

UNIVERSITY OF GEORGIA MARINE EXTENSION SERVICE



CoastScapes

Conservation Landscaping Guidelines For Coastal Georgia

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**Coastal Sustainable Communities and CoastScapes Conservation Landscaping
Program**

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Conservation Landscaping Guidelines For Coastal Georgia

Why is Conservation Landscaping Important in Coastal Georgia?

We have come to understand that people are a major cause of coastal Georgia's natural resource problems. With so many people living on the coast, nonpoint source pollution – runoff from streets, construction sites, and our own yards – has become an increasing problem. Contaminants from every home and community – sediments, sewage, fertilizers, pesticides, herbicides, manure and motor oil – can be carried into our coastal waterways from local streams and creeks.

Coastal Georgia is made up of a vast array of fresh and coastal wetlands, non-tidal and tidally



influenced waters that support rich and diverse communities of plants and wildlife. Because our actions are so closely linked to the health of the coast, stewardship of the land and water by ordinary citizens is our most effective tool for the coast's future. There is so much you can do to help and there is no better place to begin than in your own back yard.

How we all live on the land is important, so how each of us manages our property is important to all of us. How you manage your landscape can have an important impact on the health of your local environment and Georgia's coastal natural resources. Embrace that responsibility! Be a guardian of your property. Your landscape may be the one piece of land you have full opportunity to manage well, and millions of Americans rate gardening as one of their favorite forms

Source: Georgia Department of Natural Resources

of recreation. So, we invite you to enjoy yourself in your yard as you apply the principles of conservation landscaping.

The rewards of a well-maintained conservation landscape are many. It reflects positively of the owner. It beautifies the home and neighborhood – or the workplace, school, business, and park. It affords a comfortable place to entertain, relax, play, work, and learn. Most importantly, it provides and promotes a safe and healthier environment for our use and enjoyment, while living in harmony with our coastal Georgia natural treasures.

Engaging in the conservation landscaping practices described in this guidance document can make an important difference in helping preserve the coast’s plants, habitats, and animals, all critical to the complex web of life that characterizes Georgia’s coast and its surrounding watersheds.



White Ibis (Eudocimus albus)

Source: James Holland

The Eight Essential Elements of Conservation Landscaping

The following “Eight Essential Elements of Conservation Landscaping” provide the foundation for conservation landscaping in coastal Georgia. As landscapers, we have a tremendous opportunity to affect and improve the health of our coastal environment, both locally and beyond.

Within this document, you will find a number of meaningful guidelines provided under each individual essential elements section. These guidelines are intended to help you landscape more successfully while becoming a better steward of our coastal Georgia environment. Before we take the journey, we will first begin with the basics, the eight essential elements of conservation landscaping.

1. Conservation landscaping is designed to benefit the environment and to function well for human use.

A conservation landscape is designed to benefit the environment and to function well for personal use. Conservation landscape design occurs in the context of nature. It seeks to preserve, enhance, and reduce impacts upon a site’s natural features.

2. Conservation landscaping contains locally native plants that are appropriate for site conditions.

Balanced communities of native plants contribute to the biodiversity of the landscape. Native plants have co-evolved with associated animals to form interdependent communities. Properly sited native plants are adapted to local conditions, consequently once established they require few inputs of water, fertilizer or pesticides. Native plants express the character of our natural landscape in a way that alien plants cannot.

3. Conservation landscaping has an ongoing management process to remove existing invasive plants, and to manage the property to prevent future alien plant invasions.

A conservation landscape has an ongoing management process to remove existing invasive plants, and to manage the property to prevent future alien plant invasions.

4. Conservation landscaping provides wildlife habitat.

A conservation landscape encourages native wildlife species that may include birds, butterflies, bees, other pollinators, spiders, fish, frogs, salamanders, snakes, and other wildlife. An animal's habitat is the particular type of area where it finds food, water, shelter, and breeding or nesting space. Biodiversity – a wide variety of native plant and animal life – is critical to maintaining a healthy ecosystem.

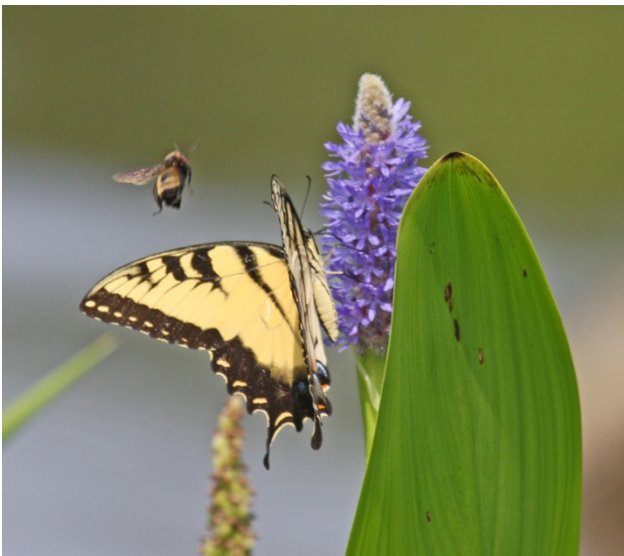
5. Conservation landscaping promotes good air quality and is not a source of air pollution.

A conservation landscape promotes good air quality, and helps to prevent and filter air pollutants.

6. Conservation landscaping conserves water and promotes good water quality.

A conservation landscape conserves water and promotes good water quality.

7. Conservation landscaping promotes healthy soils, composts plant waste on site, and amends disturbed soils to encourage native plant communities.



A conservation landscape protects and maintains healthy soils and amends disturbed soils to encourage native plant communities.

8. Conservation landscaping works with nature to be more sustainable with less input.

A conservation landscape is managed and maintained in a way that requires fewer inputs, works with nature and promotes or works toward sustainability.

*Eastern Tiger Swallowtail (*Papilio polyxenes* and Bumblebee (*Bombus* sp.) utilizing Pickerelweed (*Pontederia cordata*)*

Source: James Holland

Element One. Conservation landscaping is designed to benefit the environment and to function well for human use.

A conservation landscape is designed to benefit the environment and to function well for personal use. Conservation landscape design occurs in the context of nature. It seeks to preserve, enhance, and reduce impacts upon a site's natural features.

Landscape design is the initial investment that allows you to make the most of the site you have without spending a lot of resources to make the site into something else. It's the process that allows you to look at the site's challenges (like a wet area) as opportunities.



How to Implement Element One and Design a Conservation Landscape:

- **Perform a site analysis.** Consider character, historic uses of the land, soil types, geology, sun, water, natural plant communities, as well as environmental features on adjacent properties;
- **Choose your goals for the landscape.** Consider any specific needs that would be related to those goals. Your goals may contain multiple environmental benefits as well as benefits that are not specifically related to the environment, but can be accomplished in an environmentally sound way. Some common examples of landscape goals include:
 - To screen an unsightly view;
 - To create pollinator and/or other wildlife habitat in the home landscape;
 - To create a lovely and functional corporate, residential, or school landscape;
 - To strive for low maintenance;
 - To conserve water and other sources;
 - To provide a safe environment for toddlers;
 - To create a colorful native botanical garden for learning;
 - To capture and treat stormwater runoff from the site and adjacent properties using a beautiful but functional design.

Then **plan your landscape with your goals in mind.** Consider what you will need in order to achieve your goals and plant this into the landscape as well. For example:

- To screen the unsightly view, will you need a fence with an evergreen vine, or a row of evergreen shrubs or trees?
- To create pollinator and/or wildlife habitat, will you need plants, a water source, and shelter?
- To create a lovely and functional corporate landscape will you need a parking lot of a certain size and/or type or loading docks? If so, how will you minimize impervious surfaces while maximizing function? Will you need the landscape to be colorful and interesting in all four seasons? Would outdoor trails, rain gardens, and/or picnic tables help you meet your goals?
- To have a low maintenance landscape will you need large islands of shrub and tree plantings and a good source of mulch? How will you keep mowing, and especially mowing around obstacles to a minimum?
- To have a safe environment for toddlers do you need a landscape that is free of potential poisons like fertilizers, herbicides, fungicides and insecticides? Do you need to be able to recognize harmful poison ivy plants and be equipped to eliminate them from the landscape?
- To provide lots of color and interest for a school do you need a landscape plant that focuses on spring and fall color? Do you need landscape elements that provide educational benefits like rain gardens, water gardens, and pollinator gardens? Do you need interpretive signs?

Then plan a landscape that considers the Essential Elements 2 through 6, while achieving your goals and meeting your needs;

- **Pay attention to construction phases.** Don't install the plants before the utility lines, for example. Your landscape design may be simple or involved or somewhere in between. If your project is complex, it will be especially important to pay attention to the separate phases of the project and their sequencing. Do you have a small, simple landscape project or a big, complicated one? A homeowner designing the landscape for a row house has an easier job than the developer of a new commercial project. If your project is small, you may have a hard time fitting in enough species of plants to provide year-round color and interest. If your project is involved, it will be especially important to pay attention to the separate phases of the project and their sequencing. For example, you will want to make sure all utility lines are dug and flagged before landscaping is installed.
- **Think of landscape design as an ongoing process.** Update your design and your maintenance plan as the conditions of the landscape and the needs of the people using

the landscape change. In many cases, landscape design will need to be evaluated annually.

- **Preserve existing environmental features to the greatest possible degree.** In designing a landscape, consider existing landscape features (for example forests, individual trees that are large or especially ecologically or aesthetically valuable, highly erodible soils, an eagle's nest, high water tables, waterways and wetlands, meadows, animal and plant communities, areas of undisturbed native soils, rock formations) that can be preserved and folded into the new plan for the landscape.



Red-bellied woodpeckers (Melanerpes carolinus) nesting in snag. Source: James Holland

- **Enhance environmental features where opportunities exist.** Most environmental features in our area are no longer pristine. For example, institute an invasive species management plan for an onsite woodland, or augment the species composition of an impacted wetland onsite wetland, or build links between existing isolated habitats.
- **Take advantage of opportunities to create new environmental features where none existed before.** For example, take advantage of opportunities to link up adjacent natural areas or to transform into them. Examples would be planting forests where none have existed for a long time, converting a lawn into a meadow, or restoring a wetland. Destroying a healthy landscape feature to create some other type of landscape feature (for example, cutting down a mature forest to create a pond) is not recommended and is strongly discouraged.

- **Address the landscape implications of Essential Elements 2 through 8 during the design phase.** For example, to create wildlife habitat (Element 4), you could design in a pond. Or, to improve water quality (Element 6), you could design to reduce impervious surfaces using green infrastructure stormwater management. Or, to promote healthy soil (Element 7), you could design in a compost facility. More information on each Element is found in the following chapters.



Crossvine (Bignonia capreolata)

Source: James Holland

- **Keep lawn to the minimum area needed for function.** Conventional lawns are composed of alien invasive plants that have high maintenance requirements in terms of water input, fertilization and herbicide use. However, because they provide a smooth surface for certain recreational activities, and because the look of at least a little lawn is so strongly expected from some members of the community, even conservation landscapes often need to contain some lawn to be functional. Also, consider the extent to which any conventional lawn that must be present can be minimized in maintenance input without compromising function;

- **Mirror patterns found in nature.** For example, naturalistic layering of trees, shrubs, and herbaceous plants provides structure that is important to wildlife as well as attractive to people.

Element Two. Conservation landscaping contains locally native plants that are appropriate for site conditions.

Balanced communities of native plants contribute to the biodiversity of the landscape. Native plants have co-evolved with associated animals to form interdependent communities. Properly sited native plants are adapted to local conditions, consequently once established they require few inputs of water, fertilizer or pesticides. Native plants express the character of our natural landscape in a way that alien plants cannot.

Native plants are those species of plants occurring within the community’s biogeographic region prior to European contact, according to best scientific and historical documentation. More specifically, it includes those species understood as indigenous, occurring in natural associations in habitats that existed prior to significant human impacts and alternations of the landscape. The Federal Native Plant Conservation Committee (1994) defines a native as a plant species “that occurs naturally in a particular region, state, ecosystem, and habitat without direct or indirect human actions.” **A region** is defined as an area within approximately a 200 mile radius of and in the same physiographic province (coastal plain) as the site to be planted. Since records of native plants were not well written until the 17th and 18th centuries, most native plant lists refer back to this time. **Alien plants** are those that have been brought to the region as a consequence of human action. In conservation landscapes, **cultivars** (cultivated varieties) of native plants do not deliver the same benefits as the true species of locally native plants and are not considered native plants in this discussion.

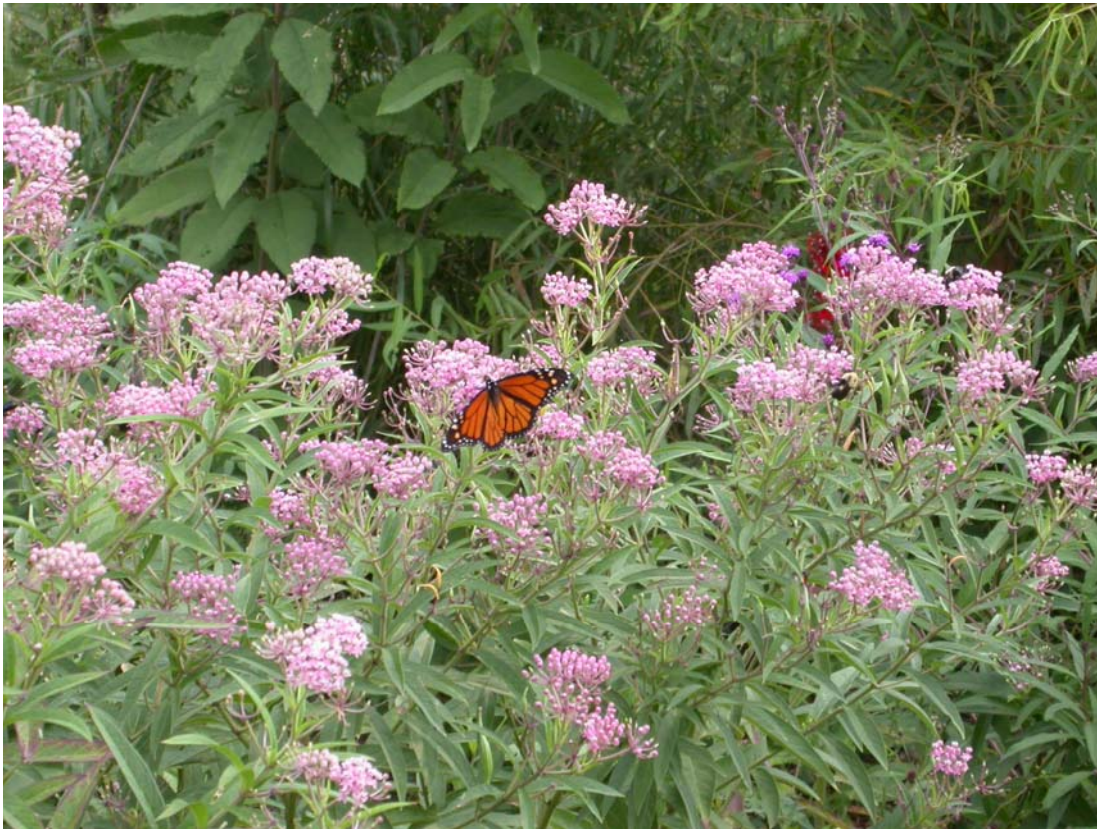


Balanced communities of native plants contribute to the biodiversity of the landscape. Native plants have co-evolved with associated animals to form interdependent communities. Properly sited native plants are adopted to local conditions, consequently once established they require few inputs of water, fertilizer or pesticides. Native plants express the character of our natural landscape in a way that alien plants cannot.

Purple passionflower (Passiflora incarnata)

How To Implement Element Two: A conservation landscape contains locally native plants that are appropriate for site conditions:

- Choose the right plant for the right place. Plants must be selected to suit existing soil, moisture, sunlight, and other site conditions;
- To determine which plants are native to your site, check out the user-friendly UGA MAREX CoastScapes/Bugwood Georgia Coastal Plain Native Plant **search engine**: www.bugwood.org/coastscapes/;
- Always ask nurseries about the source of the native species sold;
- Native plants may occasionally be obtained from the wild, as with plant rescues or wild seed collection. In general, however, native plants should not be taken directly from the wild;
- Include a diversity of native plants to provide a wide variety of benefits;
- Pick native plants that complement nearby natural areas by using similar species composition. For example, when planting adjacent to a restored longleaf pine forest, consider selecting species from that natural community.



Monarch butterfly (Danaus plexippus) on sweetscented joe pye weed (Eupatorium purpureum)

Element Two Tools and Resources

Tools Within Georgia

CoastScapes/Bugwood Coastal Plain Native Plant Search Engine

www.bugwood.org/coastscapes/

CoastScapes Coastal Plain Native Plant Lists for Conservation Landscaping Purposes

www.coastscapes.org/

Georgia Department of Natural Resources, Wildlife Resources Division, Nongame Conservation Section, Protected Plants

<http://www.georgiawildlife.com/conservation/georgia-animals-plants>

Georgia Native Plant Society

www.gnps.org

Georgia Plant Conservation Alliance

www.uga.edu/gpca

Model Landscape Ordinance Promoting Water Conservation and the Use and Preservation of Appropriate Native Vegetation for the Coastal Plain of Georgia

www.coastscapes.org

U.S. Fish and Wildlife Service, Georgia Ecological Services, federally listed plant species

<http://www.fws.gov/Athens/endangered.html>

Tools Outside of Georgia

Audubon at Home, National Audubon Society

www.audubonathome.org

Lady Bird Johnson Wildflower Center's Native Plant Directory

www.wildflower2.org/NPIN/

Plant Conservation Alliance

www.nps.gov/plants

PLANTS National Database, U.S. Department of Agriculture Natural Resource Conservation Service

<http://plants.usda.gov>

U.S. Department of Agriculture Forest Service Silvics Manual (tree ID, info, etc.)

www.na.fs.fed.us/spfo/pubs/silvics_manual/table_of_contents.htm

U.S. Environmental Protection Agency's Green Landscaping with Native Plants

www.epa.gov/greenacres

Native Grass Manuals by Ducks Unlimited

<http://www.ducks.ca/consERVE/programs/nativeplants/resource.html>

Native Plants Network (propagation information)

www.nativeplantnetwork.org/network

National Wildlife Federation's Backyard Habitats Program

www.nwf.org/backyard

The Wild Ones (organization of natural landscapers)

www.for-wild.org

Native Trees, Shrubs, and Vines for Urban and Rural America: A Planting Design Manual for Environmental Designers, Gary L. Hightshoe (1987, John Wiley and Sons)

Element Three. Conservation landscaping has an ongoing management process to remove existing invasive plants, and to manage the property to prevent future alien plant invasions.

A conservation landscape has an ongoing management process to remove existing invasive plants, and to manage the property to prevent future alien plant invasions.

Alien plants are those that occur artificially in locations beyond their known historical natural ranges, most often brought to new regions by humans through horticulture. **Invasive plants** are those aliens that display rapid growth and spread, allowing them to establish over large areas. More specifically, an invasive plant is an alien plant reproducing outside its native range and outside cultivation that disrupts naturally occurring native plant communities by altering structure, composition, natural processes or habitat quality. Outside of their natural range, these plants do not encounter conditions, competitors, or pests that would keep them in check back “at home”. Their phenomenal growth allows them to overwhelm and displace existing



Chinese wisteria
Wisteria sinensis

vegetation and form dense one-species stands. Invasive plants can spread to natural areas due to wind, water flow, birds and other wildlife, and other factors, causing significant ecological harm. They can alter fire frequencies, soil chemistry and erosion rates. They can degrade or change wildlife habitat, food quality and availability. They can displace native plants through competition for water, nutrients, light or space for establishment, reducing their establishment, growth, or reproduction. They can alter native populations through hybridization. For more information on invasive plants, see below.

A weed can be either a native plant or an alien plant, but is any plant that is out of place, growing where it is not wanted in the landscape.

How To Implement Element Three:

- **First, do no harm.** Before adding a new plant to your landscape, check to make sure that is is:
 - Native; or
 - If alien, is NOT invasive.

- **Remove existing invasive plants.**
 - Be suspicious of plants that are acting like thugs in the landscape. Plants that spread quickly, engulf other plants, dominate the landscape, produce large seed heads or copious berries may be problematic. Identification is necessary. If the plant is alien, it needs to be eradicated. If native, the landscape manager needs to decide whether or not this aggressive native plant is desirable.
 - Keep in mind that many old familiar landscape favorites may be invasive and should be checked out. Unfortunately, many commonly used landscaping plants are invasive (such as English ivy, Chinese wisteria, mimosa, chinaberry, Japanese barberry, to name a few of the many).
 - Keep in mind that a plant may be invasive even though it never spreads within your landscape. Pollen and/or seeds can be carried from your site by wind, water, and wildlife to suitable natural habitat, where they take hold.
 - Unwanted or alien plants that appear in a planting bed and choke or out-compete what was planted, or detract from desired aesthetics will need to be removed. Invasive alien species, state designated noxious weeds, and even aggressive native plants require control. Each situation will require identification and analysis of the vegetation. Fortunately, many resources are available to help (See “Tools and Resources for Element Three”).
 - English ivy, bigleaf and common periwinkle, and monkeygrass are some commonly used groundcovers. However, these species are aliens that are invasive in the landscape, so they should be avoided, and native alternatives selected instead. A groundcover can be any plant that would physically cover or hide the bare ground from view; it does not have to be evergreen or a single species. From a conservation landscaping perspective, any herbaceous native plant would make a good groundcover. There are native selections that will perform well where a low-growing, creeping, spreading, or clump-forming plant is most desired.
- **When disturbing an area take steps to prevent invasion of opportunistic alien plants by planting desirable native vegetation.** For example, in a new development, you can “armor the edge” by planting natives along the limit of disturbance. Or in a yard, if removing existing vegetation, think about what you want to occupy the space next.
- **Management is an ongoing process.** Over time, the following steps must re-occur on a regular basis:
 - Identify invasive plant problems;
 - Prioritize plant problems;
 - Implement removal according to priorities;

- Evaluate and revise your landscape plantings, add native plants where needed to fill gaps;
- Scout for missed problem plants and new infestations;
- Keep abreast of current information on invasive species and their control.

Tools and Resources for Element Three

Resources within Georgia

Georgia Coastal Plain Native Plant Alternatives to Invasive List

www.coastscapes.org

Georgia Exotic Pest Plant Council Georgia Invasive Plant List

<http://www.gaeppc.org/>

Georgia Plant Conservation Alliance

www.uga.edu/gpca

University of Georgia, Ecosystem Health and Invasive Species Program

<http://www.bugwood.org/> and <http://www.invasives.org/>

Resources Outside of Georgia

Invasive.org library of publications

<http://www.invasive.org/library/index.cfm>

Plant Conservation Alliance, Alien Plants Working Group, “Weeds Gone Wild” factsheets on many invasive species

www.nps.gov/plants/alien

National Invasive Species Council

www.invasivespecies.gov

Nonnative Invasive Plants of Southern Forests, USDA Forest Service

www.invasive.org/eastern/srs

Southeast Exotic Pest Plant Council Invasive Plant Manual

<http://www.invasive.org/eastern/eppc>

The Nature Conservancy Wildland Invasive Species Program

<http://tncweeds.ucdavis.edu>

The Nature Conservancy

www.nature.org/initiatives/invasivespecies

TNC's Bad Plants In Your Backyard Initiative

www.nature.org/initiatives/invasivespecies/features

Element Four. Conservation landscaping provides wildlife habitat.

A conservation landscape encourages native wildlife species that may include birds, butterflies, bees, spiders, fish, frogs, salamanders, snakes, and other animals. An animal's habitat is the particular type of area where it finds food, water, shelter and breeding or nesting space. Biodiversity – a wide variety of native plant and animal life – is critical to maintaining a healthy ecosystem.

The amount and quality of habitat for wildlife is declining across the landscape, for many reasons. First and foremost, conserve and protect existing wildlife habitat. Larger-scale habitat protection and restoration are most critical for conserving wildlife populations, so simply planting native plants is not the complete answer, but practicing conservation landscaping does contribute to overall restoration of the local environment. Creating conservation landscapes in residential yards, neighborhoods, parks; and businesses, schools, and municipal properties, etc., will help to increase available habitat for wildlife.



If we want our conservation landscapes to have the greatest ecological value for wildlife, we need to mimic natural plant groupings and incorporate features that provide as many habitat elements as possible. Develop landscaping that complements and links to existing natural areas. Providing a diversity of food sources and places for shelter or nesting, as well as any source of water, will help support a variety of enjoyable, beneficial wildlife.



Eastern bluebird (Sialia sialis)

The Value of Native Animal Species

The value of native wildlife in our lives cannot be understated. The history of our coastal region is inextricably linked to the value of its natural resources. The abundance of wildlife supported by a variety of habitats and landscapes within the vast watershed provides wealth to our way of life and our economy in many ways – from the seafood industry, to tourism, to local recreation. Currently, bird watching, wildlife viewing and nature photography represent the fastest growing segment of all wildlife-related

recreation. Whether or not nature is the primary focus of people’s activities, in periodic opinion surveys they still place high importance and intrinsic value on the presence of a diversity of plants and animals. Pollinators, such as bees, moths, butterflies, bats, flies, beetles, and hummingbirds, are critical to the continued survival of our native plant populations as well as our cultivated food crops. Protecting, conserving, and restoring our natural resources is a key factor in maintaining quality of life now and for future generations.



Praying mantis (Stagomantis Carolina) on Common buttonbush (Cephalanthus occidentalis)

Plants are one of the most important features of an animal’s habitat, because they often provide most, or even all of the animal’s habitat needs. Particular groupings of plant species (specific plant communities) make up the basis of the different habitat types. Animals in turn help plants to reproduce through dispersal of pollen, fruits or seeds. Consequently, plants and animals are interdependent and certain plants and animals are often found together.

Some animals must migrate to survive and will only be present during certain times of the year. Many animals’ food needs change throughout the seasons or depending on their stage of growth. Therefore, including a wide variety of food choices (native plants) in the landscape will provide for the changing needs of many animals.

Within a balanced landscape, native wildlife should

not pose a nuisance or hazard to humans, and humans should be able to live in harmony with the wildlife. Some native animals can be overabundant in some regions and may need to be discouraged in the landscape. Native animals can become nuisance wildlife due to various factors, particularly as a result of development pressures which alter habitat, food sources, or the presence of predators which would have kept populations in check. Feeding wildlife or leaving out garbage cans can attract animals such as squirrels, raccoons, or deer, which may become a nuisance situation in proximity to homes or other areas humans use.



Monarch butterfly on Solidago spp.

An **invasive animal species** is a species introduced outside of its native range that spreads rapidly (e.g., house sparrows, Norway rats, Asian tiger mosquitoes). Some invasive animals threaten native wildlife populations and/or cause destruction of habitat areas, while others pose human health risks.

How to Implement Element Four:

In order to improve the planned landscape so that a diversity of wildlife species can share it with us, we need to minimize lawn and improve vegetative structure (landscape with layers of plants), similar to what nature provides in wetlands, meadows, and forests. A conservation landscape can attract native wildlife based on wise choices and planning that will benefit the local environment as well as the homeowner. Conservation landscaping can be used to create corridors and transition zones for wildlife in a landscape otherwise fragmented by housing and shopping areas, roads, office buildings, and other development.

As conservation landscaping is planned, consider the following to benefit wildlife:

- **Provide food sources year round.** The leaves, stems, twigs, bark, flowers (nectar), seeds, fruits (nuts, berries, etc.) of native plants form the basis of the food needs for many animals. The food web is very complex. Some animals eat plants, while others eat insects or other animals, and some eat both. Providing the plants helps attract and provide various components of the web, supporting a diversity of species.
- **Include a water source.** Water is important to all living creatures, including insects, and is needed year-round for survival. Include water in landscape plants to benefit wildlife –whether a small bath, small lined pond, a large pond with a wetland edge, or anything in between.
- **Provide structure.** Use layers of plant types, heights, and arrangements mirroring nature to provide needed shelter from the elements and some nesting space important to many types of wildlife.
- **Supply cover.** Brush piles, rocky outcrops or walls, bramble patches, and hedgerows are features to consider including if the site is appropriate, as these provide protection from predators and other threats for a variety of wildlife.
- **Consider using alternatives to pesticides.** All life, including humans and pets, is susceptible to harm from pesticide use. For example, spraying to rid the yard of an insect pest can also kill butterflies and their larvae, birds eating affected insects can become ill, and the effects are magnified up the food chain. Choose safer options instead (the least toxic but still effective method).

Element Four Tools and Resources

Resources Within Georgia

CoastScapes Coastal Plain Native Plant Lists for Pollinators and Wildlife
www.coastscapes.org/

Georgia Department of Natural Resources, Wildlife Resources Division, Nongame Conservation Section, Protected Animals and Plants:

<http://www.georgiawildlife.com/conservation/georgia-animals-plants>

University of Georgia, Honey Bee Program (includes native pollinators):

<http://www.ent.uga.edu/bees/pollination/other-pollinating-bees.html>

U.S. Fish and Wildlife Service, Georgia Ecological Services, federally listed plant and animal species: <http://www.fws.gov/Athens/endangered.html>

Georgia Department of Natural Resources, Wildlife Resources Division, Nongame Conservation Section, State Wildlife Action Plan:

<http://www.georgiawildlife.com/conservation/wildlife-action-plan>

Resources Outside of Georgia

Audubon at Home, National Audubon Society

www.audubonhome.org/

Audubon Society Guide to Attracting Birds, Stephen Kress, Cornell Press

www.cornellpress.cornell.edu/kress/

Bringing Nature Home: How Native Plants Sustain Wildlife in Our Gardens, by Douglas Tallamy, 288 pages, Timber Press 2007. www.timberpress.com/books/isbn.cfm/97808881928549

National Wildlife Federation Backyard Habitat Program

www.nwf.org/backyard

North American Pollinator Protection Campaign

www.nappc.org

www.pollinator.org

Xerces Society (conservation of bees, butterflies and other invertebrates)

www.xerces.org

U.S. Department of Agriculture, Natural Resources Conservation Service, Backyard Conservation Program

www.nrcs.usda.gov/feature/backyard/

Element Five. Conservation landscaping promotes good air quality and is not a source of air pollution.

A conservation landscape promotes good air quality, and helps to prevent and filter air pollutants.

An environmentally-sound conservation landscape minimizes activities that directly create air pollution, promotes the use of trees and other plants that filter air pollutants, and eliminates or reduces the use of commercial products that are harmful or create polluting by-products.

Landscape tools that use petroleum for fuel produce pollutants responsible for poor air quality and create risks to human health and the environment. Through fuel combustion and evaporation processes, pollutants such as nitrogen oxides, sulfur dioxide, carbon dioxide, volatile organic compounds (VOCs), hydrocarbons, toxic chemicals, and particulate matter are released into the air. These pollutants contribute to the formation of ground-level ozone (also known as summertime smog) and regional haze, and to the deposition of nitrogen, acidic compounds, and mercury onto sensitive ecosystems. Air pollutants that deposit onto the land can then be carried by stormwater into local streams and rivers, affecting water quality and aquatic life.

The overuse or misapplication of commercial fertilizers and chemicals can directly and indirectly contribute to air pollution. For example, ammonia-based commercial fertilizers can release ammonia into the air. Ammonia can combine with other pollutants in the air and form fine particulate matter, which can impact human health and cause regional haze. Another example is the misapplication of pesticides which can contaminate downwind areas affecting people and pets. When it is windy, spraying should be avoided.

How to Implement Element Five:

- **Use adapted, non-invasive plants to reduce yard maintenance.** Site appropriate plants will require lower inputs of water, fertilizer, and chemicals, thereby reducing overall yard maintenance. This will reduce the need for gasoline-powered equipment such as lawn mowers, string trimmers, and leaf blowers.
- **Landscape to improve energy conservation.** Plant additional native trees and shrubs near building structures for heating, cooling and wind-protection benefits. This will reduce energy demand, and as a result less air pollution will be generated. Further, the cooler air under shade trees reduces the rate of chemical reactions that produce precursors to smog.
- **Landscape to improve air filtration.** Plants clean outdoor air by filtering out particles or absorbing gases through their stomata and cuticles. Plants can store pollutants or break them down into other compounds. The degradation of CO₂ (carbon dioxide) produces oxygen, which we need to breathe. Select native tree and plant species that are efficient in removing

pollutants from the air, including species with leaf sizes and shapes that will capture gases, dust, and fine particles. Larger, broader leaves and those with fine hairs have more surface area to collect particles. The ability of a plant leaf to absorb gaseous atmospheric pollutants is determined by conductance of the stomata, and is linked to the plant's genetics. There are varying degrees of resistance and susceptibility to pollution among plants. A good resource that provides information on tolerance of native species to urban conditions is *Native Trees, Shrubs, and Vines for Rural America: A Planting Design Manual for Environmental Designers* by Gary L. Hightshoe (1987, John Wiley and Sons).

Trees are most efficient at cleaning the air. This is especially true for CO₂ emissions whereby trees absorb CO₂ from the air, sequester (store) the carbon and release oxygen into the air. For example, one mature tree can remove 26 pounds of carbon dioxide from the atmosphere annually, equaling 11,000 miles of car emissions <http://www.ext.vt.edu/pubs/envirohort/426-721/426-721.html>. Many cities are looking into and employing "carbon offsets" – trying to counter the CO₂ produced as a result of human activities with the amount that tree plantings and forests can absorb. Using plants to clean the air and reduce the human-caused effects of air pollution is referred to as phytoremediation.

- **Decrease lawn area and reduce mowing time.** Create diverse habitats in your landscape, using native plants and trees and minimizing large expanses of lawn. This will reduce or eliminate the need to mow and spray. Small engines are big polluters. Less lawn means less time running a lawn mower. Plant and maintain your lawn according to the University of Georgia Cooperative Extension recommendations for your area. Use low-maintenance turf mixes that grow slowly and turf types that are adapted to your climate and the growing conditions in your yard.

Operating a typical four-horsepower gasoline powered lawnmower for one hour produces as much smog forming hydrocarbons as driving an average car almost 200 miles under averaged conditions. Gasoline-powered string trimmers are actually more polluting than lawn mowers (<http://www.louisvilleky.gov/APCD/lawncare>).

- **Use environmentally friendly yard equipment.** Replace old, polluting yard equipment with new, low or zero emission equipment. Recycle old equipment to prevent its continued use by others. Take it to a recycling center where it can be converted into raw material for use in cleaner equipment and other products. Ask your dealer about the new, cleaner gasoline equipment entering the market.
- **Maintain your equipment.** Change oil and clean or replace air filters regularly. Use the proper fuel/oil mixture in two stroke equipment. Tune up the engine, maintain sharp blades, and keep the underside of the mowing deck clean. Take time to properly winterize the equipment each fall.

- **Avoid spilling gasoline.** Even small gasoline spills evaporate and pollute the air. Use a gasoline container you can handle easily. Use a funnel and pour slowly and smoothly. If there is an ozone or unhealthy air advisory, do not fill or use gas-powered equipment. Keep the cap and vent hole on gasoline containers closed tightly. Transport and store gasoline-powered equipment out of direct sunlight and in a cool place. Replace your old gas cans with newer cans that have automatic shut-off, automatic closure, flow rate based on container capacity, and an anti-permeable lining that will control VOC emissions.
- **Consider cleaner options.** Electric equipment is cleaner than equipment powered by gasoline engines. Electrically-powered lawn and garden tools produce essentially no pollution from exhaust emissions or through fuel evaporation. However, even electric power tools use energy that was in many cases produced by the burning of fossil fuels, such as coal.
- **Use manual tools.** Tools that don't require electric or gasoline engines can be just as handy for small yards or small jobs. For your now smaller lawn areas, consider a reel mower which produces no pollution and provides a good source of aerobic exercise. Rakes and brooms won't bite; and minimizing the use of blowers will reduce the amount of airborne dust and noise you generate. Reducing the need for yard maintenance equipment helps reduce sources of noise pollution. Trees and shrubs in the landscape also help to filter out noise pollution.
- **Minimize the use of toxic pesticide sprays.** Use integrated pest management (IPM) techniques to prevent and control infestations. Use home-made controls (such as soapy water sprays for aphids) or commercially available organic controls to control insect and disease outbreaks.

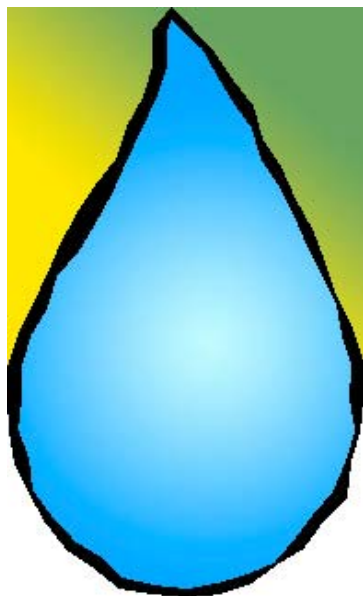


- **Little things add up.** Use and store yard chemicals and fertilizers appropriately to prevent evaporation or vaporization. Recycle or dispose of household and yard waste in approved landfill rather than burning. Keep common allergen-reproducing plants such as ragweed off your property. Keep soil covered with mulch and plant material to reduce dust. Consider planting tree species with low biogenic emissions.

Element Six. Conservation landscaping conserves water and promotes good water quality.

A conservation landscape conserves water and promotes good water quality.

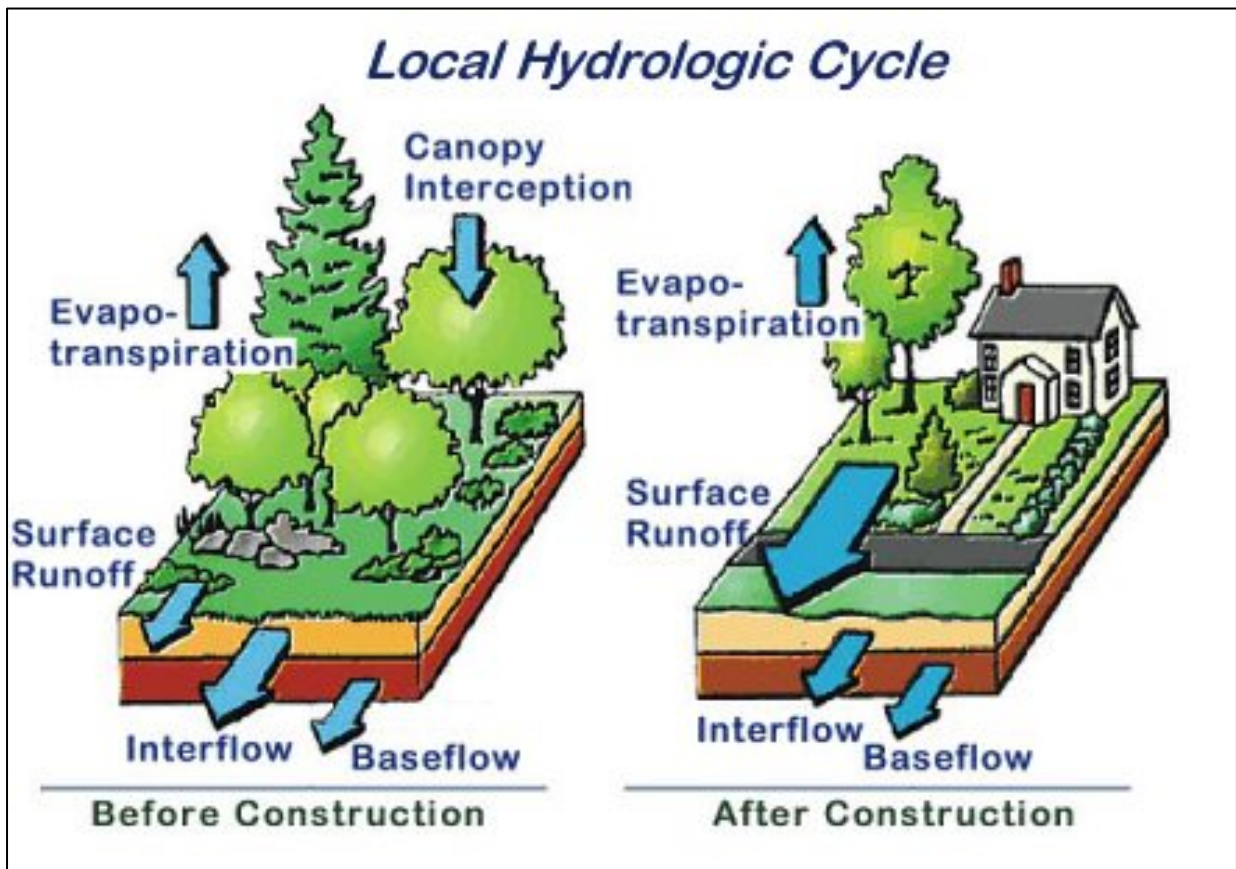
Water is a precious finite natural resource and an important component in our lives and landscapes. Without it, neither would be able to survive. Less than 1% of all the water in the world is available to us as fresh clean water. It is constantly recycled through the ground and in the air to provide us with a source of fresh water. Rainwater eventually becomes groundwater or surface water. By compacting soils and creating abundant paved surfaces, we have decreased entryways for rainwater to get back into the ground to complete the natural purifying cycle.



A conservation landscape preserves the natural water cycle and helps keep waterways clean in your local watershed. A watershed is all the land that drains after a rainfall to a particular body of water – a stream, river, pond, lake, marsh, or ocean. Rainwater running off the land carries with it chemicals, soil, plant debris, and other pollutants. Rainwater percolating into the land can also carry chemicals such as fertilizers, pesticides and other toxins. Healthy soils and landscapes allow rainwater to penetrate and help to filter out pollutants. So every piece of land has the ability to affect a waterway, whether it is above or below the ground. By using conservation landscaping techniques – which help to reduce pollutants in the landscape, reduce wastewater amounts, increase groundwater recharge and reduce water use – a homeowner can help keep waterways clean, and enjoy lower monthly water bills.

How to Implement Element Six:

The amount of water used to maintain a lawn or garden can be reduced by as much as two-thirds during summer months using conservation landscaping practices that focus on these key elements: timing, thoroughness, proper equipment, mulching, plant selection and water zoning.



- Select plants judiciously.** It is fundamental to reducing water use. When selecting plants for your landscape, choose those that are drought tolerant and adapted to your local weather conditions. Drought-tolerant species and those plants suited to existing soil moisture conditions will thrive once established with little or no supplemental watering. If the plant seems to require frequent watering, it's probably the wrong selection for that location. This is described more fully in the Element Two Section. Another example of conserving water through plant selection is to minimize the amount of lawn in the landscape. Lawns require more water, fertilizer and gas-powered mowing equipment than a planting of native plants.
- Create water zones.** Arrange landscape, lawn, and garden areas in zones according to water need ("xeriscaping"). High water-use plants are grouped close to the water source (such as the hose connection); medium water-use plants and lawn areas can be farther from the water source; low water-use plants, such as natives, can be on the perimeter of the property or farthest from the water source. Designing the landscape and selecting plants to suit specific site conditions will automatically reduce or eliminate

the need to use this zoning plan, as all plants would then need little or no watering. Keep in mind, however, that every plant needs some watering during the establishment period, so plan for access to a water source.

- **Timing is key.** Water plants and lawns only when they need it. Water the lawn only when it has shown signs of drought stress. A lawn will tell you when it needs watering; you have only to watch for the signs. When you walk across the grass and leave footprints that do not rapidly disappear, your lawn needs water. Then water thoroughly to provide a good soaking, and avoid watering during the heat of the day to minimize evaporation and possible wilting. Drought-stressed shrubs or perennials will wilt, or during severe drought leaves may drop, or turn yellow or brown and brittle. For some plants, if they were planted in the appropriate conditions and are well established, they may occasionally wilt slightly during the hottest part of the day, but this is a natural defense to conserve water, and they should perk back up as the sun shifts and the heat is reduced. If they remain wilted once the heat of the day has passed, they should be moved to a shadier, moister spot. Water during the coolest part of the day to avoid unnecessary evaporation. Early morning is generally best, but early evening is acceptable. Late evening watering can cause plants to stay wet all night, which encourages disease development. Watch the weather – no need to water if rainfall can do the job for you.
- **Water thoroughly.** Water sufficiently and deeply, but not too often. Thorough watering promotes stronger root systems, enabling plants to find below-surface water during drought or hot weather. Watering too lightly or too often harms plants by encouraging shallow root systems, which make landscape plants more vulnerable to temperature extremes and the damage caused by drought and disease. Sufficient water should be delivered to the depth of the plants' roots, average 6-10 inches deep. The time it takes to deliver the proper amount of water to the soil depends on the watering method, equipment, and soil type and moisture and weather conditions at the time watering. To determine an approximate delivery time, check the depth of soil moisture while watering, and adjust for future applications based on prevailing conditions. Also, when watering landscape plants, direct water to the base of the plant, not the leaves. Routinely watering the leaves waste water through evaporation.
- **Use proper watering equipment.** Use equipment that delivers water efficiently to where it is specifically needed. For lawns and some landscaping areas, sprinklers or sprinkler systems will water deeply and appropriately if timing guidelines are followed and the mechanisms are aimed correctly at the target (through overhead watering loses a lot of water to evaporation and wind drift); automatic systems should be set to detect moisture and bypass watering (or be turned off) if it rains. Soaker hoses can be used for

shrubs and perennial beds to deliver deep watering over a few hours. Drip irrigation – which sends water straight to plants’ roots with virtually no loss to evaporation – is the most efficient way to thoroughly water shrubs, flower beds, vegetable gardens and containers.

- **Mulch properly.** One of the many benefits of organic mulch is retaining soil moisture by reducing competition with weeds, shading the soil, and improving soil structure. This soil moisture can reduce the need for watering landscape plants as frequently as unmulched plants. The depth of mulch is variable, depending on the type of soil and plants growing there. Mulch should not be piled up around plants so water runs off instead of penetrating the soil.
- **Give it a break.** Warm season grasses naturally slow down their growth as temperatures decrease. Allow these warm-season grasses to go through their normal dormancy. Dormant lawn grass may turn brown. While this requires a change in aesthetic expectations, it will save significant water and will not harm the grass. The lawn will green up once spring brings warmer weather and more rain.
- **Retain and re-use rainwater runoff.** Additional water conservation can be achieved through various green infrastructure stormwater management practices. Reducing storm flow from the site prevents a surge of polluted runoff from entering local waterways. The following measures are some of the many ways that water can be slowed, retained, and used onsite:
 - **Reduce impervious surfaces** – prevent compaction for parking, driveways, and sidewalks by using alternative pervious surfaces (e.g., pavers) which allow water to penetrate;
 - **Encourage infiltration and avoid concentrating stormwater flows:**
 - Replace a portion of lawn with landscaped areas;
 - Refrain from clearing out trees and underbrush, especially on slopes, as the vegetation helps to slow runoff, allowing time for better absorption into the soil; plant native vegetation where stabilizing plants don’t exist;
 - A path on a slope should curve or meander instead of heading straight down, as the latter will create a “raceway” for water and contribute to the slope’s erosion.
 - Lengthen stormwater flow paths, providing long swales to carry rainwater from a site. Vegetation such as native grasses in the swale helps to slow and filter runoff.



- **Spread it out!** Redirect runoff to multiple collection points onsite and distribute the water judiciously into the landscape;
 - Install rain gardens which are depressional areas designed to retain rainwater for no longer than 48 hours, and planted with native plants that tolerate periodic flooding. These “bioretention” areas do not need to be large (compared to regular stormwater basins) and are an aesthetically appealing as “typical” landscaping beds. Rain gardens of any size are helpful. They provide a place to treat runoff onsite – pollutants settle out and sediment is trapped in the basin and excess nutrients are used up by the plants – and slowly release cleaner water.



- Direct downspouts, drains, sump discharges, and runoff from paved driveways, sidewalks, and patios into landscaped areas onsite. Do not direct runoff or any wastewater drainage

offsite into a neighbor’s property or public right of way.

- Use a rain barrel to capture rainwater from downspouts and use it later for watering plants.
- **Plant a green roof to help absorb and use rainwater.** Green roofs are partially or completely covered with plants specifically suited to growing in shallow soil, full sun and droughty conditions. They benefit the environment by increasing surface area for collecting and using rainwater, removing nitrogen pollution in rain, neutralizing acid rain effect, and providing songbird habitat. They also reduce city “heat island” effect, carbon dioxide impact, summer air conditioning cost, winter heat demand, stormwater runoff and noise.

Element Six Tools and Resources

Coastal Stormwater Supplement to the Georgia Stormwater Management Manual (CSS) and CSS Model Ordinance

<http://www.gaepd.org/Documents/CoastalStormwaterSupplement.html>

CoastScapes Conservation Landscaping Program: University of Georgia Marine Extension Service, www.coastscapes.org

GADNR Environmental Protection Division/WaterSmart Program
<http://www.conservewatergeorgia.net/documents/waterSmart.html>

Green Growth Guidelines
<http://crd.dnr.state.ga.us/Assets/Documents/green%20growth%20cover.pdf>

Model Landscape Ordinance Promoting Water Conservation and the Use and Preservation of Appropriate Native Vegetation for the Coastal Plain of Georgia. University of Georgia, Coastal Sustainable Communities and CoastScapes Conservation Landscaping Program:
www.coastscapes.org

Element Seven. Conservation landscaping promotes healthy soils, composts plant waste on site, and amends disturbed soils to encourage native plant communities.

A conservation landscape protects and maintains healthy soils and amends disturbed soils to encourage native plant communities.

Healthy plants begin with healthy soil. Soil contains a complex balance of minerals, water, air and organic material (including living organisms). Soil support plant roots and supply nutrients, oxygen and water. The structure and composition of the soil – the size and proportion of soil particles and the amount of organic material – affects how well the soil does these jobs. Large particles, such as sand, help soil drain quickly, but do not store water or nutrients for plants. Small particles, such as clay and silt, hold nutrients and water well, but drain poorly and clay is hard to dig. Organic materials in the soil hold water, improve soil structure, nourish plants and support the living organisms that keep the soil loose and fertile, and help plants fight pests and disease. Loamy soils with a balance of sand, silt and clay-plus organic matter are generally loose, well-drained, and are able to store moisture and nutrients for plants. A loamy soil structure provides channels through which water and air can filter to greater depths. Air and water are of course essential; ideally they make up about half of the volume of soil.



Soil composition varies considerably within a region and will support different plant and animal communities. Some soils are particularly unique and support unusual or rare plant and animal communities. Native soils require thousands of years to evolve and can be destroyed in a moment. Native soils are as endangered in the modern landscape as are native plants and wildlife. Disturbances to soil can result in a breakdown of soil structure and an imbalance of plant and animal communities. These disturbances may include compaction by heavy equipment or foot traffic, changes in nutrient cycling and pH from runoff and air deposition, removal of topsoil, erosion, and plowing. Thus, a cornerstone of conservation landscaping is the proper protection and ongoing care of the soil.

How to Implement Essential Element Seven:

Soil Conservation Before and During Building Construction

Perhaps the greatest opportunities to protect native soils occur prior to and during building construction. Construction impacts soil in a myriad of ways. Natural soils are directly impacted as they are bulldozed, regarded, and paved over; topsoil can erode or become compacted or even be stripped from the site and sold. Conservation landscaping sensitivity during construction can protect the topsoil and native plant material through these important considerations:

- **Take measures to minimize grading damage.** Topsoil is a valuable resource, yet it is often damaged by grading during building construction. Design for minimum building and hardscape footprints and little or no grading. Make an explicit written agreement with grading contractors that topsoil is to remain onsite.
- **Store topsoil during construction.** Setting aside topsoil to be reapplied after construction is an option. Identify areas that will ultimately be paved as a place to store topsoil during construction. Store topsoil in piles no larger than six feet to avoid suffocating the important soil organisms and protect the piles from erosion. Topsoil stored during construction should be mixed with compost – one cubic yard of compost into 3-5 cubic yards of topsoil – before respreading.
- **Prevent compaction.** Air spaces in soil are important for plant health, soil organisms, and water infiltration and activities that compress the air spaces out of soil must be avoided. Compaction causes damage that can take years or decades to recover; and it can be fatal to older trees at a construction site. Activities that cause soil compaction include grading, heaving equipment use during construction, heavy foot traffic, and parking.
- **Minimize the effect of vehicles and foot traffic during construction.** Before construction begins, designate parking areas away from trees and other planting areas. During construction, direct vehicle driving routes away from areas to be planted. Locate walkways in the most direct, convenient path so people don't create their own. Use plywood or a six-inch layer of bark mulch as a soil cushion (remove after work is completed). Avoid working with wet soil or during rain events.

- **Protect existing trees and their root zones during construction.** Install temporary fencing to keep construction activity from compacting the soil surrounding trees. At minimum, protect the area inside the drip line – the vertical line projected downward from the outermost edge of a tree’s crown or canopy of the tree. Store equipment and materials elsewhere – areas that will be paved or built over are good sites for parking equipment. If spreading soil during construction, do not bury roots of existing trees and shrubs under more than two inches of added soil.
- **Prevent erosion.** Soil washed from a site by erosion is a wasted resource. As it enters local water bodies it carries with it pollutants, clouds the water, and can be damaging to aquatic resources. During construction, and to the fullest extent possible, cover bare ground with organic mulch or biodegradable geotextile fabric. Bare ground on steep slopes, near waterways, and soils that are easily eroded are of special concern. Of course, plants stabilize soil and combat erosion, so plant as soon as possible. While larger trees and shrubs become established, various stabilization methods can be used: short-lived perennials such as black-eyed Susans or annual ryegrass can be used to fill in areas temporarily; any herbaceous plants can be installed, keeping in mind that they may become shaded out once trees mature. Applications of mulch may continue to be necessary to cover the soil until plants are well established.

Soil Care After Construction or in an Established Yard:

Ultimately your soil management program must respond to your existing site conditions. Conservation landscaping stresses working with existing conditions rather than trying to bend the site to suit desired plants. If you are fortunate, the topsoil wasn’t stripped from your site or severely compacted during building construction. But some sites with extreme soil conditions may require altering in order to reestablish a healthy soil. Such conditions would include compaction, low organic content, pH less than 4.5 (highly acidic) or greater than 8.0 (very basic), topsoil has been removed, etc. A basic soil test will provide critical information on soil composition, pH and natural fertility. Amend soil only when existing conditions are severely limiting. If necessary, steps can be taken to reestablish a healthy soil

- **If the soil is compacted, then it needs improvement.** As a basic test, if you cannot poke a screwdriver into the soil without some effort, then it is compacted and requires some level of aeration. The easiest way to improve the soil is to add leaf mulch annually as a top dressing, and allow the natural processes of soil organisms to aerate the soil. Core aeration, rototilling, plowing, turning with shovels, or breaking the soil with a fork will reintroduce spaces for movement of

water, oxygen, roots, and soil organisms. Choose first the least intrusive measure for aerating. For any method, organic matter will need to be added to improve the soil structure (see below). If improving the compacted condition is not possible, then raised planting beds are an alternative. Mechanical aeration such as tilling or double digging, if needed, should be done only in the year the planting bed is to be established – it does not need to be done annually, and in fact, over tilling is detrimental to the soil. You may want to see out separate guidelines for farming or vegetable gardening soil improvements, as these activities require more intervention than recommended for conservation landscaping.

- **Do not till, if the soil is not compacted.** If you can slip a screwdriver easily into the soil, then it is not compacted and therefore does not need tilling. Although tilling can result in an immediate increase in air spaces, these cavities are not sustainable. Over the long term, tilling destroys soil structure and causes compaction. Tilling also accelerates the loss of soil organic material through decomposition. Soil organic material is critical to soil structure, soil organisms, and soil fertility. Tilling leaves the soil bare and susceptible to erosion, and brings weeds and other buried seeds to the surface where they will sprout. There are instances where tiling or another measure for aeration is appropriate, such as establishing a new planting bed.
- **Add organic matter where it is lacking.** In many landscapes, particularly around new construction, it may be necessary to add organic matter such as mature compost, composted manure, or leaf mold to rebuild soil structure. For soils that are extremely sandy, the organic material will help improve moisture retention and hold soil particles together better; in the more northern areas where you may have extremely clayey soils, it will help break up the clay and allow water and nutrients to move through the soil. The quantity and type to use depends on the existing soil and plans for landscaping. Consult with the local UGA Cooperative Extension Service office for recommendations.
- **Import soil as a last resort.** If there is little or no topsoil in which to plant for successful growth, consider bringing in soil from elsewhere. Keep in mind that you may be bringing in a source of undesirable weeds or invasive plants. Imported soil must be carefully selected to ensure good quality – this cannot be overstressed! Choose a reliable, knowledgeable source (for large site construction, the provider must certify that the soil is weed and contaminant free). Inspect the soil before purchasing or accepting it. It should have good structure, friable (loose, crumbly) texture, an earthy smell, a brown (not gray or black) color, and it should be free of debris. Have the soil tested as you would

test soil onsite, for its type or content (sand, loam, and clay), pH, nutrients, organic matter, etc., and choose soil that best matches the soil at the site. The new soil should be lightly worked into the surface of the existing soil.

Ongoing Soil Maintenance in the Conservation Landscape:

“Traditional” landscaping practices may base soil preparation on soil test results which describe how to change or amend the soil to make it appropriate for crop production (including ornamental plants). Conservation landscaping by contrast focuses on working with the existing soil conditions and choosing plants that will thrive in the site conditions, with little or no intervention. Amendments are necessary where soil disturbances or extreme conditions severely limit native plant selection.

- **Choose native plants suited for the existing soil conditions.** Native plants have co-evolved with native soils, and are perfectly adapted to grow in these soils without amendment. The best way to conserve a native soil is to keep it covered with native vegetation. There is a wide selection of native plants that will thrive in sites with conditions most “traditional” gardeners would cringe at – hot, dry, sandy, acidic, nutrient-poor. Do not alter soil conditions to feature specific plants in a soil that would otherwise not support them. It is simpler and more sustainable and economical to simply use natives that are adapted to the ambient conditions. Exceptions, to some degree, may need to be made for turf areas and vegetable or cut flower gardens.
- **Change the pH only if absolutely necessary.** For conservation landscaping, a pH anywhere in the range of 4.5 to 8.0 can support a wide range of native plants. A soil test will reveal the pH of your soil and guide your plant selection. If the soil test reveals a pH that is so extreme that it severely limits plant selection, then the soil can be altered by adding appropriate amounts of limestone to raise pH or elemental sulfur to lower it. Compost also helps to ameliorate pH extremes. The soil test results will provide the appropriate recommendations for changing the pH, but this will likely not be necessary for most of your conservation landscape (only for extreme conditions). You may need to manage the pH in a vegetable garden, where the ideal pH for fertile soil is 6.5 to 7.0 (neutral). After applying amendments, it is important to test the soil again before finalizing the planting plan. Remember the soil pH will not change overnight, but may need testing and further amending in future years. Re-test the soil every 3-5 years and adjust accordingly.

- **Limit fertilization.** Conservation landscapes that use native plants suited to the existing soil conditions are self-sustaining and do not benefit from fertilization. Small lawns and vegetable or cut flower gardens may require some fertilization, depending on the needs of the soil compared to the requirements of the plants to be grown. For these areas, test the soil to determine what nutrients are lacking and apply amendments accordingly. In some older neighborhoods, decades of lawn over-fertilization have caused phosphorus to build up in soils making further applications unnecessary. In any case, applying excess fertilizer can be bad for plants and soil life, wastes money, and leads to water pollution. Too much fertilizer results in weak and tender plants that are especially appetizing to pests. Nitrogen that cannot be used by the plants leaches into groundwater or winds up in runoff, and excess phosphorus can be carried away with eroding soils. It is also important to fertilize at the appropriate time. Re-test the soil every 3-5 years and adjust accordingly. For more information on proper timing and amounts of fertilization, consult a UGA Cooperative Extension specialist.
- **Conservation landscapes recycle organic materials onsite.** Whenever possible, use organic material from the site itself such as fallen leaves and needles from trees onsite. This debris is part of the natural process of decomposition that is important to the soil and the needs of those trees. If mulch must be brought in, purchase from a reputable or known source to be sure of the quality of the material. Some mulches, particularly those that are dyed (red, black, other colors), contain shredded material from old wooden pallets, discarded furniture, demolished buildings, or lumber scraps. These are not appropriate quality to use with plants because they may contain toxins, nails, and other debris. Mulch applied for weed prevention needs to be free of weed seeds, an occasional problem with free mulches, such as from community leaf collection or composting programs. Do not use peat moss or cypress mulch. Peat mulch is mined from living bogs and is not a renewable resource. Cypress mulch is collected from wetland trees, greatly impacting the wetland, and is not a renewable resource.
- **Use mulch judiciously.** The use of mulch can be desirable in landscaping beds and vegetable gardens to help prevent weed growth, retain soil moisture, and encourage soil structure to develop over time. Soil surfaces should be covered with mulch, organic debris, or a dense cover of plants at all times to prevent erosion and control weed growth. However, excessive use of organic matter is discouraged because it contains nutrients and organic compounds that will become part of the site runoff, causing water

pollution. Symptoms of excess organic material include unusual height, breadth, and falling over. Some native plants require less fertile soil conditions and compost may not be necessary. Soil that is too rich also promotes weed growth.

- **Determine the appropriate type of mulch to use.** The type of mulch used needs to be appropriate to the requirements of the plants in the landscape. An acid mulch, such as pine needles or bark, would be appropriate for plants that prefer acidic soils but would be damaging to plants that require more basic conditions. Hardwood bark mulch (pH 7.0 – 8.0) may be used for newly installed landscaping or plants that require basic conditions. For annual (or as needed) mulching, larger particle size mulches (wood chips or bark nuggets) will last longer in your landscape, but may be more susceptible to wash out. Smaller particle size mulches (shredded bark/wood/leaves or pine needles) will be more resistant to wash out. Wood chips or bark can be excellent choices for lining garden paths, and will promote beneficial fungi and microorganisms that will help nourish native woodland plants.
- **Determine the appropriate amount of mulch to use.** To figure out how much organic material a plants species needs, take a look at the plant's natural habitat. Native plants that thrive best in rich, organic soils will require more mulch. Many woodland species and wetland species appreciate organic matter, whereas plants native to dunes, steep slopes and dry meadows do best in lean soils, so they require less mulch. In any case, the depth of mulch around plants should not exceed 2-3 inches, and it should be cleared from direct contact with plant stems, trunks, or bark. To calculate the quantity of mulch needed, use the information provided below:

HOW TO CALCULATE THE AMOUNT OF MULCH NEEDED:

(Or, amount of topsoil for filling an undesirable depression or creating a raised bed)

The volume is measured in cubic yards (CY) = # cubic feet ÷ 27

Cubic feet (ft³) = square feet (*) x feet (ft) [* square feet: Sq Ft, SF, or ft²]

Planting Area (SF) x (Depth in feet) = # CY

27

Depth for mulch is a matter of inches, but it needs to be converted to feet for the calculation:

One (1) inch deep = 1 ÷ 12 = 0.083 ft

Two (2) inch deep = 2 ÷ 12 = 0.16 ft

Three (3) inch deep = 3 ÷ 12 = 0.25 ft

To calculate **soil volume for a raised mound**, use the desired height:

Eight (8) inches high = 8 ÷ 12 = 0.6 feet..... and so on.

If not using bulk mulch, then determine the appropriate number of bags of mulch

Tools and Resources for Element Seven

“Don’t Treat Soil Like Dirt,” Ecological Landscaping Association

<http://www.ecolandscaing.org/newsletter.html>

Ecological Landscaping Association’s Guide to Healthy Landscapes “From the Ground Up: Site and Soil Preparation,” Volume One, 2003

<http://www.ecolandscaping.org/guide.html>

Nutrient Management in Your Backyard

<http://www.nrcs.usda.gov/FEATURE/backyard/nutmgt.html>

Sustainable Sites Initiative

www.sustainablesites.org

Element Eight. Conservation landscaping works with nature to be more sustainable with less input.

A conservation landscape is managed and maintained in a way that requires fewer inputs, works with nature and promotes or works toward sustainability.

How we all live on the land is important, so how each of us manages our property is important to all of us. How you manage your landscape can have an important impact on the health of our coastal environment. Embrace that responsibility; be a guardian of your property. Your landscape may be the one piece of land you have full opportunity to manage well, and millions of Americans rate gardening as one of their favorite forms of recreation. So, we invite you to enjoy yourself in your yard as you apply the principles of conservation landscaping.

The rewards of a well-maintained conservation landscape are many. It reflects positively on its owner. It beautifies the home and neighborhood. It affords a comfortable place to entertain, and offers a place for relaxation. Most importantly, it provides and promotes a safe environment for our use and enjoyment.

Nothing worth having comes for free, and no conservation landscaping happens without some work. But conservation landscaping doesn't have to require more time than you already spend on your yard work. Setting up an endless cycle of continual human intervention wastes time and uses up resources. Furthermore, intensive maintenance practices such as over-use of chemical pesticides and herbicides, excessive or poorly timed watering, and frequent mowing and trimming tend to be environmentally damaging. To reduce the need for intensive maintenance, develop a site management program that works with natural processes, recycles resources onsite, and achieves a self-sustaining landscape.

How to Implement Essential Element Eight:

Reduce Your Waste Stream:

Prevent fertilizer, pesticides, yard debris, and pet waste from entering the waste stream or becoming pollution in your local waterways. Reduce, Reuse and Recycle are watchwords in conservation landscaping. Reducing waste starts with not generating it in the first place.

- **Select the right plant for the right place.** Plants suited to the site conditions will thrive and are less susceptible to disease and pests. Carefully chosen plants, placed where they can grow to their natural size and shape, are more attractive and healthier.
- **Prune selectively to complement the natural form and strengthen the structure of your plants.** Selective pruning avoids unnecessary plant debris. Watering and fertilizing wisely prevents rampant plant growth that weakens the plants and generates plant waste. Especially don't over water or over fertilize your lawn only to have to mow more frequently.
- **Practice grass cycling.** When mowing your lawn, cut the grass at the highest setting and allow the clippings to filter down into the turf as a natural fertilizer.
- **Compost plant and grass trimmings, leaves, and other organic material.** Use the compost as mulch or natural fertilizer to improve soil structure and fertility. So, build a compost pile or participate in local yard waste collection programs to keep plant material out of local landfills. Dumping yard waste off site is discouraged!
- **Get creative in your material use.** Material use is another important consideration in conservation landscaping. Using recycled content, salvaged, durable or local materials conserves resources and reduces the amount of embodied energy that is consumed by the landscape.
- **Water wisely.** Over-watering wastes resources, is not good for the lawn or garden, and the wastewater leaving the site spreads pollutants to other sites and to waterways.

Manage Garden Pests with Integrated pest Management (IPM)

The ability to identify specific pest or disease problems and treat them effectively is key to maintaining a healthy landscape. Pesticides, herbicides, and fungicides are toxic and can pollute groundwater and nearby waterways, and harm wildlife, pets, and family members. To keep your landscape safe and healthy for your family's enjoyment, practice integrated pest management (IPM). IPM offers an ecological approach to controlling pests and diseases. For more information on IPM, visit the links at the end of this section.

- **Monitor regularly for signs of plant problems and insect pests.** Apply controls before pest or disease problems get out of hand. Obviously, it is critical to know the pest; contact your local UGA Cooperative Extension specialist for help identifying the pest before choosing a control method.

- **Pesticides should not be used routinely or indiscriminately.** It is unrealistic to expect a totally pest- and disease-free landscape. IPM advocates the tolerance of occasional minor pest outbreaks wherever possible. Recognize that some plant damage is okay and will likely not affect the long-term health of the plant.
- **When control is necessary, use the least toxic methods of pest control first.** Hand



picking insect pests and diseased leaves off plants will often be sufficient. Removing weeds when they are young and tender requires less effort. Insect traps and weed barriers are non-toxic control options. When necessary, use environmentally friendly and/or organic pesticides such as horticultural oils and soaps, *Bacillus thuringiensis* (Bt), and botanical insecticides whenever possible. Other pest prevention ideas include removing plant debris and diseased plants to prevent the spread of disease from one season to the next; choosing resistant varieties of plants, especially

local native plants; and planting plants (such as members of the mint and aster families) that attract beneficial insects to the garden.

Beneficial insect: praying mantis

- **Use pesticides ONLY when and where they are absolutely needed and only as instructed on the label.** Choose the least toxic pesticide for your particular use. Before using pesticides or fertilizers, read and follow the label. The label is the law! Dispose of unused pesticides and fertilizers through local hazardous waste recycling programs. And, by all means, keep pets and children away from pesticide treated areas. Remember, it is poison!

Controlling Undesirable Vegetation:

A “weed” can be any plant that is out of place, growing where it doesn’t “belong” ecologically speaking, or where it is not wanted in landscaping. Some tolerance for weeds helps to reduce the tendency to over manage the landscape. Furthermore, the prevalent human preference for “tidiness” in the landscape is contributing to a reduction in our regional biodiversity.

Developing an understanding of plant values and allowing some areas to remain “naturalized”

as appropriate will help to remove the stress to our natural resources. Many native species that some people consider “weeds” are important to the survival of insects (including pollinators) and other wildlife.

However, there are certainly situations where vegetation removal or control is necessary. Unwanted plants that volunteer in a planting bed and outcompete what was planted, or detract from desired aesthetics, will need to be removed. Aggressive and invasive plants (especially Georgia Exotic Pest Plant Council designated invasive) will require control. When removing vegetation, choose the method that will have the least negative effects on the soil, plants, animals, local water or air quality, and people.

- **Manual plant removal:**

- Pulling is advisable for small, manageable situations. Be sure to remove as much of the roots as possible. Gloves and protective clothing help prevent skin rash, irritation, or injury from many types of plants.
- Smothering or solarizing plants and seeds with materials such as layers of paper, heavy mulch, fabric, or black plastic is an environmentally sound option that requires time – possibly several weeks. Solarizing must be done in the heat of summer and requires soil moisture for success. Dead vegetation will need to be removed by raking or allowed to decompose fully into the soil. Solarizing will not effectively control plants with aggressive root systems.

- **Mechanical plant removal:**

- Use hand tools such as shovels, cultivators, hoes, and weed-pulling devices to remove entire plants. Propane torches or steam may be used for spot-treating individual plants or small areas. Fire protection measures and permits are necessary for flame use. Burning is not suitable for poison ivy as it spreads toxic fumes.
- Use machinery to mow or cut vegetation to prevent seeding and vegetative spread such as by rhizomes or vines. For some plants, cutting only multiples their sprouting, so proper plant identification and information are important to successful removal. Some woody plants can be removed with one cutting. Other plants, particularly herbaceous species, will require repeated cutting and may need complete removal by other means.
- Shallow tilling, while not promoted because of its ability to destroy soil structure and contribute to compaction, may be prescribed to eradicate weed seeds present in the soil, particularly to prepare a site for lawn or meadow seeding. A program of repeated tilling, or alternative tilling and herbiciding, may be needed.

Shallow tilling means a maximum depth of one to two inches. Remember that tilling is a disturbance which brings weeds to the surface where they will grow, so it can increase the weed problem if not done repeatedly to fully eradicate weeds.

- **Chemical control:**

In an IPM program, chemical measures may be a last resort, and organic alternatives such as corn gluten products or natural acetic acids are encouraged when appropriate. For large areas impacted by invasive species, the application of herbicides is better than the long term negative effects of the invasive plants.

Do your homework before using any chemical. Check the manufacturer's website for specific information on contents, safety and use; consider side effects to non-target plant species, children, adults with chemical sensitivity, pets, and wildlife including insects and aquatic life; determine the chemical's effectiveness and specificity for the plant(s) to be controlled, application method and timing of application, and its breakdown time or persistence in the soil. For specific advice, it is best to consult a weed specialist through the state or local agriculture department.

- **General considerations:**

Minimize soil disturbance, as it invites more weeds. Prevent further spread by cleaning seeds and root material from clothing and equipment prior to moving to another site. Do not compost weeds or chemically treated vegetation. Bag invasives and dispose in a landfill so they; will not sprout or spread seeds.

Conserve Energy:

With the use of mowers, blowers, weed whips and saws, chemical fertilizers and pesticides, conventional landscape maintenance tends to be very consumptive of fossil fuels. The need to conserve energy is as important in conservation landscaping as the need to conserve water.

- **Well placed trees can reduce energy use in buildings.** When properly placed, mature trees can reduce the interior temperature of a building by as much as 20 degrees, reducing summer cooling costs by 25-40%. Select and place trees to shade adjacent buildings in the summer or protect them from prevailing winter winds. It is also helpful to shade your air conditioner and paved areas. Plant trees to the west and southwest of

a building for maximum shading benefit. Avoid planting trees that block solar collectors or in front of south facing windows that allow the low winter sun to warm a home. Large deciduous trees will be of greater value for summer cooling and winter solar gain. Select native evergreen trees for windbreaks, and plant them on the north and west sides of your property where they will shield your home from chilling winter winds.

- **Reduce the amount of lawn in your landscape.** Lawn mowing is easily the most energy consumptive routine landscape maintenance practice. So the unavoidable fact is that reducing the amount of your landscape that is lawn is an important step toward reducing energy consumption. Keep enough lawn for your specific recreational or aesthetic needs and convert the rest to more environmentally friendly plantings. Lawns also provide relatively little habitat or food value for wildlife.
- **Choose and maintain your garden equipment with energy conservation in mind.** When using machinery, choose the smallest, most fuel efficient, lowest emission machinery required to get the job done. Use hand powered equipment whenever possible. Electric garden tools using energy produce in regulated power plants is inherently less polluting than small gas powered equipment. While they tend to be less powerful, they are more than adequate to the task for most small landscape settings.
- **Use recycled materials and avoid petroleum-based products, including synthetic fertilizers.** Remember, recycling plant debris on site will minimize fuel consumption for creating man-made products. What's more, buying local products reduces the hidden environmental costs of transporting materials, such as pollution and energy consumption.

Tell Your Neighbors About It!

Chances are good your neighbors will be curious about your conservation landscaping activities, especially as your yard takes on some new characteristics. Their curiosity is an opportunity. Tell them about it. You can help educate them about your process of creating a coastal Georgia conservation landscape! Ideally, your conservation landscape will become an example that encourages other members of the community to follow suit, and conservation landscapes are even more effective when they occur in groups or corridors. The more people that know about conservation landscaping the better! There is strength in numbers. Spread the word!

In addition, coastal Georgia communities have the opportunity to really make a difference by adopting a coastal model ordinance for water conservation and use and preservation of native plants that is now available. Check out the resources at the end of this section.

Tools and Resources for Element Eight

Conservation Landscaping Programs:

CoastScapes Conservation Landscaping Program: University of Georgia Marine Extension Service, www.coastscapes.org

Audubon at Home, National Audubon Society: www.audubonathome.org

Backyard Conservation, USDA Natural Resources Conservation Service:
www.nrcs.usda.gov/feature/backyard/

The Green Gardener's Guide: Simple, Significant Actions to Protect and Preserve Our Planet, by Joe Lamp'l. 2007. 363 pp. Cool Spring Press, Franklin, Tennessee.

Conservation Landscaping Model Ordinances:

Model Landscape Ordinance Promoting Water Conservation and the Use and Preservation of Appropriate Native Vegetation for the Coastal Plain of Georgia. University of Georgia, Coastal Sustainable Communities and CoastScapes Conservation Landscaping Program:
www.coastscapes.org

Integrated Pest Management:

National IPM Center
<http://northeastipm.org/whatis.cfm>

U.S. Environmental Protection Agency IPM Principles
www.epa.gov/pesticides/factsheets/ipm.htm

Other Coastal Georgia Sustainable Development Tools that Support Conservation Landscaping:

Coastal Georgia Riparian Buffer Restoration Guidelines
www.coastscapes.org

Coastal Stormwater Supplement to the Georgia Stormwater Management Manual
<http://www.gaepd.org/Documents/CoastalStormwaterSupplement.html>

GADNR Environmental Protection Division/WaterSmart Program

<http://www.conservewatergeorgia.net/documents/waterSmart.html>

Green Growth Guidelines

<http://crd.dnr.state.ga.us/Assets/Documents/green%20growth%20cover.pdf>