Water Conservation in Your Landscape

Water plays a vital role in all landscapes. In addition to being required for plant life, it is also the life blood of any environment. The rain water that leaves your property is not isolated. This water overflows into a series of roadway ditches or drainage inlets, which lead to local streams, rivers, and, ultimately, the Gulf of Mexico. This stormwater picks up sediment, nutrients, and pollutants along the way, which can cause significant impacts to the health of Mississippi's water bodies. In fact, according to the Mississippi Department of Environmental Quality, non-point source pollution (pollution that comes from a number of different non-specific sources, such as subdivisions or neighborhoods) is the leading cause of water pollution in the state of Mississippi, as well as in the nation.

There are a number of different things that you can do in your landscape that can improve or maintain the water quality of your property. Some techniques store or detain water temporarily in order to prevent flooding downstream, and others capture rainwater so that it can be reused for watering plants. All of them result in a positive benefit to water management on your property.

There may be state or local water regulations that govern any changes to surface or groundwater flows on your property. Be sure to check with the Surface Water Division of the Mississippi Department of Environmental Quality for any permits that you may need for significant alterations to any existing streams or drainage swales (ditches). There may also be local ordinances regarding the health and safety of water storage devices such as cisterns or rain barrels.

How Water Runoff Impacts Water Quality

Increased Water Runoff

One average city block can generate five times more rainwater runoff than a woodland area of equal size. Why is this? Building roofs, concrete, and asphalt do not allow rainwater to filter back into the ground—instead, it is carried off by drainpipes or allowed to flow to a water-collection area. This type of impermeable paving carries water very quickly and increases the amount and velocity of water to drains and collection points. Faster water can create flooding and erosion problems for others downstream.

Decreased Water Runoff

A mature woodland absorbs much of the water from an average rainfall with little runoff. Rainwater adheres to leaves and stems and is stored in the deep leaf layers on the ground. Woodland areas also have little soil compaction, allowing water to seep into the ground instead of running across a compacted surface such as a lawn. In a way, the forest acts like a giant sponge, absorbing the water before releasing it downstream. Vegetated buffers on your properties can perform similarly to the forest. Additionally, the more areas of mulch that you have on your property, the better rainwater absorption and storage will be.

Increased Water Pollution

As water travels across a surface, it picks up oils, fertilizers, soil, pesticides, manure, and other chemicals from lawns, gardens, parking lots, roads, sidewalks, construction sites, and rooftops. All of these combine to create a toxic soup that washes downstream. In areas of dense development, one good rainfall can ruin a stream's ecology. It is difficult to see the difference between poor and good water quality in a stream because the changes are mainly chemical. If excessive silt or soil is washing into a stream or ditch, the water appearance can look muddy or silty. Waters with excessive nutrients from phosphorous or nitrogen may have algal blooms that cover their surface. Excessive algae can deplete the water of oxygen, causing fish and other aquatic life to die.

What Can a Homeowner Do?

There are several ways to slow down, treat, and clean urban water runoff. Even if your property isn't next to a direct waterway or drainage channel, your runoff eventually makes its way downstream.

These are a few steps that you can take to minimize water-quality impacts in your area:

- Use fertilizers, herbicides, and pesticides sparingly and only where necessary for spot control.
- Avoid excessive irrigation that causes water to run off into street drains.
- Use alternative paving types in place of traditional concrete and asphalt materials. Brick, gravel, or pavers set on sand (instead of mortared joints) for sidewalks, patios, and driveways will allow better soil infiltration and reduce water runoff.
- Capture and store valuable rainwater in cisterns and rain barrels and reuse it to water your plants.

- Capture and treat property runoff with rain gardens.
- Mulch areas underneath trees to absorb rainwater.
- Avoid excessive soil compaction from vehicles and heavy equipment on lawn areas.
- Capture water runoff from animal pens, barns, and corrals in a water-detention area that will allow for soil infiltration and cleaning.
- Ensure that septic systems are inspected professionally every 3–5 years to check for leaks and proper drainfield operation.

The Stormwater Chain

Consider a drop of water that falls from the sky to the ground. Depending upon where it lands on your property, it will either infiltrate into the soil or it will travel to the lowest point of your property and beyond. This is called the stormwater chain, which is the path of rainwater from the point it hits the rooftops to where it eventually ends up in rivers and lakes. Water continually follows the lowest elevation, and there are a variety of methods that you can implement to capture, slow, or treat stormwater along the way. When you capture water, it can be stored for reuse, and slowing water allows it to infiltrate into the soil to recharge aquifers and prevent flooding downstream. The following sections explain each of these methods of stormwater management.

Capturing Water for Reuse

Capturing water for reuse is a time-honored way of ensuring an adequate future water supply for outdoor use. Wells were often dug at Mississippi homesteads, but cisterns were also commonly used. Cisterns, which also include rain barrels, are simply large containers that store water. They are placed to capture water running from a central source, such as a roof gutter or downspout. Rain water contains less salts (chlorine and fluorides) than tap water, so using rain water prevents salt buildup and burning on salt-sensitive plants.

Rain Barrels and Cisterns

Rain barrels and cisterns are available commercially, or you can make them from recycled containers, such as food containers (olive, wine, or whiskey barrels). Any material that holds liquids, such as metal, fiberglass, plastic, or concrete may be used but, to prevent algae buildup, the sides should not be transparent. Non-food grade barrels may be used, including detergent drums, but these must be thoroughly cleaned to prevent water contamination. Rain barrel kits are also available that contain the hardware and attachments to convert them to rain barrels. It is important to use a cover or screen on open water sources to prevent mosquitoes from breeding and to reduce water hazards.

While rainwater is fairly clean, it is recommended to install a first-flush diverter if you are catching water from a downspout or roof. The first minute of rainfall pushes all of the dust, dirt, bacteria, and bird droppings down first, and first-flush devices prevent these contaminants from going into the water-storage tank. Some rain barrel kits or cisterns include flush diverters, or you can purchase and install them separately.

Cisterns of any size may also be buried in the ground to save space in the landscape. To get water from the underground tanks, pumps can be installed. Rubber or plastic, collapsible cisterns are also available; these are portable and can save space when empty. Solar pumps are available for places that do not have access to electricity.

Figure 1. Two rain barrels can be linked so that, as one fills, any overflow goes into the other container. It is important to provide sturdy bases so that the barrels won't topple over.

Using Landscaping to Capture Water

You can also manage stormwater by capturing it temporarily or permanently in the landscape. Temporary water sources are called detention ponds, and they are used to protect against flooding and prevent erosion. Detention ponds also help settle sediments such as sands, silts, and heavy metals that may be present in stormwater. Rain gardens and biofilters are common examples of detention ponds; they are not created to hold large amounts of water for extended periods of time. A landscape feature that holds water for an extended period of time is called a retention pond. Ponds and water gardens are examples of retention ponds. Retention ponds add to the dynamic of a landscape and help store and clean stormwater.

Rain Gardens

Rain gardens are planted as stormwater drainage areas; they temporarily store rainwater until it can filter into the soil. Rain gardens do not permanently store water, and they have surface water only during and shortly after rainfall events. When properly designed, rain gardens

should have surface water for only a few days, which is not long enough for mosquito eggs and larvae to develop into adults. The benefits of creating a rain garden include:

- Reducing flooding at drainage inlets and downstream areas.
- Filtering pollutants from urban runoff, which can affect streams and creeks.
- Preventing erosion by reducing stormwater volume and velocity.

Rain gardens work by collecting surface water in a depression in the ground and then filtering the water

Figure 2. Rain gardens, such as the one at the Mississippi State University Landscape Architecture Facility, are designed to channel and filter excess rainwater.

through soils and plants. The biological and chemical processes within the soil, plants, and mulch are able to store or break down pollutants and improve water quality.

Rain gardens are best located in the main drainageways on a property or in lower depressions where water sometimes pools. These are easily seen during a moderate rain. Here are a few tips to consider when locating a rain garden:

- Always contact your utility company to come out and locate any buried lines or pipes on your property. Since most rain gardens require soil excavation, identify and avoid these locations.
- Do not place rain gardens in or near septic drainage fields.
- Place rain gardens downslope from any structure, and avoid locating near building foundations.
- Select areas that are open and away from large trees. Excavation can damage tree roots, and excess water in these areas could damage tree health.
- Avoid steep slope areas (over 12%) for rain gardens.
- Understanding the soil types on your property is key to a successful rain garden. As the purpose of a rain garden is to drain into the surrounding soil, sandy soils are typically best. Clay or compacted soils may need a larger excavation area. You may need to replace the soil with a loose soil mix, or additional underground drainage may be needed. Your local county Extension agent can provide you with soil sample boxes for soil tests. A simple way to test your soil drainage is to dig a hole about the size of a 2-gallon bucket. Fill it with a bucket of water and let it drain. If it drains less than an inch per hour, you may need to provide additional drainage, such as an outflow pipe or French drains (perforated pipe in a rock channel), that carry the overflow water safely to an outlet. If soil erosion occurs around the rain garden outflow, permanent materials such as rock or concrete may be necessary to secure the edges.

For more information on sizing rain gardens and detention ponds, see *Rain Gardens* at ***http://extension.msstate.edu/rain-gardens.***

Biofilters

Biofilters are similar to rain gardens but are often linear in shape and are constructed deeply to handle more water volume. Because of this, biofilters work well to store and cleanse water in parking lots or other non-permeable paving areas (non-permeable means water cannot drain through the surface). They are constructed to handle excess runoff just as drainage ditches are, except biofilters are heavily vegetated like aquatic gardens to slow and infiltrate water and remove sediments.

With the presense of soil microbes and plants, biofilters have the added advantage of cleansing water. As water filters through the soil, microbes break down the organic components and release nutrients for plants to absorb. Biofilters are designed to slow, store, and cleanse average rainfall amounts (less than 4 inches of rainfall in a 24-hour period), rather than store large amounts of water like a retention basin. The job of biofilters is to absorb and clean the silt and pollutants from the first-flush of a rainfall.

Retention Ponds or Permanent Water Gardens

The simple addition of water in the landscape can offer a new dynamic to a garden area. It can also serve important stormwater functions by storing water,

preventing erosion and sedimentation, and cleansing water. It can also provide recreational and waterfowl opportunities. From quiet, shallow ponds to the spray jets in a formal pool, water can provide just the right element for the many moods of a landscaped space. Because of the wide range of options that are available, a water feature can be added to even the smallest of garden areas.

How Water Gardens Work

Water gardens can range in size from a pond of several acres to a small whiskey barrel container. Although different in water volumes, the principles of water gardening are the same for any size feature. Because every water garden needs to be maintained, you should consider how much time you want to spend taking care of your water garden. By understanding a few basic principles, problems in ponds can be reduced and maintenance minimized. For more information on designing aquatic features, see *Creating Water Features in the Landscape* at ***http://extension.msstate.edu/creating-water-features-the-landscape***.

Dry Swales, Dry Creeks, and Drainageways

Roadside ditches are commonly used to drain water from roads and other surfaces. While effective at transporting water, these can often be unsightly. But drainage swales can be designed to look good and carry water safely. As mentioned above, always consult with an engineer or landscape professional when designing swales that carry large water volumes or that connect to other waterways off your property.

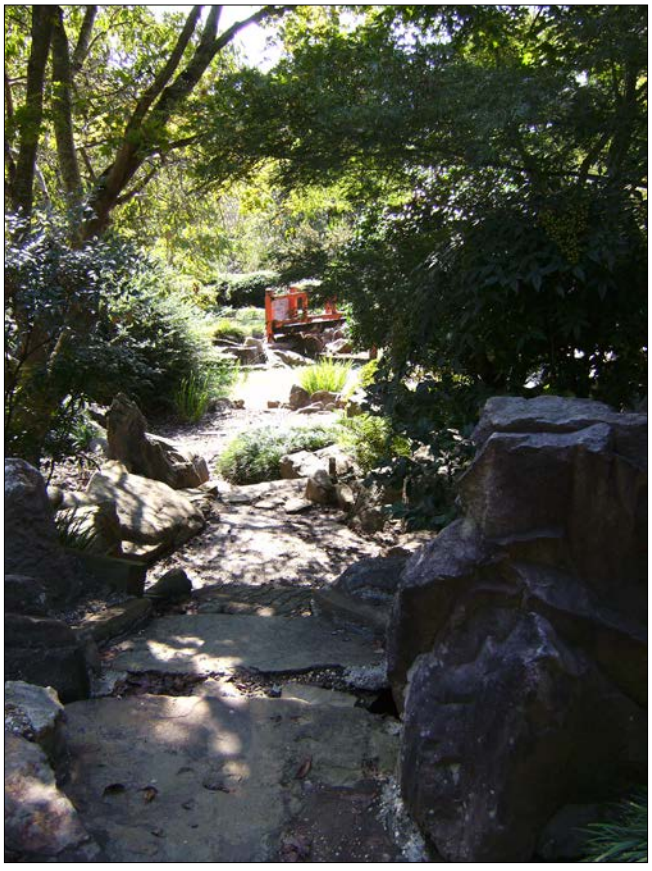

Figure 3. Dry swales contain water only during a rain and can be designed as landscape features when dry.

Dry Swales

Dry swales (also called dry washes or arroyos) are dry for much of the year and only temporarily contain water after a rain. These are shallow drainage areas that are sized to accommodate maximum water levels. If the area is sunny, turfgrass is often used to stabilize the soil as water runs off quickly. If the area is in shade or receives less than a half-day of sun, turf will not grow and you will have to substitute this with other shade- and moisture-tolerant plants. See the table below for an abbreviated list of plants that will tolerate mostly shady, dry locations, with occasional water. Heavy materials such as large rocks, river stones, and logs can also keep the soil from eroding and offer an aesthetic touch.

Table 1. Plants for shady, dry swells.

Small and Large Trees	
Swamp red maple	*Acer rubrum* var. *drummondii*
Bald cypress	*Taxodium distichum*
Green ash	*Fraxinus pennsylvanica*
Swamp black gum	*Nyssa sylvatica* var. *biflora*
Willow oak	*Quercus phellos*
Black willow	*Salix nigra*
Sweet bay magnolia	*Magnolia virginiana*
Pond cypress	*Taxodium ascendens*
Ironwood	*Carpinus caroliniana*
Wax myrtle	*Myrica cerifera*
Shrubs	
Dwarf palmetto	*Sabal minor*
Chokeberry	*Aronia arbutifolia*
Buttonbush	*Cephalanthus occidentalis*
Summersweet	*Clethra alnifolia*
Sweetspire	*Itea virginica*
Titi	*Cyrilla racemiflora*
Buckwheat tree	*Cliftonia monophylla*
Perennials	
Stokes aster	*Stokesia laevis*
Blue flag iris	*Iris virginica*
Cinnamon fern	*Osmunda cinnomomea*
Royal fern	*Osmunda regalis*
Horsetail	*Equisetum hyemale*
River oats	*Chasmanthium latifolium*
Blue eye grass	*Sisyrinchium angustifolium*

Protecting Water Quality for Drainage Areas, Ponds, and Stream Channels

Using Vegetative Buffer Strips

One simple and easy method of slowing and cleansing water is to use vegetative buffer strips near water areas. Vegetative buffers are simply zones of vegetation allowed to grow where water flows. Vegetative buffers are extremely effective when used adjacent to ponds, lakes, and stream edges. Lawn or pavement that allows surface drainage directly into water bodies can degrade water quality. By allowing dense vegetation to grow along the edges of water (where possible), you can achieve better water quality. The effectiveness of water cleansing depends on the buffer width. In general, the wider the buffer, the more pollutants it can capture. Studies have shown that a 30-foot-wide agricultural field along a waterbody can reduce soil sedimentation and pollutants.

An attractive option is to plant wetland flowering and ornamental plants. The addition of irises, cattails, pickerel weed, rushes, powdery thalia, buttonbush, and other water-loving plants at the edges of streams and water bodies creates a beautiful wetland garden.

Drainage areas and ditches can also be planted to slow stormwater and improve water quality. While maintaining turf in swales and ditches allows for some water infiltration, the addition of shrubs and trees enhances the effort. Check with municipal engineers for permission to alter vegetation in drainage rights-of-way on private properties. It is also important to prevent flooding near low-lying structures, roads, and residences.

Green Roofs and Green Walls

Urban and suburban areas offer little room for large ponds or other water features in the landscape. Because of this, some innovative gardens have been developed to store and treat water where it runs off the fastest—on buildings and in paved areas. Once considered experimental solutions, greens roofs and green walls are now commonly used in most cities around the world.

Green Roofs

Green roofs are vegetative alternatives to traditional roofing materials. Instead of having asphalt, gravel, or shingles on a roof, live plants and growing media are installed. Sod-covered houses were once common throughout much of Europe and western North America, and new technologies are now allowing for their use on modern residential, commercial, and industrial buildings. Green roofs consist of vegetation, a growing medium, impermeable membranes, drainage, and sometimes supplemental irrigation. This alternative roofing material offers the following benefits to a structure:

- Reduces summer temperatures on structures (by as much as 20 degrees).
- Absorbs rainwater and reduces stormwater runoff.
- Reduces traffic and other urban noises.
- Provides an additional living environment for birds and animals.
- Provides an attractive and natural rooftop solution.
- Protects roof materials from sun exposure and temperature fluctuations.
- Provides additional insulation for building interiors.

Green roofs are either intensive or extensive, referring to the soil media depth and the ultimate weight on the roof. Intensive green roofs have growing media ranging from 8–24 inches, which allows for the inclusion of larger shrubs and even trees, with weight loads ranging from 60 to 200 pounds per square foot. Intensive roofs require more regular maintenance and are suited to structures that can support heavier loads. Extensive green roofs are shallower (2–7 inches), typically allowing for herbaceous plants and groundcovers and weight loads ranging from 16 to 35 pounds per square foot. An extensive green roof is usually more suitable for existing roof types because it is lighter. Maintenance considerations are generally lower for extensive types. With any green roof project, an architect or structural engineer should determine the weight loads that the roof will support.

Figure 4. Green roofs provide many benefits, including their alternative roofing material.

There are a number of different techniques, materials, and growing media that may be used on a green roof project, and they may vary according to the structure. Typically, directly on top of the roof is a separation layer, followed by layers of insulation, a moisture barrier, waterproofing, drainage protection, drainage, filter fabric, growing media, and plants. The slope of the roof should range from 5 to 20 degrees for positive water drainage. Additional drainage layers or pipes may be needed for flat roofs. According to the U.S. Environmental Protection Agency's report on green roofs, the average national cost for an extensive green roof is approximately $8 per square foot for materials, preparation, and installation.

Plant species that are suitable for green roofs in the southern United States are still being researched, but the following types have been used in these regional project examples:

Student Union, University of Central Florida, Orlando, Florida

Dune sunflower (*Helianthus debilis*)

Blanket pinwheel daisy (*Gaillardia pulchella*)

Painted daisy (*Tanacetum coccineum*)

Coral honeysuckle (*Lonicera sempervirens*)

Simpson's stopper (*Myrcianthes fragrans*)

Confederate jasmine (*Trachelospermum jasminoides*)

Charles Perry Construction Yard, University of Florida

Blanketflower (*Gaillardia pulchella*)

Blazing star (*Liatris spicata*)

Blue-eyed grass (*Sisyrinchium atlanticum*)

Coreopsis (*Coreopsis grandiflora*)

Dune sunflower (*Helianthis debilis*)

Gopher apple (*Licania michauxii*)

Matchstick weed (*Phyla nodiflora*)

Muhly grass (*Muhlenbergia capillaries*)

Perennial peanut (*Arachis glabrata*)

Red salvia (*Salvia coccinea*)

Lady Bird Johnson Wildflower Center Green Roof Research, Texas

Crossvine (*Bignonia capreolata*)

Sideoats grama (*Bouteloua curtipendula*)

Buffalo grass (*Bouteloua dactyloides*)

Blue grama (*Bouteloua gracilis*)

Texas grama (*Bouteloua rigidiseta*)

Texas sedge (*Carex texensis*)

Gregg dalea (*Dalea greggii*)

Purple coneflower (*Echinacea purpurea*)

Red yucca (*Hesperaloe parviflora*)

Curly mesquite (*Hilaria belangeri*)

False aloe (*Manfreda maculosa*)

Seep muhly (*Muhlenbergia reverchonii*)

Meadow muhly (*Muhlenbergia rigens*)

Mexican wiregrass (*Nassella tenuissima*)

Hall's panicgrass (*Panicum hallii*)

Scarlet penstemon (*Penstemon triflorus*)

Texas frogfruit (*Phyla nodiflora*)

Mealy sage (*Salvia farinacea*)

Autumn sage (*Salvia greggii*)

Little bluestem (*Schizachyrium scoparium*)

Bushy skullcap (*Scutellaria wrightii*)

Woolly stemodia (*Stemodia lanata*)

Bitterweed (*Tetraneuris scaposa*)

Haley Center, Auburn University, Alabama

Prairie aster (*Aster hemisphericus*)

Aromatic aster (*Aster oblongifolius*)

Coreopsis (*Coreopsis grandiflora*)

Prairie coneflower (*Echinacea angustifolia*)

Garden phlox (*Phlox paniculata*)

Prairie phlox (*Phlox pilosa*)

Obedient plant (*Physostegia angustifolia*)

Black-eyed Susan (*Rudbeckia hirta*)

White goldenrod (*Solidago ptarmicoides*)

Stokes aster (*Stokesia laevis*)

Muhly grass (*Muhlenbergia capillaries*)

Sweet grass (*Muhlenbergia filipes*)

Green Walls

Green walls are places where plants grow on the sides of buildings or other vertical structures. This may include exterior building walls, fences or retaining walls, or even the interiors of buildings. The benefits to planting a green wall include:

- Visually enhances unappealing wall spaces.
- Absorbs rainwater and reduces stormwater runoff.
- Cools the sides of a building from direct summer sunlight, reducing indoor cooling needs.
- Provides an extra layer of insulation for building sides.
- Reduces traffic and other urban noises from building interiors.
- Reduces the urban-heat island affect in cities.
- Improves carbon sequestration and air quality in urban areas.
- Provides additional wildlife habitat in urban areas.
- Provides additional points for L.E.E.D. certified buildings (Leadership in Energy and Environmental Design Green Building Rating System™).
- Provides additional green space in a vertical format.

Figure 5. Green walls, such as this ivy, provide privacy as well as screening for unattractive views.

Trellis or Wire

There are many methods of creating green walls other than the traditional use of vines, including some new technological advances. The simplest and least expensive way to create a green wall would be to construct a freestanding or attached trellis.

A freestanding trellis is a frame of wood or metal that is anchored to the ground. Maintain a distance from the wall of at least 6–8 inches to allow for air circulation and to reduce mold and moisture buildup on building sides. Some freestanding structures around buildings (such as fences) require building permits or may need to meet other local ordinance codes. Vines that use non-attaching tendrils to climb, such as coral honeysuckle (*Lonicera sempervirens*), clematis (*Clematis* spp.), or yellow jasmine (*Gelsemium sempervirens*), will use the trellis for support. Plant species may be chosen according to the height of the wall being covered, with some species reaching over 70 feet in height. For more species of vines suitable for the Southeast, see *Designing with Vines* at ***http://extension.msstate.edu/designing-vines***.

Wood lattice that is available in hardware stores often has a short life span and requires regular maintenance. An alternative, inexpensive method is to use cables or coated wire. Similar to using string or wire for string beans, cables are anchored into the ground and attached to roof eaves or wall anchors. Vines are planted in the ground or in planters at the base and climb the wire. Vines that are planted in the ground offer the least maintenance for watering and care when compared to other green wall systems. You should space the wires of the trellis according to the density of foliage that you desire. Wall anchor and wire kits are available from a variety of manufacturers.

Metal Framework

Green walls can use a metal framework that is detached from the building sides (similar to a freestanding trellis). This framework supports panel-type planting units that hold a lightweight soil. Metal frames that are attached to building sides will require a waterproof membrane between the growing media and the wall surface. The panels are modular units that fit into the metal framework, and are available in various patterns and grid sizes. The soil media is a sponge-like sheet that holds water yet drains freely. Plants are installed in the soil on the side of the vertical structure. Very low-growing plants (under a foot in height) are used, including groundcovers, ferns, perennial flowers, small shrubs, and herbs. Plant species may be chosen for shade or sun locations, and tropical species can be used for indoor green walls. Indoor green walls help improve indoor air quality by removing volatile organic compounds that come from paints, adhesives, caulking, and carpeting. Supplemental irrigation is required for green walls; they often use a drip system on the top wall portion which then filters down through the individual wall panels. Permeable gravel strips are often used at the base of green walls to collect excess water, which is recycled via a pump.

Vertical Gardens

Vertical gardens differ from green walls because they do not use a soil media for the plants. Instead, they use a felt fabric. Similar to a green wall, vertical gardens use a metal frame that either attaches to the building sides or is freestanding. A thin, rigid plastic sheet is attached to the metal frame to provide stability and waterproofing to the building wall. A corrosion-resistant felt layer is attached to the plastic sheeting to provide both water and a base to anchor the plant roots. Ferns, mosses, sedums, and many epiphytes such as orchids and bromeliads will attach to the felt layer. As with a green wall, the felt is irrigated from the top with supplemental water that gravitates to the base. Hot, sunny walls can be planted with succulents, which require less maintenance and less water, and are green year-round.

Plants that would be suitable for green walls in the southeastern U.S. include:

Perennial wildflowers

Blanket pinwheel daisy (*Gaillardia pulchella*)

Painted daisy (*Tanacetum coccineum*)

Blazing star (*Liatris spicata*)

Blue-eyed grass (*Sisyrinchium atlanticum*)

Coreopsis (*Coreopsis grandiflora*)

Red salvia (*Salvia coccinea*)

Purple coneflower (*Echinacea purpurea*)
Red yucca (*Hesperaloe parviflora*)
Autumn sage (*Salvia greggii*)
Clover (*Clover* spp.)

Ferns (for shady walls)

Christmas fern (*Polystichum acrostichoides)*
Southern beech fern (*Phegopteris hexagonoptera*)
Autumn fern (*Dryopteris erythrosora*)
Southern maidenhair (*Adiantum capillus-veneris*)
Ebony spleenwort (*Asplenium platyneuron*)
Wood fern (*Thelypteris kunthii*)

Vines

Coral honeysuckle (*Lonicera sempervirens*)
Confederate jasmine (*Trachelospermum jasminoides*)
Crossvine (*Bignonia capreolata*)
Smilax (*Smilax* spp.)
Trumpet creeper (*Campsis radicans*)
Yellow jasmine (*Gelsemium sempervirens*)
Virginia creeper (*Parthenocissus virginicus*)
Morning glory (*Ipomoea* spp.)

Grasses

Muhly grass (*Muhlenbergia capillaries*)
Sideoats grama (*Bouteloua curtipendula*)
Buffalo grass (*Bouteloua dactyloides*)
Little bluestem (*Schizachyrium scoparium*)

Succulents

Sedum (*Sedum acre* 'Aureum')
Sedum (*Sedum album*)
Hen and chicks (*Sedum cauticol*a)
Blue carpet (*Sedum hispanicum*)
Carpet sedum (*Sedum lineare* 'Variegatum')
Japanese golden sedum (*Sedum makinoii* 'Ogon')
Sedum (*Sedum reflexum* 'Angelina')
Sedum (*Sedum reflexum* 'Blue Spruce')
Hen and chicks (*Jovibarba heuffelii*)
Hirta hen and chicks (*Jovibarba hirta*)
Trailing ice plant (*Delosperma cooperi*)

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