

Sustainable Landscaping for Water Quality

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A great majority of plant culture (gardening) in the United States is devoted to growing ornamentals and turf. According to a survey conducted by National Geographic in 1995, ninety million households in the US are involved in some form of gardening. Every gardener is a landscape manager, even if they don't know it. These homeowners on a cumulative level pose a considerable threat to natural functioning ecosystems, such as through the overuse of pesticides and fertilizers that can affect the water quality in nearby ground and surface water areas. In Connecticut, this has been documented by a number of studies showing high levels of pesticides and nutrients, primarily nitrates, leaching into drinking water wells and flowing into rivers that enter Long Island Sound.

America's landscaping and gardening tradition, as well as suburban land development, has increasingly impacted remaining natural ecosystems. Actions to reconnect as many plants and animal species as possible and to rebuild suburban ecosystems requires restoring the ecology of our own backyards. Sustainable landscape techniques and practices are systems of gardening that use many of the principles that natural ecosystems utilize.

Sustainable landscaping is about reducing waste, energy and materials. It is about thinking and observation. Its purpose is to design and create systems that imitate nature and turn the problems into solutions. Because threats to suburban ecosystems are increasing, there is a critical need for identification and monitoring of ecosystems both locally and globally for their preservation. As gardeners, each of us can make changes in our own backyards. Together, millions of households doing similar things can have a very positive effect.

Steps to Developing a Sustainable Landscape

There are three major considerations when developing a sustainable landscape – *site design, plant selection, and landscape management*.

I. Site Design

Overall design of the property is a critical first step in creating a sustainable landscape. As you look at your site, consider both the existing natural features, as well as how you would like to use the property and your time commitment to management. It is important to work with what you have in the landscape, including the existing topography which affects the flow of water across the site, soil moisture content of the soil, soil type and sun exposure (north/south, shady/sunny, etc.). Pay particular attention to protecting water quality.

a. Work with the hydrology instead of altering it

Landscape design should allow off-site runoff to move across the property without damaging the site or adding pollution to the runoff. Integrate the hydrology of the area into the landscape plan by using the following:

Maintain natural vegetation or riparian buffers around surface water edges and wetlands. Limit the areas that are maintained for access and view where possible.

Ensure developed areas drain to well-vegetated zones, never directly to a stream or storm sewer.

Use small on-site detention basins to hold water to increase infiltration or slow rapid runoff.

b. Manage runoff and pollution from impervious surfaces

Driveways, sidewalks, and gutters need not drain to the pavement – they can drain into a well-vegetated area by appropriately sloping, crowning, or redirecting water flow, such as:

Direct flow to infiltration trenches, Dutch surface drains or dry wells.

During home construction, use techniques to minimize soil compaction.

Improve existing soil infiltration by incorporating organic material into lawns and planting beds.

c. Use buffer zones

Properly designed vegetated buffer zones are highly effective in intercepting and filtering pollution in runoff and enhancing the diversity of plant and wildlife species. Infiltration can be increased by one-third to one-half by leaving areas in a more natural state, such as buffer zones or existing woods instead of more lawn area. A typical suburban lot cannot handle the runoff from the entire watershed, or provide sufficient habitat for wildlife in the corridor, but will contribute to the overall health of the area. Consider the following:

Pay special attention to protecting creeks, draining swales, storm sewer outlets, and wet areas. Use a mixture of trees, shrubs, and ground cover or native grasses, as it is more effective than a single species in protecting water quality and encouraging biodiversity within the area.

Since the backyard buffer forms the boundary between the natural and man-made worlds, the most successful planting design aims for a less manicured look than one might expect on the street side of the home landscape.

For more information on water quality, see **Clean Waters Fact Sheet** *[What's the Big Deal About Water Quality?](#)*(Crawford).

II. Plant Selection

Once a basic layout has been defined, select plants to be maintained and/or added to the property in order to create a sustainable landscape. Take particular note of existing site conditions (wet/dry areas, sunny/shady areas, etc.) as well as your long-term goals (minimize deer damage, attract birds/butterflies, enhance wildlife corridors, etc.).

a. Reduce lawn area

Increasing the size and number of landscape beds helps decrease the size of the lawn and the need to mow, rake, fertilize, or water. These beds can be planted with groundcovers that add landscape interest but still require less maintenance than grass. Perimeter or less frequently used areas can be allowed to go to natural meadows where many native species of plants will thrive.

In many landscape situations, grass may not be the best choice as a vegetative cover. Excellent locations for alternative ground cover include areas with steep slopes, wet or shady areas and sites with easily erodible soils. When carefully selected and planted, ground covers can improve infiltration of water into the soil, slow storm water runoff and reduce landscape maintenance needs. Evergreen ground covers such as pachysandra, English ivy and vinca and the deciduous ground cover, Virginia creeper, require little attention once they are established. Low growing shrubs such as junipers are effective as well. Many species of perennials such as hosta and daylilies also provide good ground cover as well as ornamental grasses.

Consider converting areas of your yard to natural looking tree and shrub borders with the trees such as evergreen white pine and deciduous Cornelian cherry, dogwood, and shadblow as well as shrubs such as smokebush, bayberry, witch hazel and sumac Gro-low, where fallen leaves provide a natural ground cover. This will conserve water and reduce maintenance.

b. Utilize xeriphytic plants (requiring little water) on dry landscape sites

Water has become a limiting factor in many communities, especially during hot, dry spells. Landscaping to minimize watering, also referred to as “xeriscaping” (“xeri” is the Greek prefix meaning “dry”) includes careful planning, using drought-resistant plant varieties, and improving soils or using mulches to help retain moisture in the soil.

Many varieties of native or non-invasive ornamental plants are adaptable to dry landscapes, black-eyed susans (*Rudbeckia fulgida*), sedums, daylilies and cone flowers for instance. Many ornamental grasses and herbs such as rosemary, sage and marjoram also have low water needs. Ornamental shrubs that require very little water include bayberry (*Myrica pennsylvanica*), lowbush blueberry (*Vaccinium angustifolia*), various species of junipers (*Juniperus* spp.), Japanese black pine, red cedar and sweet fern (*Comptonia peregrina*).

c. Utilize native plants, substitute for ornamentals currently used

Sustainable landscapes should incorporate planting of native species; those that have thrived under local conditions without human help for thousands of years. Properly situated native plants require little in the way of water, fertilizers or pesticides to provide a beautiful, natural-looking landscape. Even when using native plant species, choose those that are best adapted to your particular landscape. Dwarf conifers are a better choice in a dry, windy site, for example, than roses, while plants from the sand plains should not be planted in moist, highly organic soils.

Another advantage to selecting native species is that they attract and provide habitat for beneficial insects, birds, and animals that in turn help control problem pests, reducing the need for pesticide use in landscape maintenance.

Native plants are better for buffers than exotic ones. Aggressive exotics such as purple loosestrife can overwhelm native plants and turn your yard into a virtual desert where wildlife is concerned. Consider grey dogwood (*Cornus racemosa*) for its excellent riverbank protection and striking red stems and American cranberry bush (*Viburnum trilobum*) for its year-round interest and scarlet fruits, which persist into winter to offer food to wildlife.

Try substituting native ornamental plants for overused plants within the suburban landscape. For example, use sugar maples (*Acer saccharum*) instead of Norway maples (*Acer platanoides*), red chokeberry (*Aronia arbutifolia*) or mountain laurel instead of winged

burning bush (*Euonymus alata*) or bayberry (*Myrica pennsylvanica*) instead of spreading Japanese yews (*Taxus cuspidata*).

For more information see **Clean Waters Fact Sheet** *Going Native – Rethinking Plant Selection for the Home Landscape* (Salsedo).

d. Utilize disease, insect resistant plants

Selecting proper trees and shrubs for the home landscape can seem a daunting task, but it can be simplified. Traditionally, trees and shrubs were chosen for such characteristics as seasonal bloom intensity, bloom duration, or fall leaf color. While these characteristics are still important, today's environmentally sound, or conservation landscapes include trees and shrubs, selected for drought tolerance, disease resistance, ease of maintenance, and wildlife benefits, in addition to year-round appearance.

There really are not any plants that are truly not susceptible to insect and diseases. There are a number of plants that appear less prone to insect and disease damage. For example, shrubs such as smokebush, Bayberry, Highbush blueberry, Chokeberry, enkianthus, fothergilla, oak leaf hydrangea, blue holly, winterberry, spice bush and American cranberry bush are somewhat disease and insect proof. Trees such as Hinoki Cypress, white fringe tree, ginkgo (*Ginkgo biloba*), blue atlas cedar, amur maple, concolor fir, cedar of Lebanon, and katsura trees are also somewhat disease and insect proof. Consider substituting heritage river birch for white birch, which are more pest resistant.

Other tree species, including our native white ash (*Fraxinus americana*) are not a preferred species of gypsy moth caterpillars and are resistant to its damage. A number of recent introductions of crabapple cultivars (*Malus* spp.) have been developed to resist scab, fireblight, rust and mildew, that have troubled this ornamental species. It is probably prudent to avoid certain plants such as hemlocks (*Tsuga canadensis*) that have been under siege by the hemlock woolly adelgids in Connecticut.

For more information, see **Clean Waters Fact Sheet** *Integrated Pest Management for the Homeowner* (Crawford).

e. Select deer resistant plants

With the spread of the suburban landscape into former woodlands and fields, and the extensive use of highly edible plant species in traditional landscaping plans, white-tailed deer have become a major problem for homeowners in many areas. An alternative approach is to reduce the landscape edibility rating by selecting plants deer prefer not to eat.

As deer will browse on any shrub or low-growing tree if the conditions are bad enough, no list of plants can have an absolute guarantee for being "deer-proof". However, deer tend to avoid plants with thorny stems or prickly leaves and those with strong aromas, making plants like bayberry, boxwood, potentilla, roses, and hollies good choices.

f. Utilize plants to attract pollinators, butterflies, and wildlife

Wildflowers bring in the wildlife. They add a splash of color to your landscape and rival traditional ornamental flowers in beauty. The nectar of wildflowers is an important food source for honeybees, butterflies and hummingbirds that rapidly burn carbohydrates during flight. These nectar feeders, in turn, ensure plant reproduction through the transfer of pollen.

Since plants flower at different times of the year, include a variety of plants in your perennial garden or buffer area so butterflies have access to blossoms throughout the growing season. Creating a diversity of wildflowers will attract many butterfly species while providing

colorful blooms from April until October. Include plants and herbs such as alfalfa, red clover, parsley, fennel, dill and butterfly weed, which make up an important part of the bee's diet and the caterpillar-stage diet of butterflies. Hummingbirds are attracted to bee balm, butterfly bush and a host of other brightly colored inflorescences.

III. Landscape Management

a. Recycle existing materials such as leaves instead of utilizing purchased bark mulch

Recycle the debris and leaves created within your yard. Chop the leaves with a mulching mower and rake or blow them into the landscaping beds to use as mulch. Natural forest ecosystems function this way. They were the first "organic gardeners", recycling their own leaves and fallen twigs and branches. Save yourself a lot of time and energy by creating beds or areas in your landscape where materials can be recycled right where you are mowing and raking. Careful planning of your landscape beds and natural border areas will help to facilitate this process.

For more information see the **Residential Water Quality Fact Sheet** series article, *Twelve Steps to Transforming Yard Waste into Yard Wealth* (Salsedo).

b. Utilize slow release fertilizer that has a lower potential for leachate

Slow-release fertilizers provide a more uniform turfgrass growth during the growing season, and do not produce the peak and valley growth as is often observed with fast-release forms. They have a lower potential for leaching than is found within quick-release fertilizers. In addition, they have a long-term turfgrass response and can carry over from year to year, need to be applied less frequently, and with the natural organic forms, they often supply other nutrients and can suppress certain turfgrass diseases.

For more information see **Residential Water Quality Fact Sheet** *Lawn Fertilizer Practices to Reduce Nitrogen and Phosphorous in Runoff Water* (Morris) and **Clean Waters Fact Sheet** *Lawn Care the Environmentally-Friendly Way* (Crawford).

c. Care for your buffer

To aim for maximum wildlife diversity, manage the buffer for maximum vegetation diversity. Therefore, the best care is the least care. Resist the urge to tidy up. A natural forest floor, with its "litter" of fallen leaves and twigs, helps the buffer break down pollutants and increase biodiversity. In particular, leave large dead standing trees, understory tangles, hollow trees and logs, stone walls and rock piles, seasonal and vernal pools, and fallen shaded logs. For larger wooded areas, use small scale harvesting of trees, cutting single trees or small groups.

In Conclusion – Why Does this Matter?

So what is landscape sustainability, anyway? Sustainability simply defined, is intended to meet the needs of today's population without diminishing the ability of future populations to meet their needs. One way to look at sustainability is through the many natural cycles that occur all the time around the world – the energy cycle, the nitrogen cycle, as well as the water cycle.

We need to recognize that every home is part of a larger landscape and that the landscape is connected by the water cycle. The rain water that lands on the ground soaks either into the ground, eventually into existing surface waters like a stream, lake or Long Island Sound or flows across the surface of the ground, eventually exiting into these surface waters.

The increased development we have seen in Connecticut over the past 30 years has altered the ration of surface and ground water flow within a watershed. When the land is undeveloped, it is common to find over half the rainfall soak into the ground and then move with the groundwater flow system underground. Yet, when development increases to a significant level (say 25%), we find that over half the water flows across the surface of the ground and only about 15% or so will enter the ground. This increased flow of water across the surface of the ground has an effect on the movement of pollutants into our water bodies. With surface water runoff, there is no single source of water or pollutants. What we see is the water washing across the surface of the land picking up pollutants as it goes, eventually ending up in a surface water body.

That's the bad news. The good news is that if we begin to use a variety of sustainable landscaping techniques, we can take steps that will counteract our residential landscape practices that may be contributing pollutants – such as fertilizers and pesticides, landscape design and management, watering practice, yard waste management and soil stabilization – and use them in a pollutant prevention approach that will not only protect water quality, but also improve soil quality and enhance plant growth.

The savvy sustainable gardener or landscaper will take advantage of sustainable landscape practices that will create a prosperous landscape while, at the same time, reducing the need for excessive amounts of fertilizer, pesticides and water – which are the sorts of things and practices that contribute to polluted runoff. In other words, you can begin to bring the cycles of nature down to your own site level and have them work for your own benefit.

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