

Environmentally Friendly Gardens – Sustainability in the Home Garden

Bruce Crawford
Director, Rutgers Gardens

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Rutgersgardens.rutgers.edu

Sustainability

Sustainability is defined as a characteristic of a process or state that can be maintained at a certain level indefinitely. In the broad sense, sustainability pertains to three parts of our society:

1. Economic (Jobs, Stockholder profits)
2. Social (Education, Health, Poverty, Crime)
3. Environmental (Water quality, Air Quality, Natural Resources)

All three of these parts interact together, affect the other and to a degree determine the life of a society. The same three aspects of sustainability also apply to proper garden design. [For the purpose of this essay, a garden refers to any landscape, urban plaza or park that has been created or modified by human means.] In the short term, the garden affects primarily the economic aspect; the initial cost of the garden. For the long term, it affects all three aspects of sustainability. The social perspective is broached through the garden's ability for gathering groups, creating a sense of safety and improving health through physical activities or a mental sense of calm. Economically, and perhaps even more important than the cost of building the garden is the cost of maintaining the garden – does it fall within the financial and time constraints that the client is able to afford. Clearly, if the garden is beyond a person's means, it will fall into disrepair. The economic is strongly tied to social and environmental in regards to emotional impact. Many times, a garden is well maintained when it is new, since it is a new facility and in some cases 'toy'. As the facility ages, if it was not designed well and appeals to the client, they will lose interest and will not wish to invest the time or money to maintain the garden. Environmental is obviously the aspect that everyone knows best. Unfortunately, the initial costs of a more environmentally, as well as economically and socially friendly garden are greater, although the return benefits are obviously greater. For the designer, the obstacle is convincing the client that the benefits to be gained from a 3-pronged sustainable garden are worth the initial extra costs.

Why Sustainable?

As a generalization, it allows future generations to enjoy all the economic, social and environmental benefits that we currently enjoy today. From the standpoint of the Landscape Architect and Designer, we are strongly focused upon the Social and Environmental impacts of a design, but we must always be aware of the economic implications if the design is to be built and maintained. From the viewpoint of why sustainable in New Jersey, the reasons are manifold, but one of the details I like for focus upon with society is our growing dependence upon electronic and other technological advances. As our technological improvements have become more advanced and our daily needs to venture beyond the four walls of a structure or an automobile diminish, our daily interaction with nature has become more reduced. A

typical house now features a broad drive up to garage doors, a narrow path to the front door, a modicum of shrubs with a pristine lawn dressing the front of the house, and perhaps a small deck or patio just off the kitchen. It is saying we are people that use the car and live indoors. We use technology to heat and cool the house, frozen food or store bought produce to eat (or we dine out) and the domesticated dog or cat as our source of wildlife! Most of our garden grows 2" tall, needs weekly cutting, is nearly as impervious to deep-water penetration as is asphalt and only looks great with copious water, fertilizer and herbicide applications. The outdoors is not intended for use, but merely to be seen from inside the house or as you drive past and down the drive. This design (or lack of design) direction will ultimately lead to an economy that is more driven by natural resources, effectively reducing the water and air quality, decreasing health, narrowing education and ultimately effecting the job numbers and the economy. **Wow**, talk about the power of a garden!!

Hopeful Solutions

Obviously, the scenario above is slightly exaggerated. However, as the population density of NJ increases, the design of gardens will also need to be altered to reduce the burden upon our increasingly stretched resources. Initially, these solutions will come at an additional cost to the consumer, but the ultimate end will be an economy, society and environment that will continue. To this end we must focus upon garden designs that provide:

1. Summer Cooling

The reason farmers and original settlers planted a shade tree off the Southwest corner of the home. Obviously, it provides shade from the beating afternoon sun. Remember, it takes 25 years for a shade tree to grow to a sufficient size to cool a home. Often there is an existing tree or group of trees that can be saved through proper site construction management and utilized for this purpose. In order to save those trees and 25 years of cooling in the process, protect those trees during construction. Remember that fill kills!

2. Winter Protection and Heating

Winter winds predominantly blow out of the Northwest. Locating a coniferous windbreak or a tall mixed vegetation windbreak along the Northwest side of the building will help to reduce the stress and expense of the heating system for the house. Also, when the leaves fall from that deciduous tree on the Southwest corner, the solar rays will help to heat the home.

Also, do not forget that Ivy or vines that cover masonry or decay proof outdoor wall surfaces will provide insulation, as do evergreen espaliers.

3. Inviting Outdoor Rooms

People need to be outdoors to understand the environment. Developing outdoor rooms or spaces require the same summer and winter considerations as does the indoor rooms! No one will be beckoned out-of-doors if the patio, deck or plaza is in full beating sun. An overhead structure, such as an arbor, or shade tree planted to the SW of the patio will make the area far more inviting. If trees are employed, they are far more successful if planted along the SW side as opposed to bosques directly overhead. Having a bird nest directly overhead is often not a desirable attribute for those sitting directly below.

- Outdoor rooms also need to have windbreaks; most people enjoy the BBQ year round, as well as going out to study ice formations on a water feature or to pick herbs!
- If the outdoor room is designed as an extension of the indoor environment, we are much more apt to enter this room. This is especially true in our society, which is based upon living in an enclosed environment (house, car, office, etc). Creative uses of arbors, hedges, trees or allees of trees help to create a better indoor/outdoor use relationship. Areas that provide a cooling affect from shade provided by leaves and its associated evapo-transpiration, or water features and ponds that lure people outside with sound and the associated cooling affect of water are far more likely to be used than without these amenities.
- Quiet. Most people wish for the garden to be a refuge from urban noise, air pollution and headlight glare. Deciduous plants are great for filtering out these urban blights. Evergreens give the appearance of absorbing and filtering out these problems, but they are not as effective as their deciduous cousins during the warmer months of the year. Obviously, a mix of the two provides the ideal environment.

4. Water Conservation

Reduced water consumption and the creative use of rainwater, reduced impervious surfaces and reduced erosion are all interconnected. Fresh water is rapidly becoming the next limited natural resource and storm water damage has become a major problem. For water conservation, some points include:

- The rich, dark-green blue grass lawn is one of the largest consumers of water. Solutions to this dilemma range from simply changing the grass composition to a tall fescue lawn, which is much more drought tolerant, to reducing the size of the lawn and incorporating drought tolerant plantings in its stead. These plantings can assume the form of prairie-like meadows in sunny locations that are mown once in late winter, to masses of shade tolerant shrubs and herbaceous materials in woodland locations. In both instances, the leaves and foliage from the previous year is best not removed, but becomes mulch.
- Replace water needy garden plants with plants that have adapted to lower water dependencies and thrive under high heat and reduced rainfall.
- Rain gardens are a recent creation and beneficial. In essence, they are small retention basins with the water supply typically coming from roof drains or from paved surfaces. In this manner, watershed runoff is reduced, plants are irrigated, pollutants are filtered out, microorganisms break down pesticides and there is up to a 30% increase in deep-water recharge as compared to turf. Reduction of the watershed is beneficial since it reduces sedimentation of streams, flooding and bank erosion. Plants native to flood plains are best selected for these locations, since they can tolerate temporary inundation and drought. For rain gardens to become successful, they must be attractively incorporated into the landscape and are simply not another element dropped into a landscape.
- Run all the roof drains and storm water runoff from patios and drives to a cistern. This can then serve as a water source for irrigation, although salt concentration and pH will need to be monitored.
- Mulch. How often do we think that shredded wood products are the ultimate ground cover (especially if it is dyed orange)? Shredded wood products often knit together

too tightly. As the materials dry, they become hydrophobic, and with the relatively small pore spaces, the water simply sheets over the top. In nature, detritus (decaying leaves, sticks, animals), uncompacted soils, and the myriad stems of herbaceous plants slow the movement of water across the land. The detritus is usually rough, does not knit tightly, slows the flow of water and allows water to penetrate. Although it often does not look as neat or uniform as shredded bark, it is much more friendly to the environment. Many botanic gardens are now going to the use of shredded leaves as mulch.

5. Impervious Surfaces and Heat Islands

Reduction of impervious surfaces should be a common sense solution. Not only does it reduce watershed, but most impervious surfaces also raise the ambient temperature and sun glare. Turf should also be considered only semi-pervious. Woodland and Prairie settings allow only about 10% of rainfall to runoff as sheet flow, while turf allows close to 55 % sheet flow, taking with it many of the fertilizers, bacteria from animal waste and any other chemicals that had recently been applied. Most surfaces designed for pedestrians and vehicles are mostly impervious, even those that are laid upon a dry base of sand or gravel. Belgian blocks or pavers that are set on a gravel base and gravel between the stones or pavers are certainly more porous than those set on a compacted dust or quarry process base. Unfortunately, even the gravel and spaces between the blocks become filled with sand and other debris, reducing the permeability over time. All gravel walkways, or large stones set on a deep gravel base with wide gravel joints are more effective for water percolation. It allows the water to penetrate, and the increased effort of walking on a gravel path makes a small garden seem larger, due to the increased effort to walk on a slightly mobile surface!

Another solution potentially for parking and certainly for plants in parking areas is CU-Structural Soil. Developed at Cornell and authored in the 1990's by Dr. Nina Bassuk and Dr. Jason Grabosky, it consists of 80-83% 1" crushed stone and 17-20% loam or clay loam with a small amount of Hydrogel that helps to maintain the homogeneity of the mixture. It has proven to be a frost stable underlayment for walkways and parking areas, while allowing sufficient air and water holding capacity for roots. For small trees, a minimum depth of 24" is sufficient, while for shade trees 36" is appropriate. Structural Soil has also proven successful with porous asphalt and is being tested as an overflow parking lot base with tall fescue as the 'paving' material.

6. Reduced Erosion

Sediment from eroded soils impacts the environment in a variety of manners, including the obvious loss of topsoil to the loss of temperature stratification in lakes and ponds as they fill with sediment. During the past twenty years, shredded bark and wood mulches have become the new groundcover, with some of the drawbacks of mulch having already been mentioned. Groundcovers are not necessarily plants that are 6" tall or less, it simply implies a plant that has a strongly rhizomatous or spreading root system. Southern Bush Honeysuckle (*Diervilla sessifolia*) is a perfect example of a woody plant that grows to 3 feet in height while creating a total thicket. Yellowroot (*Xanthorrhiza simplicissima*) is another great native plant example while many of the leptomorph bamboos are appropriate for this application as long as there are boundaries. The thicket of stems and entangled roots helps to minimize soil erosion.

7. Recycled Materials

Use of recycled materials for pavement, walls, water features, and other design elements often provides the garden with a patina or a 'look' that would be hard to duplicate otherwise. Bluestone that was used for sidewalks has a great polished appearance, and is often of superior quality to newly quarried materials. Likewise, recycled Belgian block, brick, wood timbers, wrought iron elements, etc. add charm to the garden, as well as reducing the energy expended to quarry, fabricate or ship new materials. Lately, there are a number of facilities that are also crushing concrete, which is often sold under the name of road-blend. Asphalt millings are also available. Both are excellent substitutes for areas where gravel or quarry process (QP) are suggested for a base material.

8. Local Materials

Most new Belgian Block is presently quarried in India. The thought of shipping something half way around the world for a drive is not in line with sustainable fuel usage. The same is true of lumber. Interestingly, there are a number of portable mills beginning to sprout, and they will mill trees on your property into useable lumber at a reasonable price. Nothing could be more local! If a rot resistant wood is needed, many have a supply of trunks of White Oak they will cut to size that came from a local source. Also, try to use paving materials that are quarried as close to the site as possible.

9. Biodiversity

It is important to maintain or restore plant and animal biodiversity, as well as provide animal habitat and shelter. There are very few (if any) animal habitats in a well-maintained lawn! Plants that provide fruits and seeds for birds, nectar and pollen sources for butterflies, bees and hummingbirds, as well as thickets and tress for shelter are all very important. Install and plant as many native species of plants as possible in order to maintain a food source for our native birds and insects. Otherwise, suburbia becomes an animal and insect desert. Besides, who does not like to watch birds and butterflies in action?

10. Food Sources for Humans

Provide food sources for the family. Most people still have the hunter-gatherer instincts, and enjoy the thought of growing their own vegetables, small berries, and possibly fruits. Today's problem is most people would rather hunt and gather at the Shop-Rite!! Many clients simply do not wish to do a lot of work, unless it happens to be a hobby. There are a number of fruits, such as Kiwis (*Actinidea*) Blueberries (*Vaccinium*) and Paw Paws (*Asimina*), as well as many easy to grow vegetables that add interest and food to the garden. These curiosities will also help to draw people out of the home and into the garden.

11. CO2 encapsulation

Many individuals as well as corporations are trying to reduce their CO2 footprint. By planting shade trees or arborescent bamboos, the Carbon Dioxide that we emit through the burning of fossil fuels is temporarily bound-up in a solid form, thus reducing the percentage of 'new' CO2 in the air. It has recently been documented that the arborescent bamboos, such as *Phyllostachys* encapsulate more carbon dioxide than shade trees per a given area.

Practice

It must be noted that Sustainable Designs or Environmentally Friendly Designs should not be confused with Boring Designs! On the contrary, they should be anything but boring. With a little thought, creativity, and sales polish, it is possible to create a garden that fulfills all of the points outlined above. One of the most important points may be the 'sales polish'. While most homeowners or clients are certainly interested in conserving resources, the unfortunate truth is that many are often not willing to give up personal needs, or implement solutions with an initially higher cost. The challenge as a designer is to create solutions that are aesthetically pleasing and meet the needs of the clients, while at the same time conserving the resources for the future. One of our most effective agents - our goal - is to develop designs that once again acquaint people with the garden. Once a deeper appreciation of the outdoor environment is developed, a broader appreciation will hopefully develop towards the environment and its conservation.