Chapter III

Environmental Benefits of Responsible Landscape Management

Summary:
Long-term health issues need to be incorporated into water-conservation plans. Emphasis placed on landscape water conversation should be balanced by environmental benefits. People are the chief cause of wasted water and thus, the greatest hope for effective conservation.

In the name of public health and safety, or even as a political statement, landscapes in some areas have been altered to the point where the environmental damage is tremendous. Perhaps the most devastating example is now coming into public view.

Political and Environmental Motivations for Restrictive or Alternative Landscape Recommendations

During the Cultural Revolution in the People's Republic of China during the 1960s, Chairman Mao and his followers deliberately removed all vestiges of what was considered to represent "Western civilization." This included the virtual elimination of all turfgrass areas and many types of trees.

More than three decades later, the human and environmental price of this action is just being thoroughly recognized and calculated. The lack of shade trees and turf causes cities to bear the burden of "heat islands" – which are 10 degrees to 30 degrees hotter than outlying rural areas. Further, when turfgrass is removed, the amount of smog and dust in the air increases because there are not sufficient numbers of plants to hold down the dust and trap particulate pollutants. Dust carries disease, bacteria and viruses, incidences of which rise. Moreover, the lack of turf also increases erosion, which raises levels of pollution and damages water quality in ponds, streams, rivers and lakes.
Throughout China today there is a tremendous effort underway to repair the landscape and with it the environment and public health. Tree and turf areas are being expanded as quickly as possible before further damage can be done, but it will take several decades and many generations before the effort will be completed and start to yield results.

While perhaps most dramatic and widespread, China is not alone in making water-related or landscape decisions that have proved less then wise.

During the Chinese Cultural Revolution the government virtually eliminated all turfgrass areas and many types of trees. Today there is a tremendous effort underway to repair the landscape. Dr. Paul E. Rieke, retired Professor of Turfgrass Management in Crop and Soil Sciences at Michigan State University, served as consultant to the Chinese government.

In Western Australia, large numbers of trees were planted on sandy soils surrounding reservoirs in the hope of reducing erosion caused by wind and water. Recently it was determined that the trees were actually consuming huge amounts of reservoir water, so they are being removed and replaced with turfgrass.

Many communities have added areas of turfgrass, plants and trees to reduce high levels of heat and glare during the day.

Throughout the desert southwest of the United States, during a terrible extended drought in the late 1980s and early 1990s, landowners were told to remove turfgrass and replace it with a variety of other plant materials. Wildfires swept through many areas, consuming vegetation and many homes. But those people who had maintained significant amounts of turf around their homes suffered very little fire damage.

The inner-city heat islands noted in China are common to urban areas that lack the cooling effect of evapotranspiration and shade that are provided by properly watered growing trees and turf. As a result, urban areas tend to suffer much higher temperatures than nearby rural areas. Not only do the buildings, streets, sidewalks and paved plazas reflect tremendous levels of heat and glare during the day, but they also retain significant amounts of heat energy during the night, so cooling seldom occurs in built-up areas. When rains do come, the water is rushed into a highly engineered sewer system where it must be treated and released on its journey to the oceans, rather than being allowed to naturally soak into the soil, replenishing soil moisture, recharging the groundwater supplies or flowing naturally into streams, filtered by the roots of trees and turf.

Lanscape Codes, Ordinances Influenced by Profit Motive

Beyond political or environmental motivations for restrictive or alternative landscape codes, ordinances and recommendations lies the profit motive.

The myopic or single-focus approach to domestic water conservation typically calls for strict limits on lot sizes and landscape components. These limits tend to restrict amounts of turfgrass, favoring instead plants incorrectly identified as “low water-using” or “native.”

Such an approach allows builders and developers to expand their businesses, along with suppliers of building materials and home furnishings. Some banks and lending institutions also favor this approach to increase the number of mortgages; if lots are smaller due to landscape restrictions, more homes will be built. And because alternative or restrictive landscapes may require or are best designed by professional landscape architects and installed by professional landscape contractors, some firms within this industry quietly support this approach, all in the name of water conservation.

The fact remains, however, that residences use only 8 percent of the total freshwater withdrawals and up to 60 percent of the domestic supplied water. But new residential development requires the water-supply system to satisfy the expanded commercial and industrial needs of the increased population as well. Thus building more homes on smaller lots doesn’t increase water conservation because more water is required for other related, non-residential uses.

The planned water-savings projected for reduced landscape water use will be offset by the new water demand for non-landscape purposes. The result can be an increasingly dense population living in an area that is hot, dry and dusty due to inadequate evapotranspiration. Ultimately, a new water-resource problem will have been created.

The Benefits of a Well-maintained Green Landscape

Because the benefits of well-maintained green landscapes (including turfgrass lawns) are not widely understood, this area has become an easy target for water conservation. This is especially so in light of the highly visible use of water on lawns and the all-too-frequent

examples of waste: water flowing from lawns onto streets and other hard surfaces; irrigation systems running during downpours; and broken sprinkler heads spewing water like an open fountain. Absent any recognized social or environmental benefit of turfgrass, restricting lawn watering or lawns themselves have been easy answers — but perhaps not wise ones.

Published in the *Journal of Environmental Quality,* the research of Dr. J.B. Beard and Dr. R.L. Green provides strong evidence of the many important benefits provided by turfgrass[1] and divides them into three categories as follows.

Diagrammatic summary of benefits derived from turfgrass

Benefits of Turfgrass

Functional
- Soil erosion control
- Dust prevention
- Rain water entrapment & ground water recharge
- Solar heat dissipation
- Glare reduction
- Organic chemical/ pollutant entrapment and degradation
- Air pollution control
- Nuisance animal/ pest reduction
- Fire prevention
- Security—visibility
- Environmental protection

Recreational
- Low cost surfaces
- Physical health
- Mental health
- Safety cushion
- Spectator entertainment

Aesthetic
- Beauty
- Quality of life
- Mental health
- Social harmony
- Community pride
- Increased property values
- Complements trees and shrubs in the landscape

Erosion control

Sports safety

Community pride

Functional benefits: soil erosion and dust stabilization; groundwater recharge and surface-water quality; organic chemical decomposition; soil improvement and restoration; heat dissipation and temperature moderation; and noise abatement and glare reduction. Other benefits also include decreases in noxious pests, allergy-related pollens and human exposure to disease; safety in vehicle operation and equipment longevity; security for vital installations, reduced fire hazards and improved wildlife habitat.

Aesthetic benefits: improved mental health via a positive therapeutic impact; increased property values; a sense of community pride and social harmony; quality of life; general beauty and a complement to trees and shrubs in the landscape.

Recreational benefits: low-cost surfaces; physical health; mental health; safety cushion and spectator entertainment.

In addressing the issue of water conservation, Beard and Green wrote:

• Trees and shrubs can use more water than turfgrass

"If one compares the evapotranspiration studies that are available, typically trees and shrubs are found to be higher water users than turfgrasses on a per-unit land-area basis."

• Drought-resistant plants are not necessarily low water users

"Much confusion has arisen from the low water-use landscape plant lists from (some) xeriscape groups that have been widely distributed. The lists are based on the

[1] J.B. Beard is a former member of the Department of Soil and Crop Sciences, Texas A&M University, and currently heads the International Sports Turf Institute. R.L. Green is a member of the Department of Botany and Plant Sciences, University of California-Riverside. Beard and Green published *The Role of Turfgrasses in Environmental Protection and Their Benefits to Humans* in 1994. The study was then published in the May-June 1994 issue of the *Journal of Environmental Quality*. JEQ is published by the American Society of Agronomy, the Crop Science Society of America and the Soil Science Society of America.

incorrect assumption that those plants capable of surviving in arid regions are low water users, when these plants typically are only drought-resistant.

"When these species are placed in an urban landscape with drip or other forms of irrigation, many can become high water users. This occurs because the physiological mechanisms controlling evapotranspiration and drought resistance are distinctly different and cannot be directly correlated within a plant species or cultivar."

• Adjacent trees and shrubs reap benefits of turfgrass watering

"When turfed areas are irrigated, the adjacent trees and shrubs also are being irrigated as a result of the multitude of shallow tree and shrub roots that concentrate under the irrigated turf area. Thus, when a homeowner is irrigating the lawn, most of the adjacent trees and shrubs also are being irrigated.

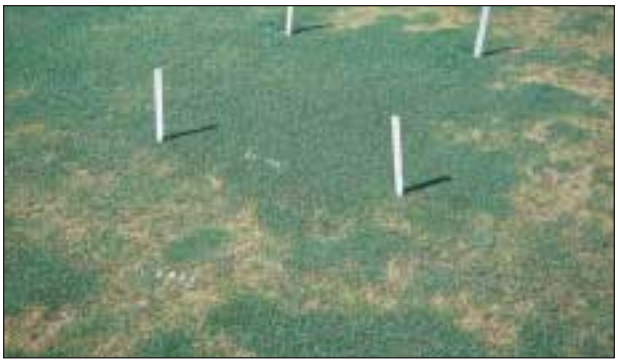
• Turfgrass' brown color during drought periods is entirely normal

"Numerous turfgrass species are capable of ceasing growth, entering dormancy and turning brown during summer drought stress, but they readily recover once rainfall occurs. Some people incorrectly assume turfgrasses must be kept green throughout the summer period to survive, and thus will irrigate. Many trees drop their leaves during summer drought stress or during the winter period when only brown bark remains.

"What then is wrong with a tan to golden-brown turf during summer droughts if one chooses not to irrigate? If water conservation is a goal, then a dormant turf uses little water, whereas certain trees and shrubs may continue to remove water from lower soil depths."

• Water conservation can be achieved with low water-use turfgrasses

"In summary, there is no valid scientific basis for water conservation strategies or legislation requiring extensive use of trees and shrubs in lieu of turfgrasses. Rather, the proper strategy based on good science is the use of appropriate low water-use turfgrasses, trees and shrubs for moderate-to-low irrigated landscapes, and similarly to select appropriate dehydration-avoidant turfgrasses, trees and shrubs for non-irrigated landscape areas.



Plant breeders strive to develop cultivars that require less moisture. In this photo, the center plot is an experimental bluegrass with exceptional resistance to summer drought and heat stress, compared to surrounding plots. Genetic improvement in turfgrasses offer the potential for significant water savings.

"The main cause for excessive landscape water use in most situations is the human factor. The waste of water results from improper irrigation practices and poor landscape designs, rather than any one major group of landscape plant materials."

Beard and Green conclude: "It is critical to educate the general public that the darkest green turf, which many people strive for, is in fact not the healthiest turf. A medium-green turf with moderate growth rate will have the deepest root system with less thatching, reduced disease and insect problems, and increased tolerance to environmental stresses such as heat, drought, cold and wear."

Thus, proper establishment and maintenance of landscaping, including turfgrass, clearly yield significant environmental and social benefits. However, there is also a clear need to move beyond the notion of "beautiful landscapes" to public education. Consumers must be helped to understand, appreciate and put into use scientifically based principles that result in environmentally positive landscapes that incorporate water conservation to the greatest degree possible.