an individual landscape may have several different soil types, or the soil may consist of fill dirt brought onto the site. Soils are seldom perfect; most of them can be improved in some way to ensure best plant growth.

Soil Analysis Saves Guesswork

Before landscaping, take a sample of your soil to your local county Extension office for testing. Your county Extension agent will provide you with a recommendation for lime and fertilizer based on the analysis.

Do Not Add Organic Matter to the Planting Hole for Trees and Shrubs

For years we have added organic matter such as peat moss, animal manure or compost to the planting hole to enrich the soil, to conserve moisture and to improve plant growth. But recent research shows no benefit from amending the planting hole. In fact, organic matter added to individual planting holes in clay soils acts like a sponge in a bathtub, holding excess moisture around plant roots after irrigation or rainfall. Wet, waterlogged soils that suffocate plant roots are a leading cause of plant death in Georgia. Even in well-drained soils, organic matter encourages the roots of plants to stay within the hole instead of growing out to explore the native soil.

When planting individual trees and shrubs, dig a large planting hole, at least two times wider than the root ball of the plant. See figure 10.

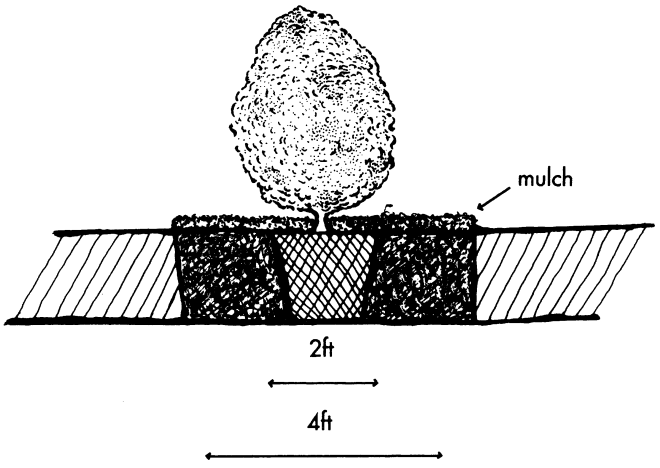


Figure 10. *Diagram of a properly planted shrub. Proper planting is the key to healthy root growth and drought tolerance of trees and shrubs.*

Research at the University of Georgia shows that plants transplanted into a large planting hole establish themselves more quickly and develop a significantly larger root system than those in a small hole no larger than the root ball. A large, extensive root mass improves the plant's ability to absorb moisture from the soil and helps the plant survive drought.

Next, make certain the top of the root ball is level with the soil surface, then backfill with the same soil removed from the hole. Do not add amendments to the hole. Simply backfill with the native soil after removing stones, sticks and other debris. Tamp the soil lightly to eliminate air pockets. Water thoroughly and then add organic mulch, such as pine straw or bark ships, to the soil surface to conserve moisture.

When planting a group of shrubs, cultivate the soil throughout the area as deeply as possible. Cultivation changes the structure of the native soil and provides a good environment for root growth.

Improve the Structure of Poor Soils

Certain native soils, like dense, poorly drained clays, have such poor structure that plant growth suffers unless they are improved. Poorly drained soils can be improved in several ways. Sometimes deep cultivation will break apart a hard layer of soil (hardpan) several inches below the soil surface and improve drainage. Another option is to bring in additional soil to raise the planting area 12 to 15 inches above the existing grade. Some professional landscapers also incorporate 3 to 6 inches of a coarse aggregate, such as granite sand, into poorly drained soils. A final option is to install subsurface drainage pipe to carry excess water off the site after rain.

On the other hand, soils that tend to dry out rapidly and hold little moisture will benefit from organic matter such as aged animal manure or compost, incorporated uniformly throughout the planting bed. This is particularly helpful when water-requiring plants, like annuals, are to be grown. However, instead of adding the organic matter to the planting hole, apply 3 to 6 inches on the soil surface and incorporate it into the soil.

Your goal in soil analysis is to create an ideal soil environment for the expanding root system. An ideal soil has good aeration and drainage, yet holds adequate moisture and nutrients for optimum root growth. Research at the University of Florida shows that the roots of trees and shrubs grow outward approximately seven times the diameter of the root ball during the first growing season when provided with a good soil environment.

Unfortunately, no cookbook recipe exists for soil improvement. How you treat the soil depends on the characteristics of the native soil, the type of plants to be grown and the time of year when planting.

Before planting, check the structure and texture of the native soil by digging a hole 12 to 15 inches deep and examining the soil horizon. Is it loose and granular or hard and compact? Fill the hole with water and watch how fast it drains. If water remains in the hole after 12 hours, the soil is poorly drained.

Plants prone to drought stress, like azalea, dogwood, annuals and herbaceous perennials, prefer a moist, well-drained soil; plants known to be drought tolerant, such as crape myrtle and juniper, will grow well on very dry sites once established. Likewise, soil prepared for summer transplanting when dry periods are likely to occur should have a greater water-holding capacity than soil prepared for fall transplanting when rainfall is generally more regular and irrigation demand is low.

Water-absorbing polymers, commonly called hydrogels, are popular new products. Refer to figure 11. These man-made crystals, sold under various trade names, absorb several hundred times their weight in water and gradually release it to plant roots. One pound of crystals applied to 100 square feet of bed area will absorb 20 to 25 gallons of water, or about 50 times as much moisture as peat moss. They last from six months to several years in the soil, depending on product.

Figure 11. *Hydrogels, synthetic polymers that absorb hundreds of times their weight in water and gradually release it to the plants, are among the popular new products on the market for water conservation. One teaspoon absorbs a quart of water.*

Research to date with hydrogels is limited and has provided conflicting results. However, preliminary studies with hydrogels at the University of Georgia shows them to enhance the growth of summer annuals in nonirrigated soils. Another potential use for hydrogels reported by professional landscapers is in container plants to extend the time between waterings.

STEP 3: APPROPRIATE PLANT SELECTION

Appropriate plant selection means selecting plants that not only are compatible with the design but also are well suited to the planting site and local environment. It involves selecting plants according to the soil type and light level of the site. Ideally, the plants you select should be adaptable to local fluctuations in temperature and soil moisture. See figure 12.

Drought tolerance is important in a Xeriscape-type landscape. However, it should not be the only criteria used to select plants. Junipers, for instance, are extremely drought tolerant, but they cannot tolerate wet soils or heavy shade.

Figure 12. *Beds of drought-tolerant ground covers such as junipers are an excellent way of reducing the water requirement of the landscape.*

Native plants are not necessarily the most drought tolerant. Even though a plant may be native to the area, it may not adapt to an adverse new environment (microclimate). When forced to grow in a harsh new environment, native plants can become a high-maintenance nightmare.

In addition to the adaptability of a plant to the site, other important criteria to consider include:

1. **Mature size and form.** Will the plant remain in scale with the rest of the landscape as it matures, or will it likely overgrow the site and compete with other plants for space, nutrients and water?
2. **Growth rate.** Slow-growing dwarf shrubs and ground covers used around the base of the home require little routine pruning.
3. **Texture.** Is the leaf texture fine, medium or coarse, and does it combine well with the adjacent plants?
4. **Color.** Is the flower or foliage color compatible with other plants or the background color of the building?
5. **Functional use.** Is the plant suitable for the location and intended purpose; i.e. under low windows, along the perimeter of the property as screening hedge, or as a ground cover?

Select healthy, vigorous plants. Examine the root system for well-developed roots throughout the root ball and an abundance of small white roots (absorptive roots) along the exterior of the root ball. Examine the leaves and stems for insects or diseases and avoid plants that are weak or appear unhealthy.

Pages 19 to 31 contain descriptive listings of durable ornamental plants and turfgrasses for Georgia landscapes. Please note that it is not an all-inclusive list. Listing all the ornamental plants grown and sold in Georgia would be impossible. The suggested water-use zones for each plant are based on observation, experience and best judgement of the authors and are certainly open for additions as research provides further data. Although many plants can grow in any of the three water-use zones, for greatest water conservation, use them in zones that require the least amount of water whenever possible.

To best use the tables, first go to the section listing the type of plant you desire, i.e. ground cover, vine, ornamental grass, small shrub, medium shrub, large shrub, small tree, large tree, annual or perennial flowers or turfgrass. Then select the plants having your desired merits within each category, and group them into the appropriate water-use zone.

When selecting plants for a Xeriscape-type landscape, keep in mind this important fact: PLANTS DON'T SAVE WATER, PEOPLE DO! The plants we select do not save water; our ability to locate them in the landscape appropriately and to manage them properly determines their water needs.

Match the water-use zones with the condition of the planting site. For instance, place high-water-requiring plants in areas of the landscape that stay moist and low-water-requiring plants in areas that stay drier naturally.

Any ornamental plant or turfgrass presently on the market can be used in a Xeriscape-type landscape. In fact, you may be surprised to learn just how many plants can thrive without any supplemental water once they are established. The key is to identify the water needs of the plant you select, and then group it in the landscape with other plants having a similar need for water. By doing this, supplemental irrigation can be applied most efficiently and only to those plants that require it. The result is maximum water conservation in the landscape.

STEP 4: PRACTICAL TURF AREAS

Turfgrass is one of the most versatile and functional plants in the landscape. It provides one of the best recreational surfaces for outdoor activities. From a water management standpoint, turf is recognized as one of the most effective plant covers to reduce runoff and erosion while recharging the ground water, which results in more efficient use of rainfall.

Turf has a tremendous mitigating effect on the environment. For example, research documents that a turf area can be as much as 30°F cooler than a concrete or asphalt surface and 10°F to 14°F cooler than bare soil. This cooling effect from the average lawn is equal to more than eight tons of air conditioning; the average home central-air unit produces three to four tons. Turf also absorbs dust and other air pollutants and produces oxygen.

However, in the typical landscape, turfgrass occupies the largest area and, when managed incorrectly, receives the largest amount of irrigation. You can realize considerable water savings by irrigating only the turf in high impact, highly visible areas of the landscape.

All turfgrasses recommended for Georgia can be used in any water-use zone and can survive most droughts without supplemental irrigation once they are established. During drought periods, a healthy turfgrass will wilt and turn brown, then regain its normal color and growth when it receives adequate water. You must be willing to accept a loss of quality and appearance during periods of limited rainfall when growing turf in nonirrigated areas of the landscape.

Maximum water conservation with turf is obtained through proper selection, establishment and maintenance. In addition to differing in appearance, turfgrasses differ in their tolerance to environmental factors such as shade, temperature, soil fertility, water use and drought resistance. Table 3 shows water use and drought resistance of some turfgrass species and varieties tested in Georgia. The water use is based on the user's adhering to recommended irrigation practices. Drought resistance is important when growing turfgrass in nonirrigated areas. The turfgrasses listed would survive most droughts in Georgia.

Table 3. *Average water use and drought resistance of selected turfgrasses in Georgia.*

Common Name	Water Use	Drought Resistance
Tifway Bermuda	Very Low	Very High
Common Bermuda	Very Low	High
Raleigh St. Augustine	Very Low	Very High
Rebel 11 tall fescue	Very Low	Medium
Centipedegrass	Low	Medium-high
Meyer Zoysia	Low	Low
K 31 tall fescue	Low	Low-medium

Practical turf areas mean using turfgrass for a specific function in the landscape. A small "oasis" of turf near the entrance to the home, a playing surface of durable turf in recreational areas or a blanket of turf on a highly erodible slope are all examples of "practical" turf areas. See figure 13. Also, design turf in practical shapes that can be efficiently irrigated and maintained. Avoid sharp angles and long narrow strips that are difficult to mow and water.

Remember, the goal in developing a water-wise landscape is to reduce the need for supplemental irrigation, regardless of whether in turf or in ornamental areas of the landscape. As irrigated space decreases, water savings increase.

For additional information on turfgrass selection and maintenance, see "Appropriate Maintenance" on page 16, "Turfgrasses" on page 31 and Cooperative Extension Service Bulletin 733, *Lawns in Georgia.*

Figure 13. *An area of well-maintained turfgrass is like a welcome mat at this home.*

STEP 5: EFFICIENT IRRIGATION

A water-wise landscape requires a minimal amount of supplemental water from irrigation. When irrigation is used, water is applied efficiently and effectively to make every drop count.

Just as we zone plants in the landscape according to their different water needs, zone the irrigation system so that plants with different water needs are irrigated separately. Water turfgrass, for instance, separately from shrubs and flowers.

Using irrigation water efficiently also requires us to select the appropriate type of irrigation for the plants and for each area of the landscape. Trees and shrubs in the low water-use zone would need supplemental water only during establishment (first 8 to 10 weeks after transplanting); plants in moderate water-use zones require water only during periods of limited rainfall when they show signs of stress. For these plants, a temporary system such as a soaker hose or hand watering may be all that is required. On the other hand, high water-use zones require frequent watering and may warrant a permanent system with automatic controls. Whenever possible, use highly efficient watering techniques, such as drip irrigation.

Sprinkler Irrigation

Sprinkler irrigation may be as simple as a single sprinkler attached to a garden hose, or it may be a complex system of underground pipes and pop-up spray heads with automatic controls. A Xeriscape-type landscape uses sprinkler irrigation for watering turf where water must be applied uniformly over the entire area. For most other applications in the landscape drip irrigation is a better choice.

Many types of sprinklers are available for use in the landscape. Permanent systems with pop-up type spray heads are most common. They are installed underground and rise above the ground surface to operate. Some are designed for use in turf (2 to 3 inch pop-up height); others are designed for use in beds of taller plants (6 to 12 inch pop-up height). Some sprinkler heads are designed for watering small irregularly shaped areas. These typically have a radius of 15 feet or less. Others, like rotary sprinkler heads, wet a radius of 20 to 50 feet and are used to irrigate large areas. Most sprinklers are available in either full-circle or part-circle models and most have an adjustable radius for watering irregular areas.

Proper Design Is Important

The installation of an efficient sprinkler system begins with good design. The system must be capable of applying water uniformly over the desired area with minimal overspray into adjacent areas.

Choosing the appropriate sprinkler for a given area is important, but equally important is the location and spacing of sprinklers. It is usually desirable to place part-circle sprinklers along the boundaries of the irrigated area. This allows uniform watering along the edges while avoiding wasteful overspray onto buildings, paved areas and other adjacent areas.

Proper spacing of sprinklers is crucial in achieving uniform water application. Sprinklers that do not overlap adequately will waste water by applying too much water in some areas and not enough water in others. On the other hand, spacing sprinklers closer than required increases the cost of the system and wastes water. In general, spacing between sprinklers should be about 50 percent of the wetted diameter. For example, sprinklers with a wetted diameter of 80 feet should be spaced 40 feet apart.

Where part-circle sprinklers are used on the same zone with full-circle sprinklers, the sprinklers should be carefully selected to achieve a “matched precipitation rate.” A half circle sprinkler will only water half as much area as a full circle sprinkler; therefore, it should only discharge half as much water. If a full-circle sprinkler discharges six gallons per minute, then a half-circle sprinkler should deliver three gallons per minute and a quarter-circle sprinkler one and one-half gallons per minute. Most manufactures offer sprinklers with matched precipitation rate (MPR) nozzles.

One other important aspect of proper design is pipe sizing. Selection of pipe sizes should be based on the flow rate through the pipe. If pipes are too small, excessive pressure losses occur. This causes some sprinklers to apply more water than others and results in nonuniform application and waste of water. Additional information on pipe sizing and irrigation system design is available in Georgia Cooperative Extension Service Bulletin B 894, *Lawn and Garden Irrigation Design*, as well as design manuals available from the sprinkler manufacturers.

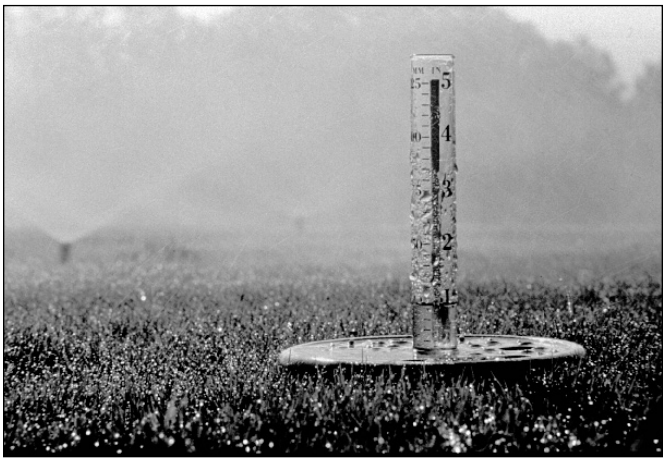


Figure 14. *Use rain gauges to monitor the output of your sprinkler system.*

Check the Application Rate of Your Sprinkler Systems

Application rate is the rate at which a sprinkler system applies water to the soil surface, measured in inches per hour (in./hr.). If application rates exceed the intake capacity of the soil, then runoff occurs. Problems with runoff are more likely to occur in clay soils, which have a low intake capacity.

Rotary sprinklers usually have application rates of 0.25 to 0.50 inches per hour and rarely cause runoff.

Spray heads, on the other hand, typically have application rates between 1 and 2 inches per hour and may cause run-off on heavy soils, especially where slopes are greater than 10 percent. If run-off occurs, turn the system off for an hour or two to let the water soak in, and then apply the remainder of the water.

Determine application rate of a sprinkler system by placing three or four rain gauges at random on an irrigated area for a predetermined length of time (usually one hour). See figure 14. By knowing the application rates of your sprinkler system, you will know how long to operate the system to apply a given amount of water and will avoid wasting water. Average water level within the gauges is a measure of the output of the system (inches per hour). Repeat this procedure in each sprinkler zone, particularly if different types of sprinklers are used on different zones. For additional information on determining sprinkler application rate see Georgia Extension Service Bulletin 894, *Irrigation for Lawns and Gardens.*

Adjust Sprinkler Heads as Needed

Improper adjustment of sprinkler heads not only wastes water but also may damage buildings or cause accidents if the water is allowed to spray onto buildings, public streets or sidewalks. Carefully adjust the radius and arcs of part-circle sprinklers to prevent undesirable overspray. Check the system several times during the year to ensure proper adjustment.

Drip Irrigation

Drip irrigation, also called trickle or micro-irrigation, applies water slowly and directly to the roots of plants through small flexible pipes and flow control devices called emitters. Drip irrigation uses 30 to 50 percent less water than sprinkler irrigation and usually costs less to install. Apply water directly to the root zone to minimize evaporative water loss and run-off.

For maximum water-use efficiency, use drip irrigation on trees, shrubs and flowers in the high and moderate water-use zones of the landscape. Several types of drip irrigation systems can be adapted to suit a variety of applications, from watering individual trees and shrubs to beds of annuals, herbaceous perennials or ground covers.

Components of a Drip System

In a drip system, water is distributed to the plants through small, flexible plastic pipes (3/8 to 3/4 inch in diameter) and emitters or through perforated or porous pipe.

Emitters may be purchased separately from the tubing and placed in the line wherever watering is desired. Another option is to purchase drip tubing with emitters already installed at the factory, usually spaced 12 to 24 inches apart. Most emitters will discharge water at a rate of 2, 1 or 2 gallons per hour at a pressure of about 20 pounds per square inch.

Perforated or porous pipe discharges water along its entire length to wet a continuous strip. By spacing the pipe 12 to 18 inches apart, wetting a solid area is possible. It is a good system for closely spaced plantings of annuals, herbaceous perennials or groundcovers.

Most drip systems will use PVC pipe for main lines and polyethylene tubing for distribution lines. Polyethylene tubing is flexible, easy to cut, and can be connected without glue or clamps. Install emitters by punching a hole in the polyethylene tubing and snapping the emitters into place.

The drip system must have a main valve to turn it on and off. It may be an automatic electric valve connected to a controller or a manual gate valve. You can also connect the drip lines directly to an outside faucet. However, when connecting the system directly to the faucet, use an automated timer to turn the system off after a preset time. Otherwise, you may forget and leave the system on for several days.

Two other necessary components for a drip system are a filter and a pressure regulator. A drip system uses small passageways to control the rate of water application, so even tiny particles suspended in the water could cause clogging problems. To prevent clogging, use a screen filter with a 150 to 200 mesh screen.

Figure 15 is a diagram of a typical component of a drip irrigation system.

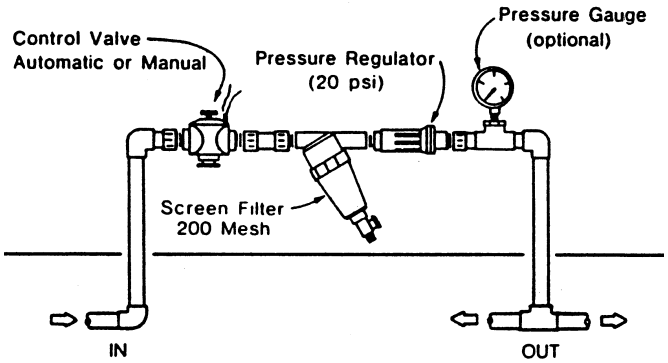


Figure 15. *Typical controls required for drip irrigation. These components are usually installed below ground in a valve box.*

Most drip systems are designed to operate at a pressure of about 20 psi, (pounds per square inch). Household water pressure typically ranges from 40 to 100 psi. A pressure regulator installed immediately after the filter in the main line will reduce the pressure in the line and ensure efficient operation of the system.

Which Drip System Is Best?

Because so many different types of drip irrigation components exist, trying to choose the best system for a particular application is often confusing. The best advice is to keep it as simple as possible and try to wet only those areas where the water can be taken up by the roots of the desired plants.

For trees and shrubs, using a system in which you can insert emitters wherever water is needed is generally best. The number of emitters per plant and flow rate (gallons per hour) per emitter depend on the size and type of plant. Generally, the larger the plant, the more water it requires. The following is an example of how emitters might be installed based on plant size:

Plant Height (ft.)	Emitters per Plant
<2	one, ½ gallon per hour
2-4	one, 1 gallon per hour
4-6	two, 1 gallon per hour
6-7	three, 1 gallon per hour
7-8	four, 1 gallon per hour
	two, 2 gallons per hour

During very dry weather, this system would need to run about three times per week for four hours to supply the optimum water needs of the plants. Keep in mind that some species require more water than others. Consider this when installing emitters.

For watering annuals, perennials and ground covers, it is usually necessary to irrigate a solid area. This can be done using emitter lines with emitters spaced every 12 to 18 inches. By placing emitter lines 12 to 18 inches apart, a uniform wetting pattern can be achieved. Perforated or porous pipe spaced every 12 to 18 inches apart can also be used. In sandy soils, the lines will need to be closer together than in tighter soils. In annual flowerbeds, the drip lines can be laid aside during bed preparation and replaced afterwards.

A similar method of watering uses small sprinkler heads called microsprinklers, instead of emitters. All other components are identical to drip irrigation, including the polyethylene distribution lines. Microsprinklers spray an area 3 to 12 feet wide and are used for trees and shrubs or beds requiring complete coverage. Microsprinklers may be prone to vandalism and are not quite as efficient as emitters, but they do provide an economical method of achieving uniform watering.

In landscape applications, drip irrigation tubing is usually installed on top of the ground and concealed beneath mulch. This makes the system easy to install and service. However, if vandalism is likely, the tubing can also be installed 4 to 6 inches beneath the soil surface with small microtubing (1/8 to 1/4 inch) protruding to the surface. Running the microtubes above ground will allow for easy inspection and will prevent dirt from siphoning back into the emitters and clogging the system.

Guidelines for Irrigating the Landscape

Establish Irrigation Objectives

In a Xeriscape-type landscape, your goal is to minimize the amount of supplemental water applied to the landscape. Therefore, routine irrigation is necessary only in the high water-use zones of the landscape. Occasional hand watering or a portable irrigation system, such as porous pipe, would be used as needed in the moderate water-use zones, while established plants in low water-use zones would receive only natural rainfall and no supplemental irrigation water.

Operate Sprinklers Between 9 p.m. and 9 a.m.

Time of application affects water-use efficiency. The best time to irrigate with sprinklers is between 9 p.m. and 9 a.m. During this time, less wind and lower temperatures generally occur; therefore, less water is lost to evaporation. Irrigating during the evening after dew develops (9 p.m.) and before it dries in the morning (9 a.m.) does not increase disease problems.

Drip irrigation systems can be operated any time of day because evaporative water loss is not a problem, and the foliage stays dry.

An Automatic Controller Helps Save Water

An automatic controller attached to the irrigation system turns the system on and off and controls the water flow through the various zones according to a preset time clock. See figure 16. It allows you to set the length of time each zone operates as well as the days of the week and time of day the system operates.

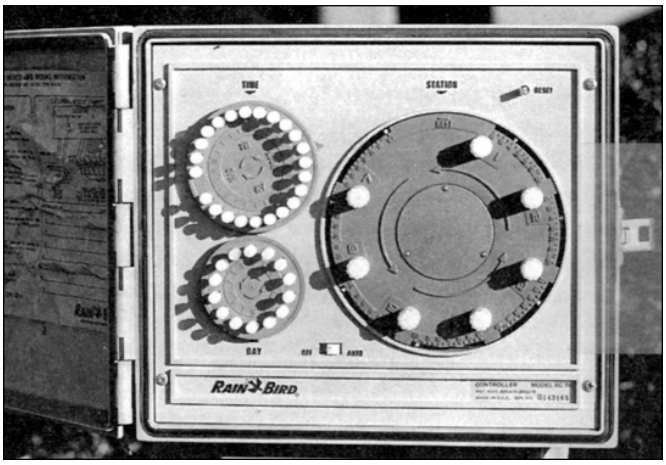


Figure 16. *Using an automatic controller can save water and labor.*

However, an automatic controller does not relieve you of the need to closely monitor its operation. Controllers should be reprogrammed frequently during the growing season because water needs change from week to week.

A rainfall sensor attached to the controller detects rainfall and prevents the irrigation system from operating if significant rainfall has occurred. Another type of sensor measures soil moisture and overrides the system when soil moisture is adequate. Sensors are especially useful if the system cannot be monitored and adjusted regularly.

Many different types of controllers are on the market. Make sure you get one with the features you need. When managed properly, an automatic controller can pay for itself in reduced water usage, cost and labor.

Hand Watering

Hand watering is not just for newly planted ornamental plants. It is also an effective and efficient way of applying water to selected plants that show signs of stress during dry periods. The direct application of water to the base of the plant, provided it is applied slowly enough to be absorbed by the soil, uses less water and is more efficient than sprinkler irrigation.

To avoid runoff when using the hand-held hose, use a nozzle that divides the spray into rain-size droplets. Some nozzles have built-in spray pattern adjustments.

When watering by hand, apply about 5 gallons of water per 10 square feet, which is approximately the

amount of water delivered by a 5/8 inch garden hose operating one minute at medium pressure. Watering small shrubs (less than 4 feet in height) for one minute with the hand-held hose should suffice. Larger shrubs (4 feet and up) will require slightly more water. Increase the watering time by 15 seconds for each foot of height exceeding four feet. For large trees, apply about 6 or 7 gallons for each 10 square feet of canopy area. For best results, check the output of your faucet by determining the number of seconds to fill a one-gallon jug and then estimating output per 60 seconds. If runoff occurs before you have applied the correct amount of water, move on to another spot and come back after the water has soaked in.

Irrigating Turfgrass

Turfgrasses used in Georgia can survive seasonal dry periods without irrigation and therefore can be used in any water-use zone. In moderate water-use zones, a turfgrass would be irrigated only when it shows signs of moisture stress. Turf under water stress will appear a dull bluish green color, the leaf blades will roll inward, and footprints will remain on the grass after walking over an area. Irrigating turf in the moderate water-use zones with a portable lawn sprinkler within 24 to 48 hours of these signs will generally prevent serious loss of turf vigor while maximizing water-use efficiency.

Under optimum growing conditions (high water-use zone), turfgrasses use 1 to 12 inches of water per week during hot dry weather. Dividing this amount into two applications per week, applying 2 to 3/4 inch each time, usually works best. Never apply more than one inch at a time because this will likely result in runoff or deep percolation below the root zone. Early or late in the season when temperatures are cooler, irrigating only once per week is usually adequate.

Never water grass daily except during establishment. Daily irrigation with small amounts encourages a shallow root system and reduced drought tolerance, as shown in figure 17. Because roots generally grow where the soil is moist, a shallow root system also prevents efficient uptake of plant nutrients. Shallow, frequent irrigation increases evaporative water loss from the soil.

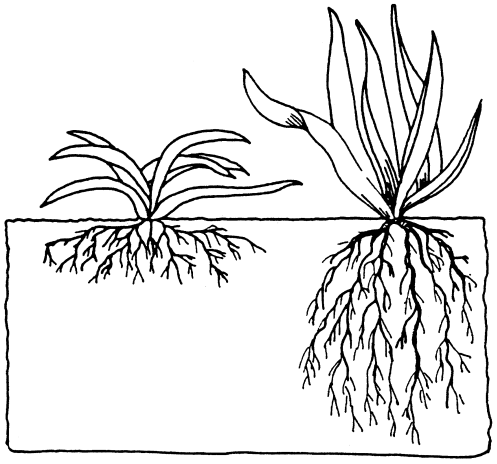


Figure 17. *The healthy, deep-rooted grass on the left results from proper irrigation. The weak, shallow-rooted grass on the right results from light frequent irrigation.*

Irrigating Trees and Shrubs

Woody ornamental trees and shrubs have a deeper, more extensive root systems than turfgrasses or herbaceous ornamental plants. The root system of a mature tree, for instance, extends two to three times the canopy spread and may go down several feet into the soil. Woody plants, therefore, can extract moisture from the soil even when the soil surface appears bone dry and can survive long dry periods without supplemental irrigation.

Use drip irrigation on trees and shrubs in the high water-use zones of the landscape. Locate the emitters near the drip line of plants where the concentration of absorbing roots is the highest. During extended dry periods, operate the system two to three times per week. Run the system long enough to thoroughly wet the soil 18 to 24 inches deep.

Regular and thorough watering of newly planted trees and shrubs will encourage good root establishment and greater drought resistance. See page 17 for suggestions on survival watering during drought or restrictions.

Irrigating Herbaceous Ornamentals (Annuals and Perennials)

Herbaceous ornamentals vary widely in their tolerance to drought. Some will perform adequately with a minimum of supplemental water while others require close attention to soil moisture. Irrigation can be provided most efficiently if the plants within a bed have similar water needs. Herbaceous ornamentals generally have a shallower root system than woody ornamentals and are among the first plants in the landscape to show water stress during dry periods. Water these plants once or twice a week and use drip irrigation whenever possible. If you can not water because of restrictions, remember that these plants are less costly to replace than trees and shrubs.

STEP 6: USE OF MULCHES

Mulching is one of the most beneficial landscape practices. Mulches conserve moisture by preventing evaporative water loss from the soil surface and reducing the need for supplemental irrigation during periods of limited rainfall. By maintaining an even moisture supply in the soil, mulches prevent fluctuations in soil moisture that can damage roots. See figure 18.

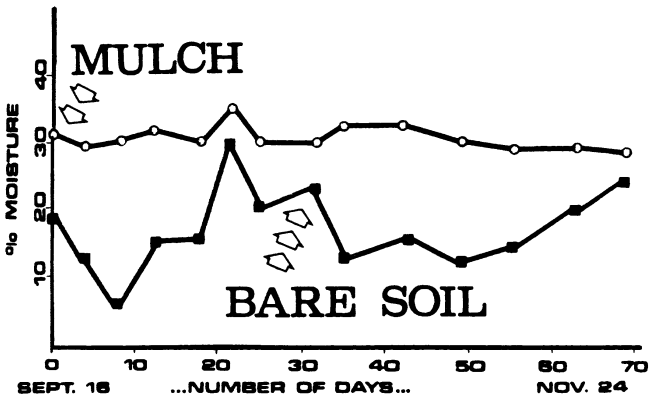


Figure 18. *Moisture level of mulched vs. bare soil*

Mulches also prevent crusting of the soil surface and allow water to penetrate readily to plant roots. They insulate the roots of plants from summer heat and winter cold and help control weeds that compete with plants for moisture. By serving as a barrier between the plant and soil, mulches help discourage soilborne diseases that stress plants and cause them to have a higher demand for water.

Islands of unplanted organic mulch designed to blend with the landscape are an economical way to retrofit an existing landscape to make it more water efficient while reducing maintenance requirements. See figure 19.

Figure 19. *Islands of natural organic mulch that blend with the landscape are an economical way of conserving water while reducing maintenance.*

Aside from occasional weed control and topdressing with additional mulch, unplanted mulched areas require no water and little routine maintenance.

Pine straw, pine-bark, mini-nuggets and shredded hardwood mulch or chips are some of the best mulches for a water-wise landscape. These fine-textured mulches hold moisture in the soil better than coarse-textured mulches like large-nugget pine bark. They also are nonmatting and allow water, nutrients and oxygen to freely penetrate to plant roots.

Inorganic mulches, on the other hand, such as rock, gravel and marble, absorb and reradiate heat from the sun and increase water loss from plants and soil. Table 4 compares several commonly used mulches on the market.

Apply approximately 3 inches of mulch under ornamental plants in the landscape. Avoid applying too much mulch because it encourages shallow roots, which are easily damaged by excessive cold, heat or drought.

Where possible, extend the mulched area two to three times the canopy spread of ornamental trees and shrubs. Research shows that the roots of ornamental plants grow far beyond the canopy spread, so mulching as large an area as practical is important.

Once mulch is in place, use your hand to pull it back 2 to 3 inches away from the trunk of trees and shrubs. Keeping mulch away from the trunk will help prevent wood rotting diseases.

During periods of limited rainfall, make certain sufficient mulch is maintained beneath plants. If watering restrictions prevent you from irrigating, mulches will help conserve the moisture remaining in the soil.

Placing newspapers under organic mulches not only improves water conservation in the soil but also is an excellent way to recycle. Place them on the soil surface under organic mulch at planting time. They may also be used on established ornamentals by carefully removing the organic mulch from around the plants, placing the newspapers two sheets thick on the soil surface and reapplying the mulch. Be sure to wet the newspapers thoroughly immediately after application; otherwise, they may pull moisture from the soil.

Table 4. *Advantages and disadvantages of commonly used mulches*

Mulch	Advantages	Disadvantages
Pine Straw	An excellent mulch for water conservation	Flammable when extremely dry. Fades to a dul gray-brown color with age. Decomposes rather quickly and requires annual top-dressing with additional pine straw.
Pine Bark	Mini-nuggets conserve moisture better than large nuggets. They also stay seated better on the landscape than large nuggets.	None
Shredded/Chipped Hardwood Bark	Provides a durable, long-lasting mulch	None
Fall Leaves	An overlooked and readily available mulch. Shredded leaves stay seated better on the landscape and conserve moisture better than unshredded leaves.	Not as neat or uniform in appearance as pine straw and pine bark
Grass Clippings	None	Decompose quickly, mat down and mold. Not recommended. Compost them instead.
Pecan Hulls	An acceptable and economical mulch where available	Rough looking. Mold with age. Attract wildlife when fresh.
Gravel, Marble Chips, Volcanic Rock	Long lasting	Absorb and reradiate heat. Unnatural in appearance. Not recommended.
Newspaper	Placed two sheets thick under organic mulch, newspaper helps conserve moisture while allowing water and nutrients to penetrate.	When placed too thick (more than two layers), it can serve as a barrier to water and nutrients.
Landscape Fabric	Allows nutrients and water to penetrate to plant roots. Prevents most weeds.	Aggravating to install. Does not prevent nutsedge and other persistent weeds. Must be covered by an organic mulch.
Plastic Film	None	Prevents oxygen, nutrients and water from reaching plant roots. Not recommended.

STEP 7: APPROPRIATE MAINTENANCE

By following the six previous steps toward water conservation in the landscape, you will have a beautiful landscape that not only saves water and money but also requires minimal maintenance.

The objective of Xeriscape maintenance is to discourage water-demanding new growth on plants. In other words, keep plants healthy, but do not encourage growth at all times. Depending on your current level of maintenance, this may require you to fertilize less often with less fertilizer, to prune only when necessary and lightly when essential and, of course, to irrigate less. Remember, a Xeriscape-type landscape is a low-maintenance landscape. By working smarter, not harder, in the landscape, you'll save time, energy and water without sacrificing the beauty of the environment.

Fertilize Less and Use Slow-release Fertilizers

When purchasing a fertilizer, look closely at its contents. Nitrogen, the first number in the analysis, is the element that promotes new growth. Purchase a fertilizer having nitrogen in a slow-release form, such as sulfur-coated urea, urea formaldehyde, IBDU (isobutylene-diurea), or methylene urea. Some new products on the market feed plants for an entire growing season with one application. Slow-release type fertilizers generally cost more than soluble all-purpose garden fertilizers, such as 8-8-8 or 10-10-10, but they last longer by releasing nutrients gradually. Also, they do not leach from the soil or wash away in run-off as readily as all-purpose fertilizers.

Always check the application rate on the label. The label usually suggests an application rate for optimum growth. This application rate is ideal for newly planted ornamental plants and turfgrasses to encourage healthy new growth and plant establishment. However, once plants are established, the recommended application rate of fertilizer can be reduced without sacrificing quality or appearance. This reduction in application rate is particularly important before or during dry periods.

Leaving grass clippings on turfgrass at each mowing, a process called grasscycling, supplies the grass with recycled nutrients and reduces the need for supplemental fertilizer. Grasscycling does not promote thatch, a spongy condition of the turf. Thatch results from a build-up of grass stems, shoots and roots, not clippings. As much as one-third of the nutrients applied to your lawn can be recycled back to the grass through grasscycling.

Soil Testing Saves Guesswork

Soil pH, a measure of a soil's acidity or alkalinity, affects nutrient availability and uptake. Take a separate soil sample from your turf and ornamental areas every two to three years to monitor pH and nutrient levels to determine if you need to add lime or otherwise adjust the chemical balance of the soil. Soil testing is available through you local Cooperative Extension Service office.

Avoid Shearing Plants

Just like nitrogen fertilizer, shearing promotes water-demanding new growth on plants. When pruning is required, use hand shears or loppers to thin branches and twigs to a side branch or bud. Thinning results in a more open, natural canopy and is less stressful to the plant than shearing. See figure 20.

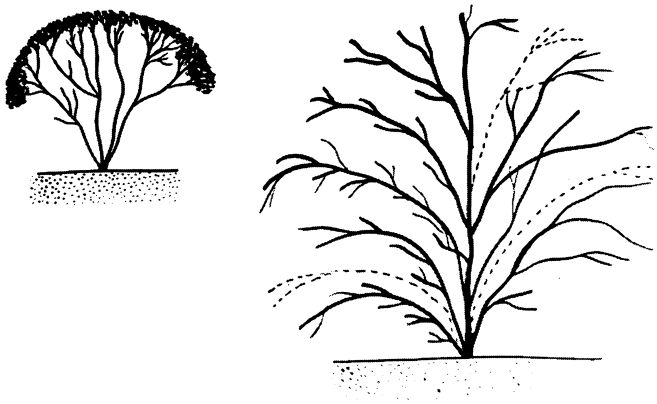


Figure 20. *Thinning (right) is better than shearing (left).*

Proper Mowing Saves Water

Proper mowing practices are of particular importance in Xeriscape-type landscapes. Mow at the recommended height (Table 5), and mow often enough so that no more than one-third of the leaf tissue is removed at each mowing. For example, if tall fescue is to be maintained at a height of 2 inches, then it would be cut when it reaches 3 inches. Research shows that raising the mower blade during dry weather and cutting the grass higher encourages deeper rooting, increases turf survival during drought and reduces water demand.

Mow turf in shaded areas higher than turf in full sun. Avoid scalping and stressing the grass and make certain the mower blade is sharp at all time.

Table 5. *Mowing heights for turfgrasses in Georgia*

Turfgrass	Mowing Height (Inches)
Centipede	1 to 1.5
Common Bermuda	1 to 2
Hybrid Bermuda	0.5 to 1.5
Tall fescue	2 to 3
St. Augustine	2 to 3
Zoysia	0.5 to 1.5

Aerating Turfgrass Improves Water Movement

Aeration or coring of turf areas is sometimes required to relieve soil compaction and to increase air and water movement into the soil. It is particularly helpful on slopes where water run-off is possible and in areas of heavy foot traffic where compaction has occurred. Aeration is best accomplished with a power aerator that has hollow tines to remove small cores of soil. Many rental stores have this type of equipment available. Aeration is best during periods of active plant growth and when the

soil is moist enough to allow deep penetration of the tines. Generally, aeration is used to correct soil problems and is not done on a routine basis.

For additional information on turfgrass maintenance, see Georgia Extension Service Bulletin 733, *Lawns in Georgia.*

Other Water-saving Maintenance Practices

Don't Let Weeds Compete With Plants for Water

Scout the landscape regularly and don't let weeds take over. Hand weeding, chemical herbicides and mulches will help keep weeds in check.

Scout for Pests Before You Spray

As you scout for weeds, also scout for insect and disease pests. Control pests when they begin affecting the appearance and overall health of a plant. Target your control measures to the affected plants and avoid spraying the entire landscape if the pest problem is confined only to a small area.

Make Every Drop Count

Where irrigation systems are used, check nozzles and emitters regularly to see if they are operating efficiently and are delivering the right amount of water and in the right locations.

Let Your Plants Tell You When They Need Water

Learn to identify the symptoms shown by plants under water stress. Shrubs under moisture stress will turn a gray-green color and wilt. Trees will show premature fall color and shed leaves. Turfgrass will turn a dull gray-green color, and the blades will wilt and roll inward.

Survival Watering During Drought or Watering Restrictions

During drought or watering restrictions, consider the replacement cost of the plants in the landscape and do what you can to save the most valuable plants. Annual flowers can be replaced more readily than trees and shrubs. If you can not water, cut back annual flowers and mulch them heavily to help them survive a drought. Turfgrass and herbaceous perennials will go into a dormant state when under moisture stress. During watering restrictions, selectively hand water shrubs and trees showing drought stress. Although trees have an extensive "bank account" of roots to absorb water during dry periods, prolonged drought can severely stress and damage a large portion of their surface roots. A thorough watering of three small areas (60 gallons/100 square feet near the drip-line) each two weeks in clay soils and once a week in sandy soils using the hand-held hose will minimize tree damage during an extended dry period.

If restrictions do not allow you to water outdoors at all, prune back trees and shrubs by one-third to one-half when they become severely wilted and begin shedding leaves. This will reduce water demand on the roots and increase their chances of survival during drought.

In some Georgia counties, the use of gray water (i.e., bath water or dish water) is permissible outdoors. Check with your local health department regarding the legality of using gray water outdoors.

SUMMARY

In the future we are not going to have as much water for landscape use as we had in the past. As urban areas continue to grow and develop, water shortages are likely to be a recurring problem because of population pressure on available water supply.

By implementing the Xeriscape fundamentals described in this publication, you can reduce your outdoor water use by as much as 50 percent without sacrificing the quality or beauty of the home environment. Let's review each of the fundamentals once more:

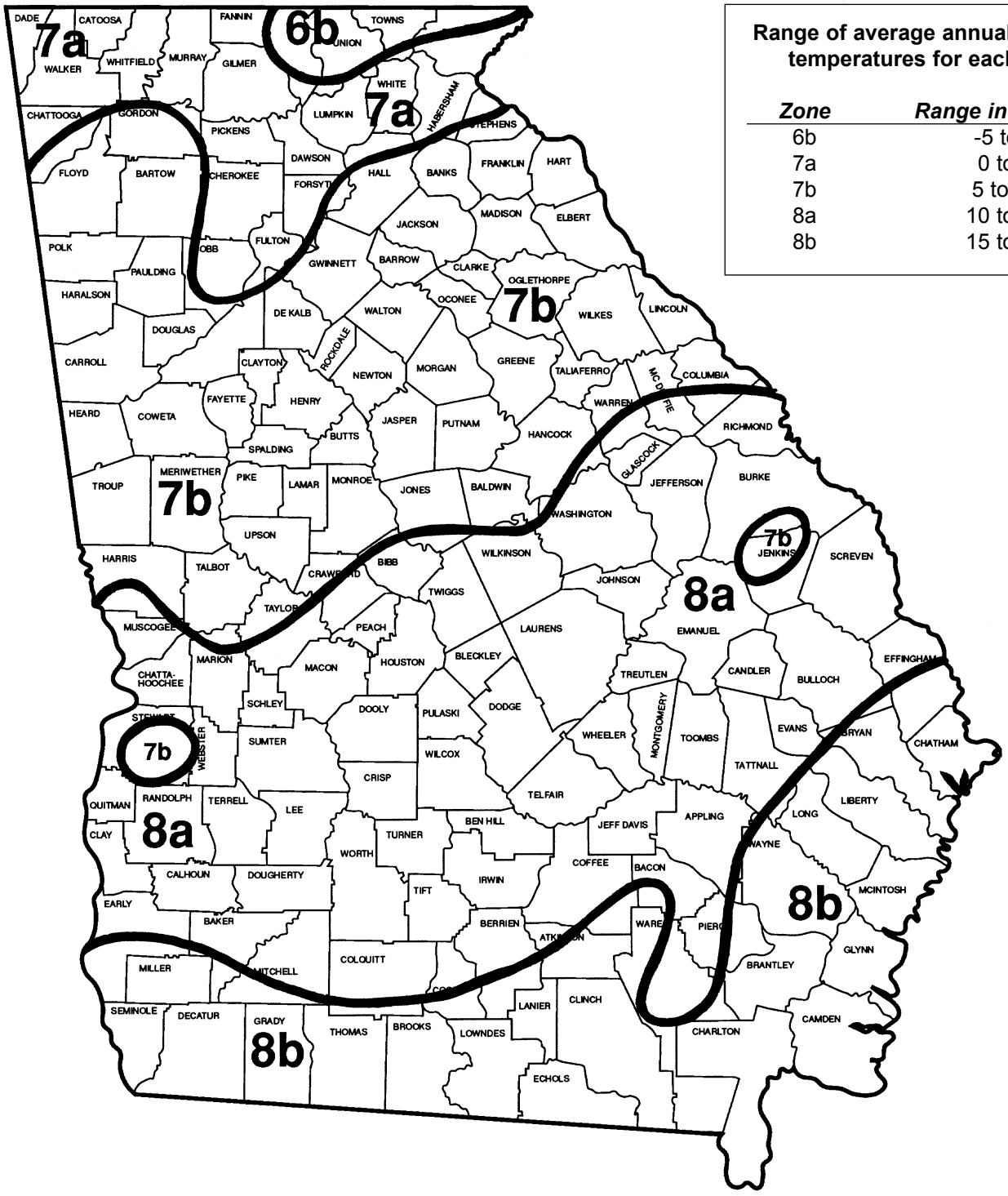
1. **Planning and Design:** Start with an accurate plan of the site, identify site problems and potentials, and develop a list of needs and wants to be incorporated in the new plan. As your plan begins to take form, divide the landscape into water-use zones. Incorporate shade where possible, and develop your plan using appropriate plants.
2. **Soil Analysis:** Evaluate the planting soil, including its structure, texture, water-holding capacity and drainage. Let the physical and chemical characteristics of the existing soil be your guide in determining the type of soil improvement needed.
3. **Appropriate Plant Selection:** Select plants appropriate to the site and the imposed stresses of the environment. Any of our Southern ornamental plants presently on the market are good candidates for a water-wise landscape as long as they are adapted to the site and zoned in the landscape according to their water need.
4. **Practical Turf Areas:** Use turf for a function or aesthetic benefit, such as in a recreational area, an erodible slope or a welcome mat to the home. Select a turfgrass that is adapted to the site and has good drought resistance.
5. **Efficient Irrigation:** When irrigation is required, make every drop count by watering efficiently to prevent run-off or evaporative loss. Let your plants tell you when they need water, and avoid watering according to a set schedule or habit. Hand watering individual plants and drip irrigation on ornamentals requires 30 percent to 50 percent less water than sprinkler irrigation. Water between 9 p.m. and 9 a.m. to avoid evaporative loss of water.
6. **Use of Mulches:** Use fine-textured organic, nonmatting mulches when possible. Fall leaves, pine straw, pine bark, mini-nuggets and shredded hardwood bark are excellent choices. Mulch as large an area as possible under tree shrubs. Islands of unplanted mulch require no water and little routine maintenance.
7. **Appropriate Maintenance:** Keep plants healthy, but do not encourage water-demanding new growth. Once plants are established, reduce the amount of nitrogen applied as well as the appli-

cation rate and frequency of application. Avoid plant stress by mowing properly, by thinning shrubs instead of shearing, and by controlling weeds and pests before they affect plant health.

Remember, the landscape alone does not save water; it is up to us to save water. Considerable water savings can be realized simply by breaking bad watering habits and learning how to water, when to water, the most efficient ways to water and the water needs of our Southern ornamental plants.

By putting the Xeriscape fundamentals into practice in your landscape, you will become a good steward of the environment and you will be doing your part to ensure your family and future generations, the same quality of life we all have grown to enjoy and appreciate in Georgia.

GEORGIA HARDINESS ZONES



Range of average annual minimum temperatures for each zone.

Zone	*Range in degrees*
6b	-5 to 0
7a	0 to 5
7b	5 to 10
8a	10 to 15
8b	15 to 20

DURABLE PLANTS FOR XERISCAPE-TYPE LANDSCAPES

See pages 9 and 10 for information on how to use these tables.

Vines

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Flower Color/ Time of Bloom	Growth Rate	Group	Exposure
Antigonon leptopus Coral Vine	1, 2, 3	8	Reddish Pink/ Summer	Fast	Deciduous	Sun
Campsis radicans Trumpet Vine	1, 2, 3	6b to 8	Orange/ Summer	Fast	Deciduous	Sun/Shade
Clematis hybrids Flowered Clematis	1, 2	6b to 8	Purple, Pink, White/Spring	Medium	Deciduous	Sun/ Semi-shade
Fatshedera lizei Fatshedera	1, 2	7 to 8	Not Showy	Medium	Evergreen	Shade/ Semi-shade
Ficus pumila Climbing Fig	1, 2	7b to 8	Not Showy	Slow	Evergreen	Sun/Shade
*Gelsemium sempervirens** Carolina Jessamine	1, 2, 3	6b to 8	Yellow/Spring	Medium	Evergreen	Sun/ Semi-shade
Lonicera x heckrottii Goldflame Honeysuckle	1, 2, 3	6b to 8	Pink/Spring	Fast	Evergreen	Sun/ Semi-shade
*Lonicera sempervirens** Trumpet Honeysuckle	1, 2, 3	7b to 8	Orange-Red-Yellow/Spring	Fast	Evergreen	Sun/ Semi-shade
Parthenocissus quinquefolia Virginia Creeper	1, 2, 3	6b to 8	Greenish White/ Summer Not Showy	Fast	Deciduous	Sun to Shade
Parthenocissus tricuspidata Japanese Creeper	1, 2, 3	7b to 8	Not Showy	Fast	Deciduous	Sun/Shade
Rosa banksiae Banks Rose	1, 2, 3	6b to 8	White/Spring	Fast	Semi-evergreen	Sun
Rosa species Climbing Roses	1, 2	6b to 8	Many Colors/ Spring	Fast	Deciduous	Sun/ Semi-shade
Trachelospermum jasminoides Star or Confederate Jasmine	1, 2, 3	7 to 8	White/Summer	Medium	Evergreen	Sun

* Denotes native Georgia plant

' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Ground Covers

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Flower Color/ Time of Bloom	Normal Height	Growth Rate	Group	Exposure
Ajuga reptans Carpet Bugle	1, 2	7a to 8	Purple/Spring	2-4 in.	Medium to fast	Evergreen	Shade/ Semi-shade
Hedera canariensis Algerian Ivy	1, 2, 3	8	None	6-8 in.	Medium	Evergreen	Shade/ Semi-shade
Hemerocallis spp. Daylily	1, 2	6b to 8	Many colors/ Summer	12 in.	Fast	Evergreen	Sun/ Semi-shade
Hypericum calycinum Aaronsbeard St. Johns Wort	1, 2, 3	6b to 8	Yellow/Spring	8-12 in.	Medium to fast	Semi-evergreen	Sun/ Semi-shade
Juniperus conferta 'Blue Pacific' Shore Juniper	2,3	6b to 8	None	12-18 in.	Fast	Evergreen	Sun
Juniperus horizontalis Creeping Juniper	2,3	6b to 8	None	12-24 in.	Moderate	Evergreen	Sun
Ophiopogon japonicus Dwarf Lilyturf or Mondo	1, 2	6b to 8	Not Showy	5-6 in.	Medium	Evergreen	Shade
Phlox subulata Moss Phlox or Thrift	1, 2	6b to 8	Pink, White, Purple/Spring	3-4 in.	Medium	Evergreen	Sun
Trachelospermum asiaticum Asiatic Jasmine	1, 2, 3	7b to 8	Fine	4-6 in.	Medium	Evergreen	Sun/ Semi-shade

' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Ornamental Grasses

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Height and Spread	Panicle Length	Exposure
Calamagrostis x acutiflora 'Stricta' Feather Reed Grass	1, 2, 3	6b to 8	Fine	5 ft./3 ft.	12 in.	Sun
Carex morrowii Japanese Sedge Grass	1, 2, 3	6b to 8	Fine	1 ft./1 ft.	3 in.	Sun/ Semi-shade
*Chasmanthum latifolium** Upland Sea Oats	1, 2, 3	6b to 8	Fine	3 ft./2 ft.	8 in.	Sun/ Semi-shade
Cortaderia sellonana Pampas Grass	1, 2, 3	7b to 8	Fine to Medium	8 ft./6 ft.	20 in.	Sun
Cortaderia sellonana 'Pumila' Dwarf Pampas Grass	1, 2, 3	6b to 7a	Medium	3 ft./4 ft.	2 ft.	Sun
Elymus glaucus Blue Wild Rye	1, 2, 3	6b to 8	Medium	5 ft./4 ft.	10 in.	Sun
Erianthus ravennae Ravenna Grass	1, 2, 3	6b to 8	Medium to Coarse	9 ft./4 ft.	20 in.	Sun

Continued on next page

Ornamental Grasses (continued)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Height and Spread	Panicle Length	Exposure
Miscanthus sinensis 'Strictus' Porcupine Grass	1, 2, 3	6b to 8	Medium	7 ft./4 ft.	12 in.	Sun
Miscanthus sinensis 'Variegatus' Variegated Equalia	1, 2, 3	6b to 8	Fine	6 ft./3 ft.	11 in.	Sun
Pennisetum alopecuroides Australian Fountain Grass	1, 2, 3	6b to 8	Fine	3 ft./2 ft.	3 in.	Sun
Pennisetum setaceum Fountain Grass	1, 2	Use Like an Annual	Fine	4 ft./4 ft.	12 in.	Sun
Pennisetum setaceum 'Rubrum' Crimson Fountain Grass	1, 2	Use Like an Annual	Fine	4 ft./4 ft.	12 in.	Sun
Pennisetum villosum Feathertop Grass	1, 2, 3	6b to 8	Fine	3 ft./2 ft.	3 in.	Sun
Phalaris arundinacea 'Picta' Ribbon Grass/Gardeners-Garters	1, 2, 3	6b to 8	Fine	2 ft./3 ft.	6 in.	Light Shade

' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Small Shrubs (2 ft.-5 ft.)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Normal Height	Growth Rate	Group	Exposure
Abelia x grandiflora Abelia	1, 2, 3	6b to 8	Fine	Irregular to Oval	3-4 ft.	Slow	Evergreen	Sun/ Semi-shade
Aucuba japonica 'Nana' Dwarf Aucuba	1, 2, 3	6b to 8	Coarse	Oval	3-4 ft.	Slow	Evergreen	Shade/ Semi-shade
Berberis thunbugi Japanese Barberry	1, 2, 3	6b to 8a	Medium	Oval	3-5 ft.	Medium	Evergreen	Sun/ Semi-shade
Buxus microphylla var. *japonica* Semi-Japanese Boxwood	1, 2, 3	7a to 8	Fine	Rounded	3-4 ft.	Slow	Evergreen	Sun/Shade
Deutzia gracilis Slender Deytzia	1, 2, 3	6b to 8a	Fine	Mounded	2-4 ft.	Medium	Semi-evergreen	Sun/ Semi-shade
Gardenia radicans Creeping Gardenia	1, 2	7a to 8	Fine	Spreading	2-4 ft.	Slow	Evergreen	Semi-shade
Azaleas Hybrids	1, 2	6b to 8	Fine	Upright Spreading	3-5 ft.	Slow to Medium	Evergreen	Semi-shade
Hydrangea arborescens 'Anabelle' Smooth Hydrangea	1, 2	6b to 8	Coarse	Rounded	3-5 ft.	Fast	Semi-evergreen	Sun
Ilex cornuta 'Carissa' Carissa Holly	1, 2, 3	6b to 8	Medium	Rounded	3-4 ft.	Slow	Evergreen	Sun/Semi-shade
Ilex cornuta 'Rotunda' Dwarf Chinese Holly	1, 2, 3	6b to 8	Coarse	Rounded	3-4 ft.	Slow	Evergreen	Sun/Semi-shade
Ilex crenata 'Compacta' Compacta Holly	1, 2	6b to 7	Fine to Medium	Rounded	3-4 ft.	Medium	Evergreen	Sun/Semi-shade

Continued on next page

Small Shrubs (2 ft.-5 ft.) (continued)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Normal Height	Growth Rate	Group	Exposure
Ilex crenata 'Green Lustre'	1, 2, 3	6b to 8a	Fine to Medium	Rounded	3-5 ft.	Medium	Evergreen	Sun/ Semi-shade
Ilex crenata 'Helleri' (Heller) Japanese Holly	1, 2	6b to 7	Fine	Spreading	2-3 ft.	Slow	Evergreen	Semi-shade
Ilex crenata 'Hetzi' Hetz Holly	1, 2	6b to 7	Fine to Medium	Rounded	4-5 ft.	Medium	Evergreen	Sun/ Semi-shade
*Ilex vomitoria** 'Nana' Dwarf Yaupon Holly	1, 2, 3	6b to 8	Fine	Rounded	3-4 ft.	Slow	Evergreen	Sun/ Semi-shade
*Itea virginica** Virginia Sweetspire	1, 2, 3	6b to 8b	Medium	Upright Branching	3-5 ft.	Medium	Deciduous	Sun/Shade
Jasminum floridum Showy Jasmine	1, 2, 3	8	Medium	Upright	3-5 ft.	Medium	Evergreen	Sun/ Semi-shade
Jasminum nudiflorum Winter Jasmine	1, 2, 3	6b to 8	Fine	Mounded Spreading	3-4 ft.	Fast	Evergreen	Sun/Shade
Juniperus davurica 'Expansa' Parsons Juniper	1, 2, 3	6b to 8	Fine	Spreading	2 ft.	Medium to Fast	Conifer	Sun
Juniperus horizontalis 'Plumosa' Andorra Juniper	1, 2, 3	6b to 8	Fine	Spreading	2 ft.	Slow	Conifer	Sun
Kerria japonica Japanese Kerria	1, 2, 3	6b to 8	Medium	Upright Arching	3-5 ft.	Medium	Evergreen	Sun
Lonicera pileata Privet Honeysuckle	1, 2, 3	6b to 8a	Medium	Oval	2-3 ft.	Medium	Evergreen	Sun/ Semi-shade
Pittosporum tobira 'Nana' Dwarf Pittosporum	1, 2	7b to 8	Medium	Spreading	3-4 ft.	Medium	Evergreen	Sun/ Semi-shade
Pyracantha koidzumii 'Santa Cruz'	1, 2, 3	7b to 8	Medium	Prostrate Spreading	2-3 ft.	Medium	Evergreen	Sun
Raphiolepis indica Indian Hawthorne	1, 2, 3	7 to 8	Medium	Spreading	2-4 ft.	Slow	Evergreen	Sun
Santolina chamaecyparissus Lavender cotton	1, 2, 3	6b to 8	Fine	Irregular	2-4 ft.	Slow to Medium	Evergreen	Sun
Spirea x bumalda Bumald Spirea	1, 2, 3	6b to 8a	Fine	Mounded	2-3 ft.	Fast	Deciduous	Sun/ Semi-shade
Spirea nipponica 'Snowmound'	1, 2, 3	6b to 8a	Fine	Mounded	3-5 ft.	Fast	Deciduous	Sun/ Semi-shade
Spirea thunbergii Thunberg Spirea	1, 2, 3	6b to 8	Fine	Irregular	3-4 ft.	Medium	Deciduous	Sun

* Denotes native Georgia plant

' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Medium Shrubs (5 ft.-8 ft.)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Normal Height	Growth Rate	Group	Exposure
Aucuba japonica Japanese Aucuba	1, 2	6b to 8	Coarse	Upright	6-8 ft.	Medium	Evergreen	Semi-shade/ shade
Berberis julianae Wintergreen Barberry	1, 2, 3	6b to 8	Medium	Oval	5-6 ft.	Slow to Medium	Evergreen	Sun
Buxus sempervirens Common Boxwood	1, 2, 3	6b to 7a	Fine to Medium	Rounded	5-8 ft.	Slow to Medium	Evergreen	Semi-shade
Forsythia intermedia hybrids Border Forsythia	1, 2	6b to 8	Medium	Irregular	5-7 ft.	Fast	Deciduous	Sun
Hydrangea macrophylla Bigleaf Hydrangea	1, 2	6b to 8	Coarse	Rounded	5-8 ft.	Fast	Semi-evergreen	Sun
Hydrangea quercifolia Oakleaf Hydrangea	1, 2, 3	6b to 8	Coarse	Upright Irregular	6-8 ft.	Medium	Deciduous	Sun
Ilex comuta 'Burfordii Nana' Dwarf Burford Holly	1, 2, 3	6b to 8	Medium to Coarse	Rounded	5-6 ft.	Slow	Evergreen	Sun/ Semi-shade
Ilex glabra	1, 2, 3	6b to 8	Medium	Rounded	6-8 ft.	Medium	Evergreen	Sun/Shade
Jasminum mesnyi Primrose Jasmine	1, 2, 3	8	Medium	Mounded Trailing	5-6 ft.	Medium	Evergreen	Sun/ Semi-shade
*Kalmia latifolia** Mountain Laurel	1, 2	6b to 7	Medium	Upright	5-8 ft.	Slow to Medium	Evergreen	Semi-shade
Southern Indian Azalea	1, 2	7a to 8	Medium	Rounded Irregular	5-8 ft.	Medium to Fast	Evergreen	Semi-shade
Spiraea prunifolia 'Plena' Bridalwreath Spirea	1, 2, 3	6b to 8	Fine to Medium	Rounded	5-7 ft.	Medium to Fast	Deciduous	Sun
Spiraea vanhouttei Vanhoutte Spirea	1, 2, 3	6b to 7b	Medium	Rounded	5-7 ft.	Medium to Fast	Deciduous	Sun
Yucca filamentosa Adam's Needle Yucca	1, 2, 3	6b to 8	Coarse	Upright	5-6 ft.	Medium	Evergreen	Sun

* Denotes native Georgia plant
' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Large Shrubs (8 ft. and up)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Normal Height	Growth Rate	Group	Exposure
Buddleia davidii Butterfly Bush	1, 2,3	6b to 8	Medium	Upright Oval	10-15 ft.	Fast	Deciduous	Sun
*Calycanthus floridus** Sweetshrub	1, 2, 3	6b to 8	Medium	Broad Rounded	8-12 ft.	Medium	Deciduous	Sun/Shade
Camellia japonica Camellia	1, 2	6b to 8	Medium to Coarse	Rounded to Oval	8-10 ft.	Slow to Medium	Evergreen	Sun/Semi-shade

Continued on next page

Large Shrubs (8 ft. and up) (continued)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Normal Height	Growth Rate	Group	Exposure
Camellia sansanqua Sasanqua Camellia	1, 2	7 to 8	Medium	Irregular to Upright	8-10 ft.	Slow to Medium	Evergreen	Sun/ Semi-shade
Chaenomeles speciosa Flowering Quince	1, 2, 3	6b to 8	Medium	Rounded	8-10 ft.	Medium	Deciduous	Sun/ Semi-shade
Cupressocyparis leylandii Leyland Cypress	1, 2, 3	6b to 8	Fine	Upright	60-70 ft.	Fast	Evergreen	Sun/ Semi-shade
Hamamllis vemalis Vernal Witchhazel	1, 2, 3	6b to 8a	Medium	Dense Rounded	8-12 ft.	Medium	Deciduous	Sun/ Semi-shade
Hibiscus syriacus Shrub Althea (Rose of Sharon)	1, 2, 3	6b to 8	Medium	Rounded	8-12 ft.	Medium	Deciduous	Sun
Ilex x attenuate 'Fosteri' Foster Holly	1, 2	6b to 8	Medium	Upright	8-10 ft.	Slow to Medium	Evergreen	Sun/ Semi-shade
Ilex comuta 'Burfordii' Burford Holly	1, 2, 3	6b to 7b	Coarse	Oval to Rounded	8-12 ft.	Medium to Fast	Evergreen	Sun/ Semi-shade
*Ilex vomitoria** Yaupon Holly	1, 2, 3	6b to 8	Fine	Upright	8-12 ft.	Medium to Fast	Evergreen	Sun/ Semi-shade
Juniperus chinensis 'Hetzi' Hetz Juniper	2, 3	6b to 8	Fine	Upright	15 ft.	Fast	Conifer	Sun
Juniperus chinensis 'Pftzeriana' Pfitzer Juniper	2, 3	6b to 8	Fine	Broad Upright	8-10 ft.	Fast	Conifer	Sun
*Leucothoe populifolia** Fetterbrush	1, 2	7a to 8	Medium	Upright Arching	8-12 ft.	Medium	Evergreen	Semi-shade/ Shade
Magnolia stellata Star Magnolia	1, 2, 3	6b to 8a	Coarse	Rounded	10-15 ft.	Medium	Deciduous	Sun/ Semi-shade
*Myrica cerifera** Southern Waxmyrtle	1, 2, 3	7b to 8b	Medium	Upright Rounded	8-10 ft.	Medium	Evergreen	Sun/ Semi-shade
Osmanthus fortunei Fortunes Osmanthus	1, 2, 3	6b to 8	Medium	Rounded	8-10 ft.	Slow to Medium	Evergreen	Semi-shade
Philadelphis coronarius Semi-sweet Mockorange	1, 2, 3	6b to 8a	Medium	Rounded	10-12 ft.	Medium	Deciduous	Sun/Shade
Pittosporum tobira Japanese Pittosporum	1, 2	7b to 8b	Medium	Rounded	8-10 ft.	Fast	Evergreen	Sun/ Semi-shade
Podocarpus macrophyllus var. *maki* Semi-Southern Yew	1, 2	7a to 8b	Medium	Upright	8-12 ft.	Medium	Evergreen	Sun/Shade
Pyrancantha species Firethorn	1, 2	6b to 8	Medium	Irregular	10-12 ft.	Fast	Evergreen	Sun
*Rhododendron austrinum** Florida Azalea (Red Flower)	1, 2	6b to 7	Medium	Rounded	8-12 ft.	Medium	Deciduous	Semi-shade/ Shade
*Rhododendron calendulaceum** Flame Azalea (Yellow-pink Flower)	1, 2	6b to 7	Medium	Rounded	10-15 ft.	Medium	Deciduous	Semi-shade/ Shade

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Large Shrubs (8 ft. and up) (continued)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Normal Height	Growth Rate	Group	Exposure
*Rhododendron canescens** Piedmont Azalea (Rosy Purple Flower)	1, 2	6b to 7	Medium	Rounded	10-15 ft.	Medium	Deciduous	Semi-shade/ Shade
Rhus typhina Staghorn Sumac	1, 2, 3	6b to 8	Fine	Open Spreading	15-25 ft.	Fast	Deciduous	Sun/ Semi-shade
Temstroemia gymnanthera Cleyera	1, 2	6b to 8	Medium	Upright	8-10 ft.	Slow to Medium	Evergreen	Sun/ Semi-shade
Vibumum lantana Wayfaringtree Viburnum	1, 2, 3	6b to 8a	Coarse	Round Spreading	10-15 ft.	Medium	Deciduous	Sun/ Semi-shade
Vibumum opulus European Cranberrybush Viburnum	1, 2, 3	6b to 8a	Coarse	Upright Spreading	8-12 ft.	Medium	Deciduous	Sun/ Semi-shade
Vibumum plicatum var. *tomentosum* Doublefile Viburnum	1, 2, 3	6b to 8a	Coarse	Round Spreading	8-10 ft.	Medium	Deciduous	Sun/ Semi-shade
Vibumum x pragense Prague Viburnum	1, 2, 3	6b to 8a	Medium	Oval	10- 12 ft.	Medium	Deciduous	Sun/ Semi-shade

* Denotes native Georgia plant
' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Small Trees (10 ft.-30 ft.)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Height Spread	Growth Rate	Group	Exposure
Acerbuergeranun Trident Maple	1, 2, 3	7bto8	Medium	Oval	20-25 ft. 10-15 ft.	Slow	Deciduous	Sun
*Carpinus caroliniana** American Hornbean (Ironwood)	1, 2, 3	6b to 8	Medium	Loose Rounded	20-30 ft. 15-25 ft.	Slow	Deciduous	Sun/Shade
*Cercis canadensis** Redbud or Judas Tree	1, 2	6b to 8	Medium	Oval	25-30 ft. 20-28 ft.	Medium	Deciduous	Sun/Shade
Chionanthus virginicus * Fringe Tree or Grancy Gray-beard	1, 2	6b to 8	Coarse	Irregular	10-20 ft. 15-20 ft.	Slow to Medium	Deciduous	Sun/ Semi-shade
Cotinus coggygria Common Smoketree	1, 2, 3	6b to 8a	Medium	Upright Spreading	10-15 ft. 10-15 ft.	Medium	Deciduous	Sun/ Semi-shade
Erlobotrya japonica Loquat	1, 2	7b to 8	Coarse	Rounded	10-20 ft. 8-12 ft.	Medium to Fast	Evergreen	Sun
*Halesia carolina** Silverbell	1, 2, 3	6b to 8	Medium	Spreading	20-30 ft. 15-20 ft.	Medium	Deciduous	Sun/ Semi-shade
Ilex x *attenuate* 'Savannah' Savannah Holly	1, 2, 3	6b to 8	Coarse	Pyramidal	25-30 ft. 10-15 ft.	Medium	Evergreen	Sun/Shade
Ilex decidua Possumhaw	1, 2, 3	6b to 8	Medium	Loose Rounded	20-30 ft. 15-20 ft.	Medium	Deciduous	Sun/ Semi-shade

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Small Trees (10 ft.-30 ft.) (continued)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Height Spread	Growth Rate	Group	Exposure
Ilex latifolla Lusterleaf Holly	1, 2, 3	6b to 8	Coarse	Pyramidal	20-25 ft. 15-20 ft.	Medium	Evergreen	Sun/Shade
Ilex x 'Nellie R. Stevens' Nellie R. Stevens Holly	1, 2, 3	6b to 8	Coarse	Pyramidal	15-25 ft. 10-15 ft.	Medium	Evergreen	Sun/Shade
*Ilex opaca** American Holly	1, 2	6b to 8	Medium to Coarse	Pyramidal	20-30 ft. 15-20 ft.	Medium	Evergreen	Sun/Shade
Koelreuteria paniculata Goldenraintree	1, 2, 3	6b to 8	Fine	Rounded	20-30 ft. 10-15 ft.	Medium	Deciduous	Sun
Lagerstroemia indica Crape Myrtle	1, 2, 3	6b to 8	Fine	Upright	20-30 ft. 10-15 ft.	Fast	Deciduous	Sun
Maclura pomifera Osage-orange	1, 2, 3	6b to 8	Medium	Rounded Irregular	20-30 ft. 20-30 ft.	Fast	Deciduous	Sun
Magnolia x soulangiana Saucer Magnolia	1, 2, 3	6b to 8	Coarse	Rounded	20-30 ft.	Medium	Deciduous	Sun/ Semi-shade
Malus species Flowering Crab	1, 2	6b to 8	Medium	Rounded to Upright	15-30 ft. 15-30 ft.	Medium	Deciduous	Sun
*Pinus virginiana** Virginia Pine	1, 2, 3	6b to 8a	Fine	Conical	15-30 ft. 10-30 ft.	Slow	Evergreen	Sun
*Prunus caroliniana** Carolina Laurel Cherry	1, 2, 3	7 to 8	Medium	Oval	20-30 ft. 15-20 ft.	Fast	Evergreen	Sun/Shade
Prunus serrulata (many cultivars) Japanese Flowering Cherry	1, 2	6b to 8a	Medium	Oval Spreading Weeping	20-30 ft. 20-30 ft.	Medium	Deciduous	Sun
Prunus x yedoensis Yoshino Cherry	1, 2	6b to 8a	Medium	Oval Spreading	10-15 ft. 20-25 ft.	Medium	Deciduous	Sun
Vitex agnus-castus Chastetree	1, 2, 3	6b to 8	Medium	Oval	15-20 ft. 10-15 ft.	Medium	Deciduous	Sun

* Denotes native Georgia plant
' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Large Trees (30 ft. and up)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Height Spread	Growth Rate	Group	Exposure
*Acer floridanum** Florida Maple or Southern Sugar Maple	1, 2, 3	6b to 8	Medium	Oval	40-50 ft. 20-25 ft.	Medium to Fast	Deciduous	Sun/ Semi-shade
*Acer rubrum** Red Maple	1, 2	6b to 8	Medium	Rounded	40-50 ft. 25-35 ft.	Medium	Deciduous	Sun/ Semi-shade
Acer saccharum Sugar Maple	1, 2	6b to 7a	Medium	Oval	60-80 ft. 25-40 ft.	Medium to Fast	Deciduous	Sun/ Semi-shade
*Betula nigra** River Birch	1, 2	6b to 8	Medium	Oval	40-70 ft. 40-60 ft.	Fast	Deciduous	Sun
Carya illinoensis Pecan	1, 2	7a to 8	Medium	Rounded	50-60 ft. 30-40 ft.	Medium	Deciduous	Sun

Continued on next page

Large Trees (30 ft. and up) (continued)

Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Texture	Form	Height Spread	Growth Rate	Group	Exposure
Cunninghamia lanceolata Semi-common Chinafir	1, 2	7b to 8	Fine	Conical	30-75 ft. 10-30 ft.	Slow	Evergreen	Sun/Shade
Cypressocyparis leylandii Leyland Cypress	1, 2, 3	6b to 8	Fine	Upright	60-70 ft.	Fast	Evergreen	Sun/ Semi-shade
*Fraximus pennsylvanica** Green Ash	1, 2, 3	6b to 8	Medium	Upright Spreading	50-60 ft. 20-30 ft.	Medium	Deciduous	Sun
Ginkgo biloba Ginkgo or Maiden Tree	1, 2	6b to 8	Medium	Irregular	50-70 ft. 30-40 ft.	Very Slow	Deciduous	Sun
Liriodendron tulipifera Tuliptree (Yellow Poplar)	1, 2, 3	6b to 8	Coarse	Broad Rounded	70-90 ft. 35-50 ft.	Fast	Deciduous	Sun
*Liquidambar styraciflua** American Sweetgum	1, 2, 3	6b to 8	Coarse	Broad Rounded	60-75 ft. 30-40 ft.	Fast	Deciduous	Sun
*Magnolia grandiflora** Southern Magnolia	1, 2	6b to 8	Coarse	Upright Pyramidal	60-80 ft. 40-50 ft.	Slow to Medium	Evergreen	Sun
Metasequoia glyptostroboides Dawn Redwood	1, 2	6b to 8	Fine	Conical	40-50 ft. 20-25 ft.	Fast	Deciduous	Sun
*Oxydendrum arboreum** Sourwood	1, 2, 3	6b, 7a	Medium to Coarse	Upright	30-40 ft. 15-20 ft.	Medium	Deciduous	Sun/ Semi-shade
*Pinus elliottii** Slash Pine	1, 2, 3	7b to 8	Medium	Horizontal Branching	80-100 ft. 15-20 ft.	Fast	Evergreen	Sun
*Pinus strobus** White Pine	1, 2	6b to 7a	Medium	Pyramidal	80-100 ft. 25-40 ft.	Medium	Evergreen	Sun
*Pinus taeda** Loblolly Pine	1, 2, 3	6b to 7	Medium	Horizontal Branching	80-100 ft. 20-30 ft.	Fast	Evergreen	Sun
Quercus acutissima Sawtooth Oak	1, 2, 3	6b to 8	Medium	Broad Oval	35-45 ft. 35-45 ft.	Medium	Deciduous	Sun
*Quercus falcata** Southern Red Oak	1, 2	6b to 8	Coarse	Rounded	70-80 ft. 30-40 ft.	Medium	Deciduous	Sun
*Quercus nigra** Water Oak	1, 2, 3	6b to 8	Medium	Rounded	80-90 ft. 40-50 ft.	Medium	Deciduous	Sun
Quercus palustris Pin Oak	1, 2	6b to 8a	Medium	Pyramidal	70-80 ft. 40-50 ft.	Medium	Deciduous	Sun
*Quercus phellos** Willow Oak	1, 2	6b to 8	Fine	Rounded	80-100 ft. 40-50 ft.	Medium	Deciduous	Sun
*Quercus shumardii** Shumard Oak	1, 2, 3	6b to 8	Medium	Pyramidal	40-60 ft. 40-60 ft.	Medium	Deciduous	Sun
*Quercus virginiana** Live Oak	1, 2, 3	7b to 8	Medium	Rounded	60-80 ft. 50-60 ft.	Medium	Evergreen	Sun
Pyrus calleryana 'Bradford' Bradford Pear	1, 2, 3	6b to 8	Medium	Upright Rounded	35-40 ft. 15-20 ft.	Medium to Fast	Deciduous	Sun
Sophora japonica Japanese Pagodatree	1, 2, 3	6b to 7	Medium	Upright Spreading	50-75 ft. 50-60 ft.	Fast	Deciduous	Sun
Taxodium distichum Common Baldcypress	1, 2, 3	6b to 8	Fine	Conical	50-70 ft. 20-30 ft.	Medium	Deciduous	Sun
Ulmus parvifolia True Chinese Elm (Lacebark Elm)	1, 2, 3	6b to 8	Medium	Rounded	40-50 ft. 30-40 ft.	Fast	Deciduous	Sun
Zelkova serrata Japanese Zelkova	1, 2, 3	6b to 8a	Medium	Broad Oval	50-80 ft. 50-60 ft.	Fast	Deciduous	Sun

* Denotes native Georgia plant

' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Annuals

Botanical Name and Common Name	Water' Use Zone	Height (in.)	Color*	Suggested Planting Time	Exposure
Ageratum houstonianum Ageratum	1, 2	24	Foliage	Spring/Summer	Partial Shade
Anthirrhinum majus Snapdragon	1, 2	6-36	All but B	Spring/Fall	Sun/ Partial Shade
Begonia x semperflorens Wax Begonia	1, 2	6-12	WPR	Spring/Summer	Partial Shade/ Shade
Brassica oleracea Ornamental Kale	1, 2	6	Foliage	Early Fall/Late Winter	Sun
Calendula officinalis Calendula	1, 2	12-24	YGO	Early Fall/Late Winter	Sun
Capsicum annuum Ornamental Pepper	1, 2, 3	6-12	Fruit	Spring/Summer	Sun
Catharanthus roseus Madagascar Periwinkle	1, 2, 3	6-18	WPL	Spring/Summer	Sun/ Partial Shade
Celosia cristata Cockscomb	1, 2, 3	6-30	All but B	Spring/Summer	Sun
Cleome hasslerana Spider Plant	1, 2, 3	36-60	WPL	Spring/Summer	Sun
Coleus x hybridus Coleus	1, 2	12-36	Foliage	Spring/Summer	Partial Shade/ Shade
Cosmos bipinnatus, C. x sulphureus Cosmos	1, 2	12-48	YGP	Spring/Summer	Sun
Digitalis purpurea Foxglove	1	12-60	All but B	Fall/Spring	Sun/ Partial Shade
Eschscholzia califomica California Poppy	1, 2, 3	12-24	All	Early Fall/Late Winter	Sun/ Partial Shade
Gaillardia pulchella Blanket Flower	1, 2, 3	12-30	YGR	Spring/Summer	Sun
Gomphrena globosa Globe Amaranth	1, 2	8-24	WPL	Spring/Summer	Sun
Impatiens wallerana Impatiens	1	6-36	All but B	Spring/Summer	Partial Shade/ Shade
Limonium sinuatum Statice	1, 2, 3	12-24	All but R	Spring/Summer	Sun
Lobularia maritima Sweet Alyssum	1, 2	4-8	WPL	Early Fall/Late Winter	Sun/ Partial Shade
Melampodium paludosum Melampodium	1, 2, 3	24-36	Y	Spring/Summer	Sun/ Partial Shade
Nicotiana alata Flowering Tobacco	1, 2	12-36	All but B	Spring/Summer	Sun/ Partial Shade
Pelargonium x hortorum Geranium	1, 2	12-24	All but BY	Spring/Summer	Sun/ Partial Shade
Petunia x hybrida Petunia	1, 2, 3	6-12	All	Spring/Summer	Sun
Portulaca grandiflora Rose Moss	1, 2, 3	1-3	All but B	Spring/Summer	Sun

Continued on next page

Annuals (continued)

Botanical Name and Common Name	Water' Use Zone	Height (in.)	Color*	Suggested Planting Time	Exposure
Salvia splendens, S. farinacea Salvia	1, 2, 3	10-30	RWB	Spring/Summer	Sun/ Partial Shade
Senecio cineraria Dusty Miller	1, 2, 3	6-12	Foliage	Spring to Fall	Sun
Tagetes erecta, T. patula Marigold	1, 2	6-36	YGRO	Spring/Summer	Sun
Verbena Verbena	1, 2, 3	6-12	All	Spring/Summer	Sun/ Partial Shade
Viola x wittrockiana Pansy	1, 2	6	All	Fall/Winter	Sun/ Partial Shade
Zinnia elegans Zinnia	1, 2	6-36	All but B	Spring/Summer	Sun
Zinnia linearis Creeping Zinnia	1, 2, 3	8-10	Y	Spring/Summer	Sun

* Colors: B = Blue; G = Gold; L = Lavender; P = Purple; R = Red; W = White; Y = Yellow; 0 = Orange
' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Herbaceous Perennials

Botanical Name and Common Name	Water' Use Zone	Height	Color*	Time of Bloom	Exposure
Achillea millefolium Yarrow	1, 2, 3	2-4 ft.	WPYG	Summer	Sun
Aquilegia Columbine	1, 2	2-3 ft.	WPBY	Spring	Partial Shade
Ajuga reptans Carpet Bugle	1	2-3 in.	BWP	Spring	Sun/Shade
Aster sp. Aster	1, 2, 3	1-5 ft.	All	Summer/Fall	Sun
Asclepeas tuberosa Butterfly Weed	1, 2, 3	1-2 ft.	OY	Summer	Sun
Astilbe japonica Astilbe	1	1-3 ft.	WPR	Spring	Partial Shade/ Shade
Baptisia australis Baptisia	1, 2, 3	3 ft.	B	Spring	Sun/ Partial Shade
Chrysanthemum x morlfolium Garden Chrysanthemum	1, 2	1-3 ft.	B	Summer/Fall	Sun
Chrysanthemum x suberbum Shasta Daisy	1, 2	1-3 ft.	W	Summer	Sun/ Partial Shade
Coreopsis grandiflora, C. lanceolata, C. verticillata Coreopsis	1, 2	1-3 ft.	YG	Summer	Sun
Echinacea purpurea Purple Coneflower	1, 2	3-5 ft.	LP	Summer	Sun/ Partial Shade
Gaillardia x grandiflora Gaillardia	1, 2, 3	1-2½ ft.	YRO	Summer/Fall	Sun
Gerbera jamesonii Gerbera Daisy	1, 2	1 ft.	B	Spring/Fall	Sun/ Partial Shade

Continued on next page

Herbaceous Perennials (continued)

Botanical Name and Common Name	Water' Use Zone	Height	Color*	Time of Bloom	Exposure
Gypsophila paniculata Babys breath	1, 2	2-4 ft.	W	Summer/Fall	Sun
Helleborus orientalis Lenten Rose	1, 2	12-15 in.	WPL	Winter/Spring	Partial Shade/ Shade
Hemerocallis Daylily	1, 2, 3	1-4 ft.	B	Summer	Sun/ Partial Shade
Heuchera americans Coral Bells	1, 2, 3	6-12 in.	WPR	Spring/Summer	Shade
Hosta Hosta	1, 2	1-3 ft.	Foliage	Spring/Summer	Partial Shade/ Shade
Iberis sempervirens Evergreen Candytuft	1, 2	12 in.	W	Spring	Sun/ Partial Shade
Iris hybrids, I. siberica, I. kaempferi, I. tectorum, I. danfordae, I. reticulate, I. crestata Iris	1, 2	2-4 ft.	All	Spring/Summer	Sun/ Partial Shade
Kniphofia uvaria Tritoma (Red Hot Poker)	1, 2, 3	2-4 ft.	ROY	Summer	Sun
Liatris scariosa Gayfeather	1, 2	2-6 ft.	LP	Summer/Fall	Sun/ Partial Shade
Monarda didyma Beebalm	1, 2, 3	2-3 ft.	WRP	Spring/Summer	Sun
Paeonia lactiflora Peony	1, 2	3-4 ft.	W,PR	Spring	Sun/ Partial Shade
Phlox paniculata, P. subulata, P. divaricata Phlox	1, 2	1-3 ft.	All	Spring/Summer	Sun/Shade
Rudbeckia hirta, R. hybrida Rudbeckia	1, 2	2-3 ft.	YOG	Summer/Fall	Sun
Salvia farinacea Blue Salvia	1, 2, 3	½-5 ft.	WBRL	Summer/Fall	Sun/ Partial Shade
Sedum spectabile Sedum	1, 2, 3	1-2 ft.	WPR	Spring/Fall	Sun
Solidago hybrids Goldenrod	1, 2, 3	1-3 ft.	Y	Summer/Fall	Sun
Stokesia cyanea Stokes Aster	1, 2	12-15 in.	B	Summer	Sun
Verbena canadensis, V. tenuisecta Verbena	1, 2, 3	6 in.	WBL	Spring/Fall	Sun
Veronica spicata Speedwell	1, 2	1-2ft.	BW	Summer	Sun/ Partial Shade

* Colors: B = Blue; G = Gold; L = Lavender; P = Purple; R = Red; W = White; Y = Yellow; 0 = Orange

' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

Turfgrasses

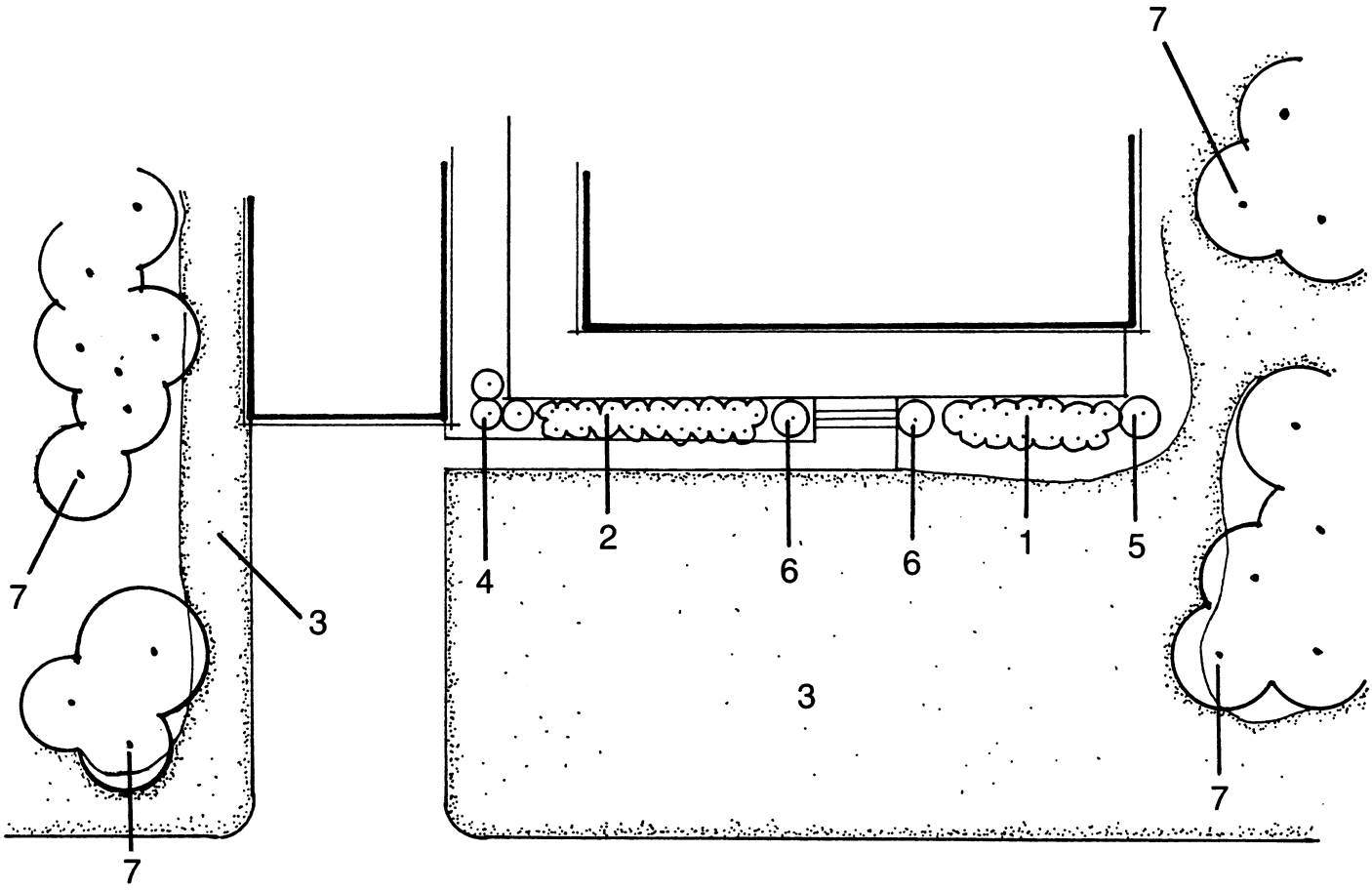
Botanical Name and Common Name	Water' Use Zone	Georgia Hardiness Zone	Shade Tolerance	Propagation	Green Foliage	Plant
Axonopus affinis Carpet Grass	1, 2, 3	7b to 8	Fair	Seed	Spring, Summer, Fall	May-July
Cynodon dactylon hybrids 'Tifway', 'Tifgreen', Bermuda	1, 2, 3	6b to 8	Poor	Sprigs, Plugs, Sod	Spring, Summer, Fall	May-July
Eremochloa ophiuroides Centipede	1, 2, 3	7 to 8	Fair	Sprigs, Seeds, Plugs, Sod	Spring, Summer, Fall	May-July
Festuca arundinacea Tall Fescue	1, 2, 3	6b, 7b	Good	Seed, Sod	Most of Year	Sept-Oct
Poa pratensis Kentucky Bluegrass	1, 2	6b	Good to Fair	Seed, Sod	Most of Year If in Shade	Sept-Oct
Stenotaphrum secundatum St. Augustine	1, 2, 3	8	Excellent	Sprigs, Plugs, Sod	Spring, Summer, Fall	May-July
Zoysia hybrids 'Emerald', 'Meyer', 'Matrella', Zoysia	1, 2	6b to 8	Good	Sprigs, Plugs, Sod	Spring, Summer, Fall	May-July

' Water Use Zones: 1 = regular irrigation; 2 = moderate, occasional irrigation; 3 = low, no irrigation (natural rainfall)

COMMERCIALLY DESIGNED XERISCAPE-TYPE LANDSCAPES: BEFORE AND AFTER RENOVATION

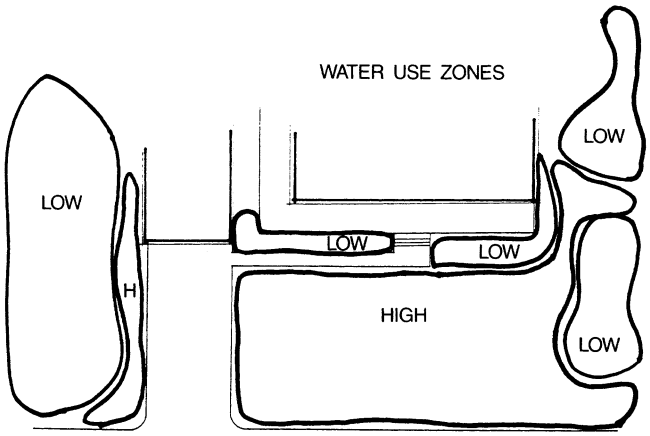
The landscape designs that follow show before and after plans of actual landscapes renovated for water conservation. In some cases, the water-use zone changed even though the type of turfgrass was not changed. This is because the owner adjusted his water management practices.

Before



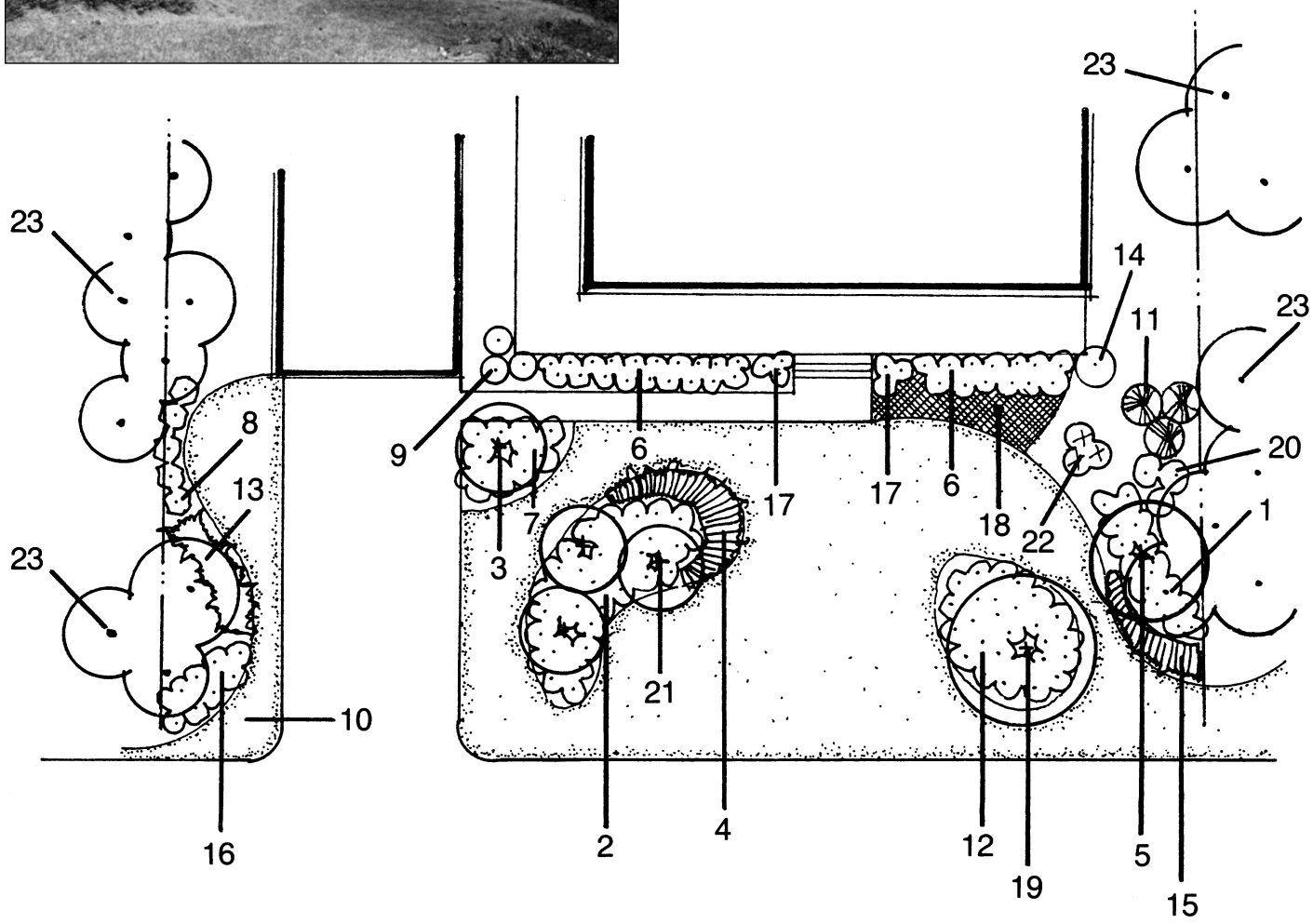
Plant List

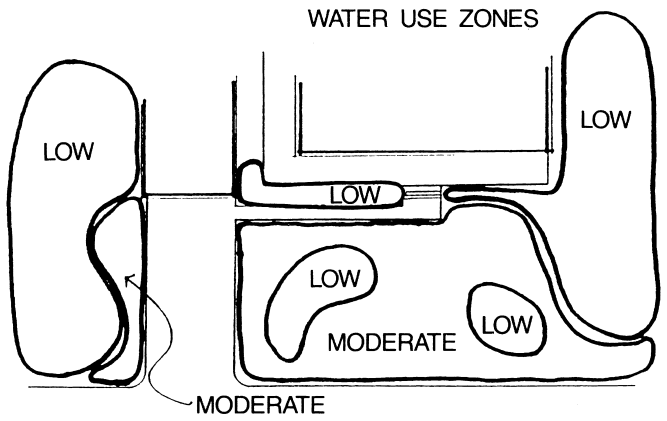
1. Burford Holly
2. Dwarf Yaupon Holly
3. Fescue Turf
4. Foster Holly
5. Leyland Cypress
6. Fatsia
7. Trees (existing)



After

Design courtesy of Allgood Outdoors
Alpharetta, GA
Strickland residence
Jacob Zimmerman, designer

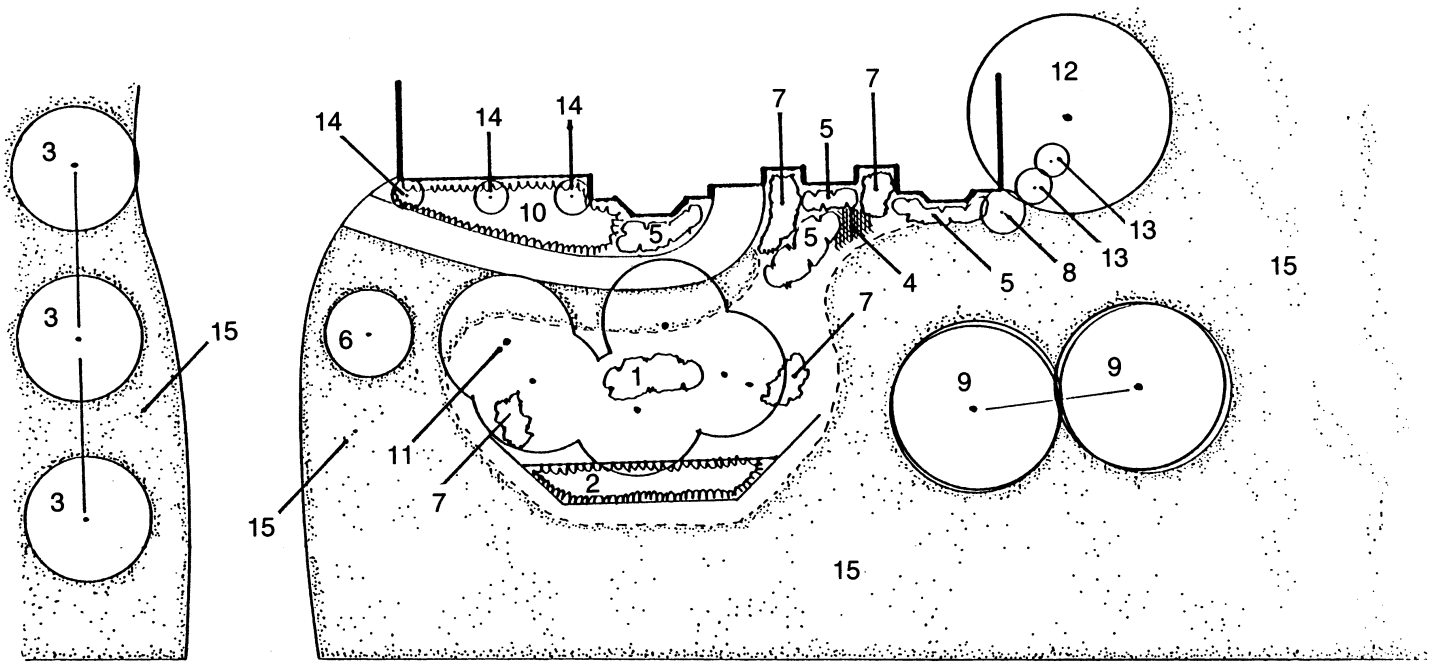




Plant List

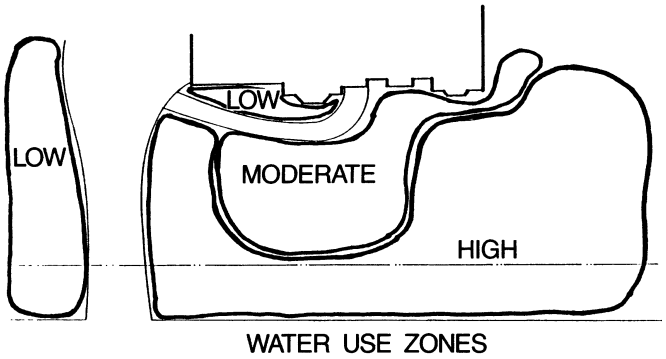
1. Azalea
2. Carissa Holly
3. Crape Myrtle
4. Daylily
5. Dogwood
6. Dwarf Yaupon Holly
7. Dwarf Yaupon Holly
8. Forsythia
9. Foster Holly
10. Hybrid Bermuda Turf
11. Japanese Black Pine
12. Juniper, Sargents
13. Juniper, Blue Pacific
14. Leyland Cypress
15. Liriope
16. Dwarf Abelia
17. Otto Luyken Laurel
18. Perennials and Herbs
19. Pin Oak
20. Quinch
21. River Birch
22. Pink Loropetalum
23. Trees (existing)

Before



Plant List

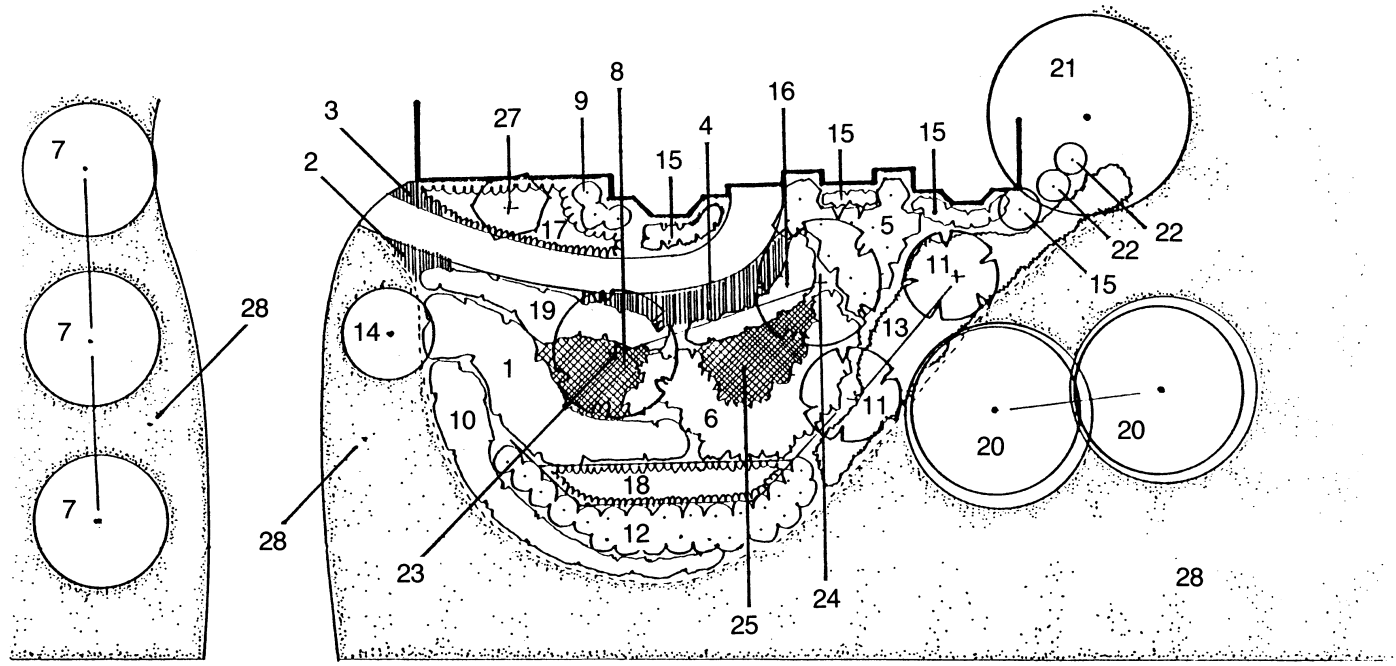
1. Azalea
2. Blue Pacific Juniper
3. Willow Oak
4. Chrysanthemums
5. Compcata Holly
6. Flowering Cherry
7. Hosta
8. Nellie R. Stevens Holly
9. Oaks
10. Parsons Juniper
11. Pines
12. Poplar
13. Rose Creek Abelia
14. Waxleaf Ligustrum
15. Turf (Fescue)

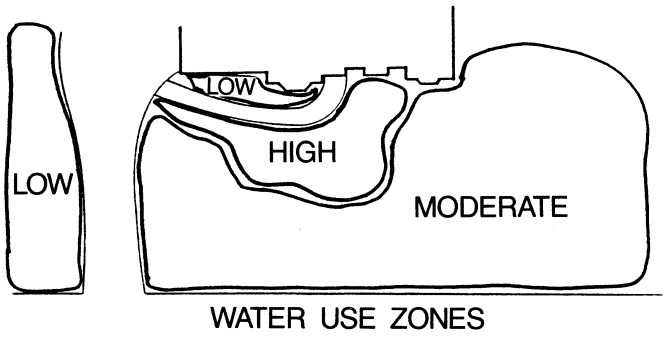


WATER USE ZONES

After

Design courtesy of Bregenzer's, Inc.
Alpharetta, GA
Pilkington residence
Randolph Beck, designer

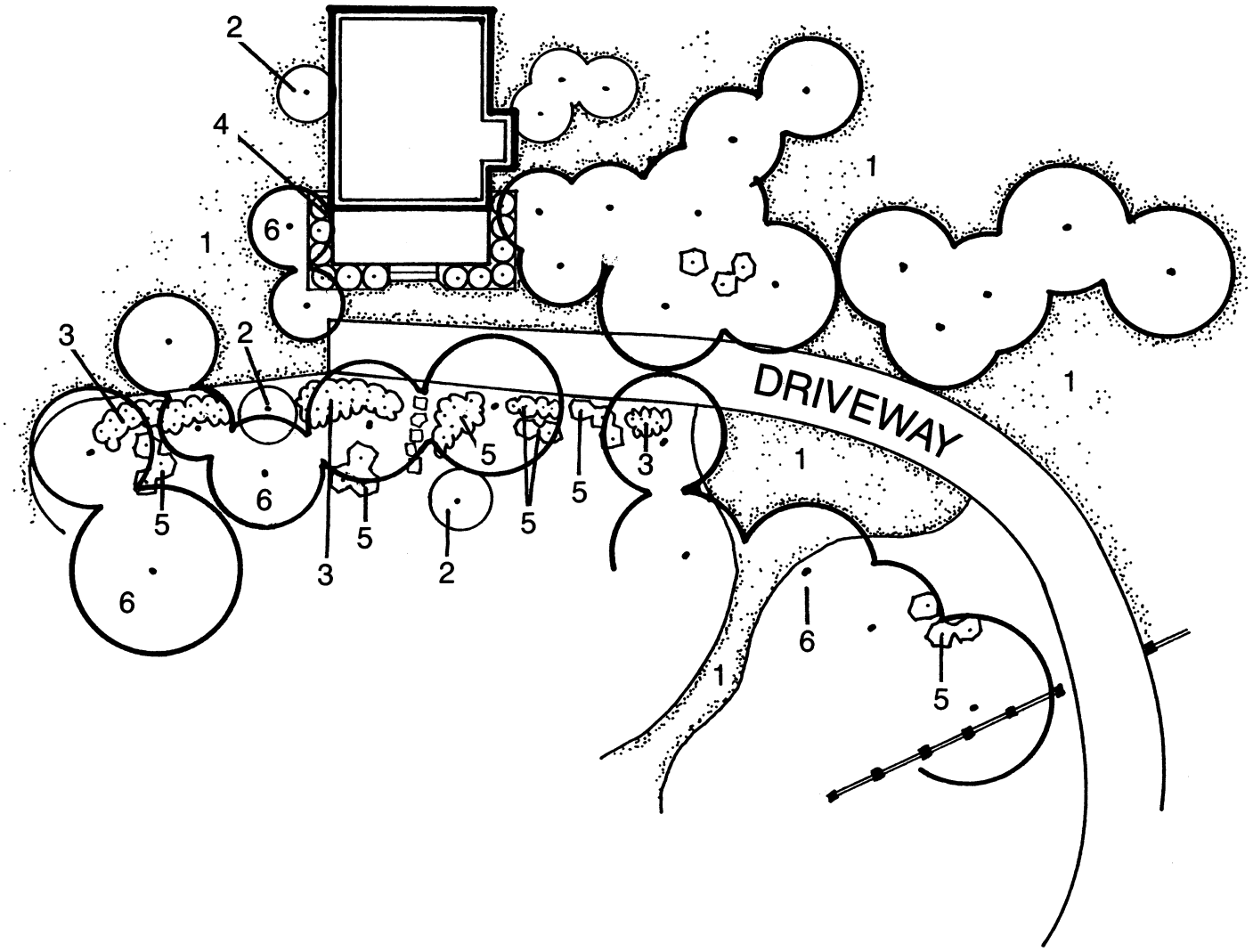




Plant List

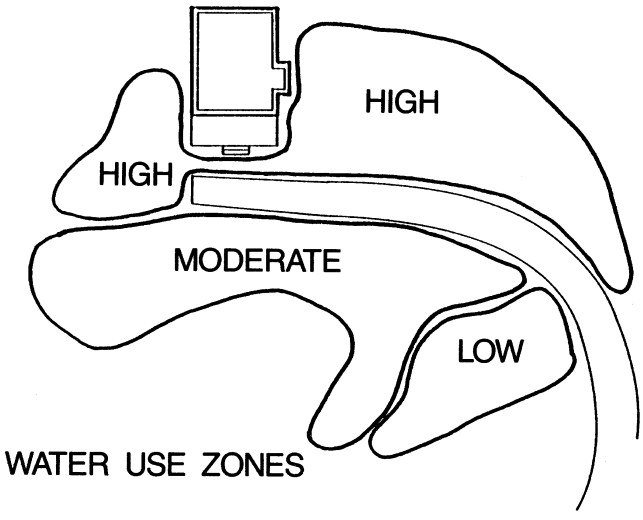
1. Abelia, Sherwood
2. Annuals
3. Annuals
4. Annuals
5. Azalea, G.G. Gerbing
6. Azalea, G. Tabor
7. Bradford Pear
8. Christmas Fern
9. Cleyera
10. Daylily, Aztec Gold
11. Dogwood
12. Dwarf Yaupon Holly
13. Pink Muhly Grass
14. Flowering Ivy
15. Holly
16. Hosta
17. Juniper
18. Juniper
19. Liriope, Green
20. Oak
21. Poplar
22. Burgundy Loropetalum
23. Redbud
24. Redbud
25. Southern Shield Fern
26. Wax Myrtle
27. Yaupon Holly
28. Turf (Fescue)

Before



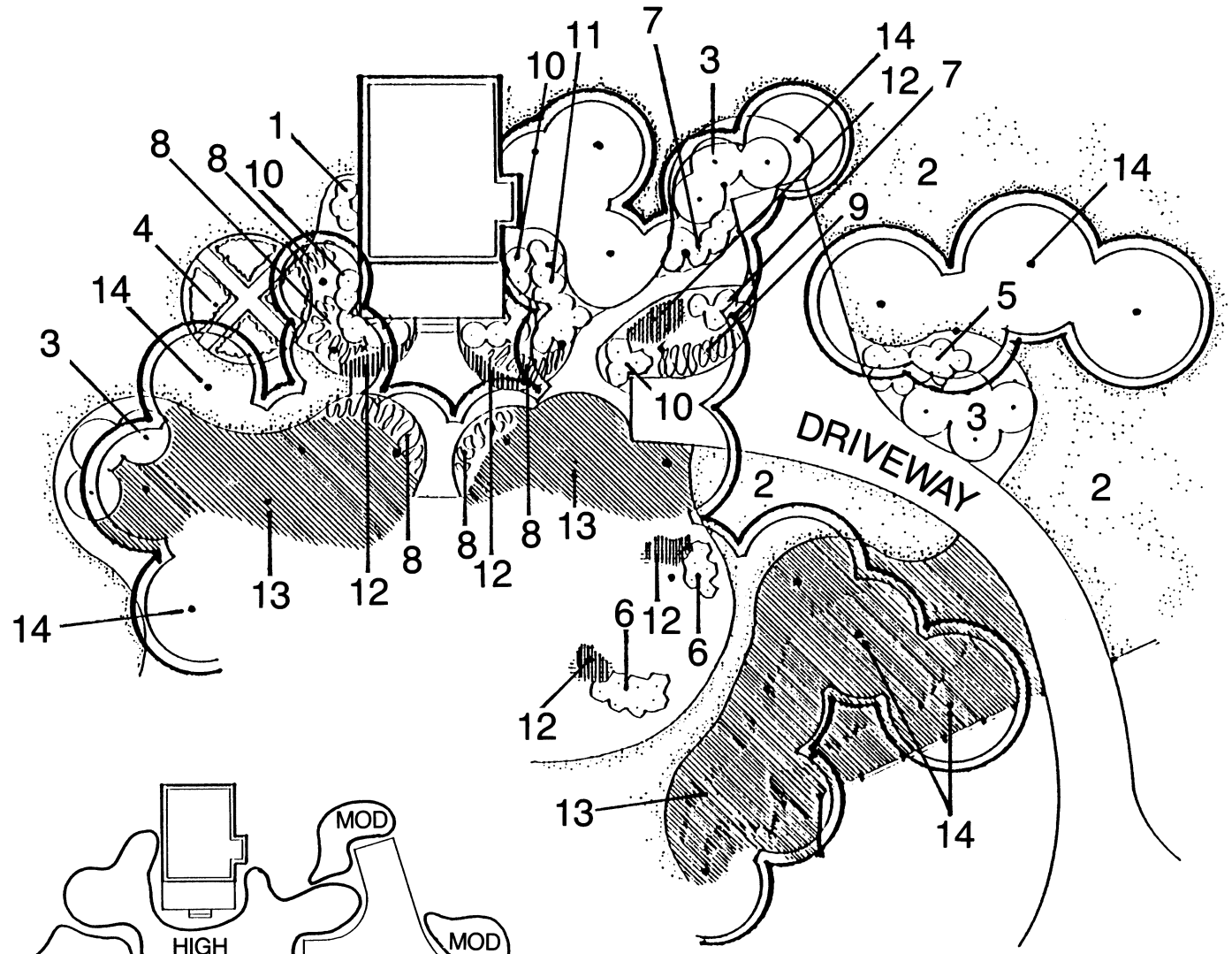
Plant List

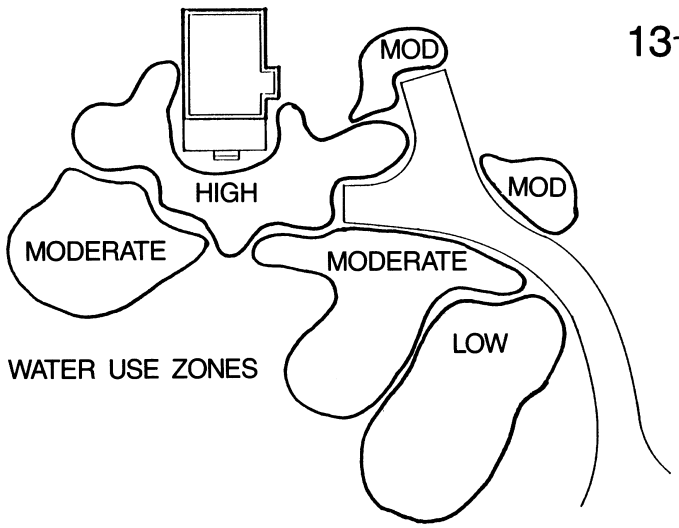
1. Fescue Turf
2. Hemlock
3. Perennials
4. Rhododendron
5. Shrubs (Assorted)
6. Trees (Native)



After

Design courtesy of Lifescapes, Inc.
Canton, GA
Sewell Guest Cabin
Pat Noe, designer

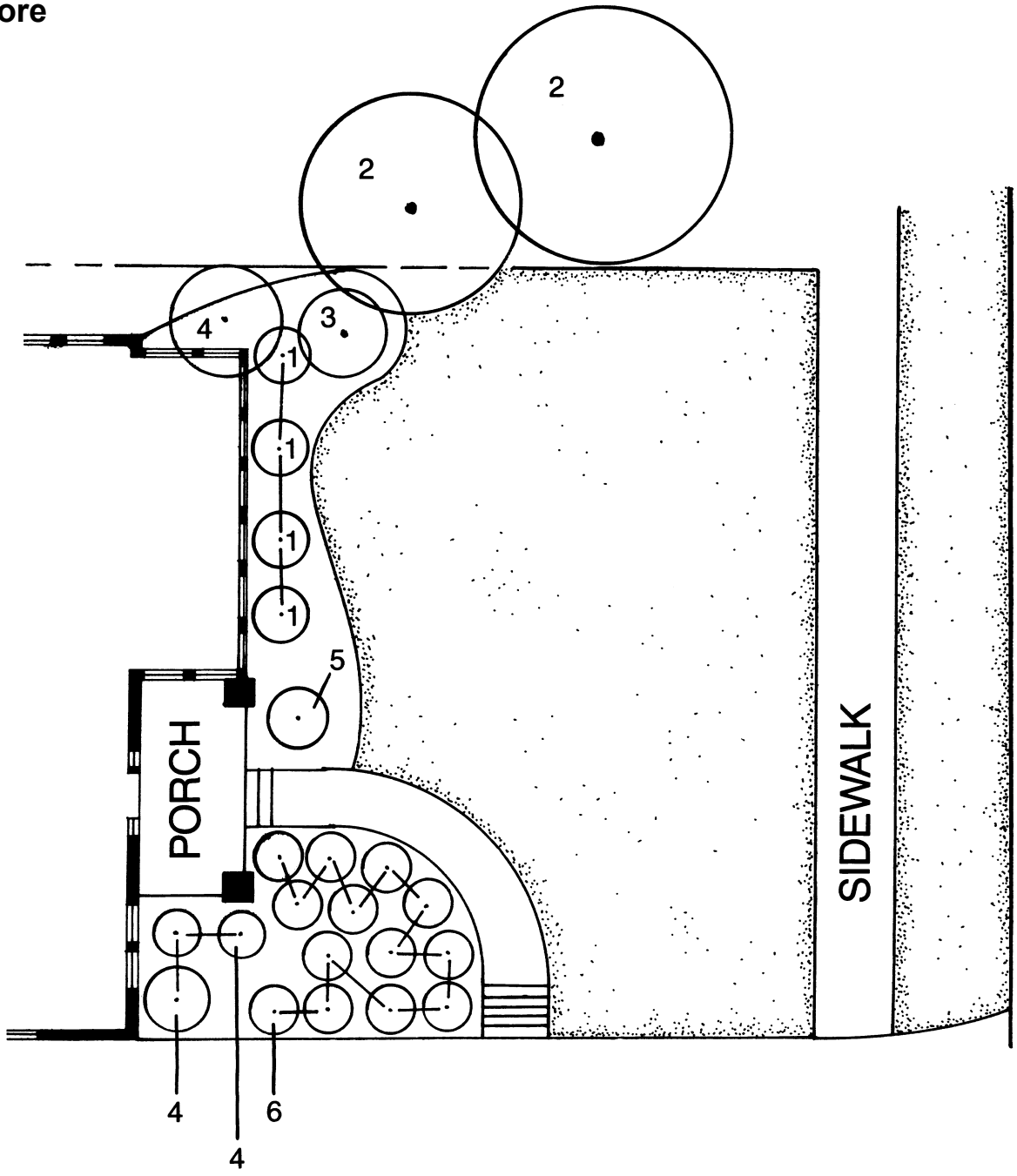




Plant List

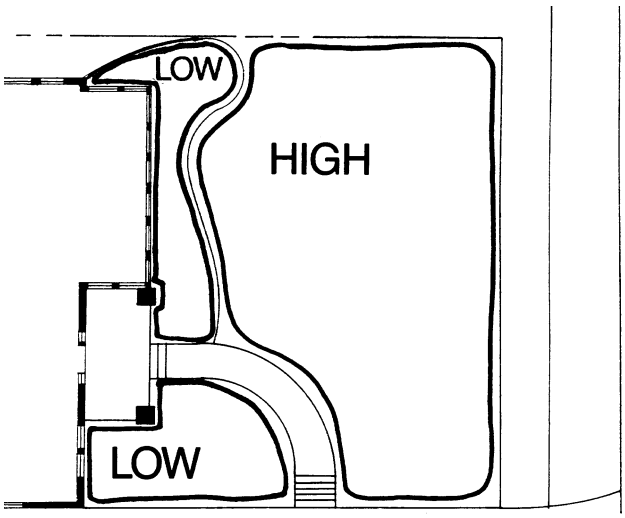
1. Anise
2. Fescue Turf
3. Hemlock
4. Herb Garden
5. Indica Azalea
6. Leucothoe
7. Mountain Laurel
8. Perennials
9. Phlox
10. Rhododendron
11. Satsuki Azalea
12. Seasonal Color
13. Pink Muhly Grass
14. Trees (Native)

Before



Plant List

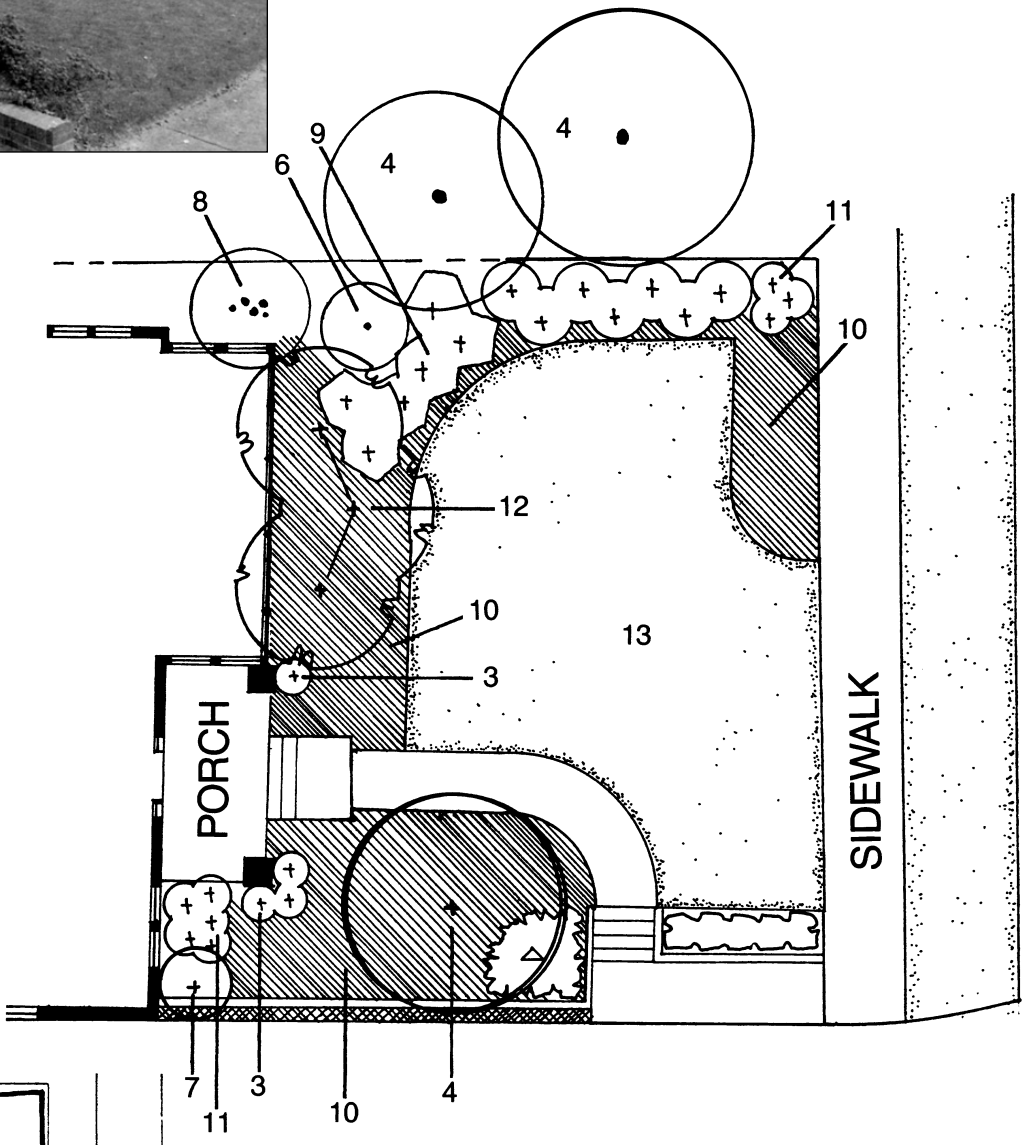
1. Boxwood
2. Dogwood
3. Eleagnus
4. Holly
5. Nandina
6. Pfitzer Juniper

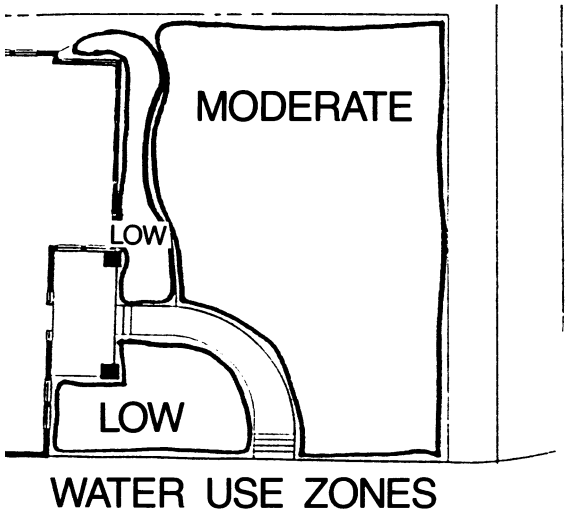


WATER USE ZONES

After

Design courtesy of William T. Smith & Associates
Atlanta, GA
Redd-Chezmar residence
William T. Smith, designer





WATER USE ZONES

Plant List

1. Azalea, George Tabor
2. Azalea, Gumpo
3. Boxwood, American
4. Dogwood
5. Dogwood, Existing
6. Little Gen Magnolia
7. Foster Holly
8. Holly, Existing
9. Hydrangea, Bigleaf
10. Mondo Grass
11. Otto Luyken Laurel
12. Yaupon Holly (Tree Form)
13. Zoysia Turf

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Georgia Water Wise Council, 1738 County Farm Road, Suite 200, Marietta, GA 30060-4012.
National Xeriscape Council, Inc., PO Box 767836, Roswell, GA 30076-7936.

SLIDE SETS/VIDEO TAPES

National Xeriscape Council. *Xeriscape: Landscaping for Today and Tomorrow.* 13 min. color VHS video. $15. P.O. Box 163172, Austin, TX 78716-3172.

South Florida Water Management District. *Principles of Xeriscape Irrigation.* Video. $20. P.0. Box 24680, West Palm Beach, FL 33416.

South Florida Water Management District. *What is Xeriscape?* Video. $20. P.O. Box 24680, West Palm Beach, FL 33416.

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Xeriscaping: Water-Efficient Landscaping. Slide set #751. Overview of Xeriscape principles for presentations to garden clubs, civic clubs and others interested in water conservation. Script included. Available through Georgia county Extension offices.

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