Case Study 2: 21st-Century Landscape Water Use: A Global Perspective

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The extensive research I have conducted on the water-use rate and drought resistance of turfgrasses and the lecturing I have done more recently in 20 to 25 countries a year have given me a global perspective on landscape water use and its important role in various cultures around the world.

The Human Desire to Enhance the Living Environment

It is very significant that for 11 centuries, humans have chosen to devote time and resources, including water, to establish and maintain turfgrasses in landscapes for a better quality of life. While this desire to enhance the living environment may exist worldwide, it has not been attainable in those regions where people must spend all of their waking hours in pursuit of food, fiber and housing to survive. Countries that have industrial as well as agricultural employment can generate sufficient financial resources enabling individuals to afford to improve their living environment with landscape plants.

In my travels around the world I have consistently observed that countries with extensive urban landscapes, including lawns, trees and shrubs, also have associated with them a dominant population with a relatively high productivity rate. In addition, people in these places interact more harmoniously than people who live in areas that are seriously deficient in using landscapes to improve the quality of life.

Worldwide Landscape Water Use

I offer the following experiences and insights on landscape water use:

Northern Europe has been experiencing (at least on a short-term basis) a seemingly significant climate change to a more extended droughty period in the summer. As a result, governments have imposed water-use restrictions in Denmark, Luxembourg and parts of the United Kingdom. Extended drought stress is a new experience for landscape and turfgrass managers in northern Europe, as they typically depend on rainfall at fairly frequent intervals for most required water. Turfgrass managers have much to learn about the appropriate cultural practices needed to minimize drought stress. Drought also has brought out the inadequacy in all phases of existing turfgrass-irrigation systems.

Southern Europe, which is typically dominated by a Mediterranean climate including warm and dry summers, has historically used cool-season turfgrasses, based on practices common in England. However, current research and educational programs are attempting to introduce the use of warm-season turfgrasses as a water-conservation strategy. Italian researchers are leading these investigations and educational activities, with an emphasis on bermudagrasses (*Cynodon* species).

The use of bermudagrasses at the LeQuerce Golf Course in Nepi, Italy, is an example of using warm-season turfgrasses as a water conservative strategy.

In the **Middle East,** water shortages have been common for many centuries, and water quality is relatively poor because of high salt and/or sodium levels. Thus, emphasis has been placed on the use of salt-tolerant turfgrass species, such as seashore paspalum (*Paspalum vaginatum*).

Top photo: Native Paspalum growing on the Lanakai Beach, Oahu, Hawaii. Bottom photo: This salt-tolerant turfgrass species, seashore paspalum, is shown at the Sea Island Golf Course, Sea Island, Georgia.

A unique water-conservation strategy is being used in Israel on fine-textured soils that are 30 feet to 60 feet deep. Basically, this deep soil profile is recharged during the rainy winter season, when water costs are lower. Then, during the hot-dry summer period, deep-rooted dactylon bermuda turfgrasses are used to harvest the water, which is combined with a single irrigation per month to sustain green turf.

In **Africa** considerable attention is being given to the use of effluent water sources for landscape irrigation, as well as the use of salt-tolerant species such as bermudagrass and seashore paspalum.

In **Australia**, activists have been promoting legislation to minimize turfgrass areas and increase tree-planting programs. However, experiences in West Australia, which is the second-driest state in the world's driest continent, have proven the need for other considerations. Many decades ago, a pine plantation was established on the groundwater recharge and well field area that serves as a major potable water source for the city of Perth. The area is a very shallow sandy aquifer over impermeable clay. These trees have now grown to a substantial height and are actually causing an excessive drawdown of the aquifer due to the high evapotranspiration rates associated with the increasing canopy areas of the trees. Thus the Waters and Rivers Commission plans to conduct staged harvesting of the pine trees and plant these areas with a vegetative cover composed principally of low-growing perennial grasses that also will lend the areas a dual park-recreation function.

In **China** many decades ago during the Communist purges, the dictate was to eliminate symbols of capitalism throughout the country. Green lawns were removed and ornamental trees were cut down. Subsequently, many of China's outdoor public spaces have been maintained as well-swept, bare-dirt ground.

Some 15 years ago, I was contacted about the development of a revegetation plan for urban open spaces in cities such as Beijing. The elimination of green vegetative turf cover, which stabilizes the soil, had resulted in major atmospheric pollution in the form of dust storms. More importantly, the rate of serious human diseases was increasing much faster in Chinese cities than in other major cities of the world.

The Chinese had concluded that the lack of green vegetative cover and its associated living biological ecosystem of antagonists to disease-causing viral organisms had resulted in a major increase in these organisms, which were readily disseminated in wind-blown dust particles. Initial revegetation efforts emphasized tree planting, but this did not solve the problem. China is

now embarking on an active program of revegetating open spaces with turfgrasses. These events illustrate the vital role of turfgrasses and the need for judicious water use to provide numerous functional benefits including the protection of human health.

Top photo: Tiannenmen Square in central Beijing, the site of the 1989 riots, was originally a solid gray mass of concrete. Bottom photo: in 1998, the Chinese government tried to soften the hard-line square by tearing up much of the cement and installing sodded bluegrass, giving it a more user-friendly appearance.

In the drier regions of **South America**, the primary problem is very archaic and relatively non-functional landscape-irrigation systems. A major investment is needed to improve these systems in order to achieve more efficient water use that in turn will maximize water conservation.

Singapore and **The Netherlands** are two outstanding examples of highly developed countries where the use of turfgrass and landscape plants is encouraged and people interact relatively harmoniously. While both of these countries are burdened with relatively dense populations and both have unique climatic and geographic situations, they are nonetheless two key examples of the importance and benefits of landscaping.

Parque Tezozomoc, Mexico City

Before: A 70-acre industrial area; After: the finished park for a community of one million people.

In one of Mexico City's most polluted areas, in the middle of an industrial and working-class district, was a space of 70 acres. This land was conceived as a cultural and recreational open space and transformed into a park for a community of one million people. The park was designed to recreate the topography and lagoons of the valley of Mexico as they were in the 15th century, to offer a symbolic vision of the region's historical and ecological evolution in an attractive and simple form. This physical memory is complemented with sports facilities, bike paths, a cafeteria, open-air auditorium and gymnasium.

The project was executed in four years, applying ecological concepts. The mounds were built of recycled earth from subway excavation; recycled water is used to fill the lake, for the irrigation and for year-round maintenance of the park; a municipal nursery was installed to produce plants for the reforestation of this part of the city. In the five years of its existence, the park has been transformed into a local landmark that receives from 5,000 to 20,000 visitors every weekend. This project has become the model to show that contemporary landscape design—even when done in the most difficult situations in terms of poor social conditions and extreme budgetary constraints—can provide a social, artistic and ecological benefit to a Third World environment such as Mexico City.

The architect was Sr. Mario Schjetnan / GDU and the project won the American Society of Landscape Architects President's Award of Excellence.