

the historic county seat of Montgomery County, is in the midst of a revitalization effort for its downtown and the surrounding community. Norristown joined with the county to commit the time and funds needed to implement a number of projects and programs, not only to attract more people, but also to encourage the creation of new businesses and jobs. The Norristown Main & Cherry mixed-use parking structure is one part of the plan to revitalize the municipality and make it a destination for people from Philadelphia and the surrounding suburbs.

The garage facade was designed to complement the historic atmosphere of downtown Norristown, emulating the materials, scale, and proportion of the neighboring buildings. The structure's retail component was seen as important in the design because it helps maintain pedestrian scale as well as the character of the streetscape along Main Street. Providing another occupancy type in the garage is expected to attract patrons, making the street more active.

Because Norristown officials realized that parking would be a critical component of downtown business revitalization, the mixed-use parking structure is designed to provide sufficient parking spaces for the area, as well as incorporate retail destinations that are expected to make the street and the surrounding neighborhood more vibrant.

Providing parking for redevelopment and revitalization is not simple. It requires a visionary process that incorporates not only municipalities, owners, and developers, but the community as well. Parking can make a significant contribution to economic and community revitalization as well as to sustainable land use by creating density and active places for people. **UL**

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*The Parking Garage: Design and Evolution of a Modern Urban Form*, by Shannon S. McDonald, is available (\$69.95, members; \$87.95, nonmembers) from [www.uli.org/bookstore](http://www.uli.org/bookstore) or 800-321-5011.

## Synergistic Landscapes

PATRICIA L. KIRK

**Attention to environmental concerns and the need to halt sprawl is ushering in a new era in landscape architecture, challenging designers to take a synergistic approach to creating environments that simultaneously satisfy the goals of multiple interests.**

WHILE POLITICIANS in Washington, D.C., debate the effects of global warming, state and local governments faced with the reality of erratic weather patterns and resulting droughts and floods are taking matters into their own hands, implementing policies and incentives aimed at better management of water resources.

Most states have drought plans in place or in the works, and those already hard hit, such as California, Arizona, and Colorado, have issued strict requirements for on-site stormwater retention and treatment and new rules for development in urban areas to reduce groundwater draw. Some states, including Maryland and Florida, have enacted laws to ensure that development does not exceed a community's water resource capacity.

Some local governments, particularly those in arid climates, also are making zoning changes that favor conservation, creating water recycling infrastructure and rewarding developers for using landscaping strategies that conserve and recycle water resources. Code for new construction in Denver, Colorado, for instance, now requires water-efficient fixtures and appliances, and the city is building a dual water system to provide large users with recycled water for irrigation. Tucson, Arizona, is offering developers utility revenue kickbacks for using a desert, or "xeriscape," landscaping strategy, utilizing drought-tolerant plants, gravel, rocks, and other natural materials to conserve water and create attractive landscapes with little or no turf. In addition, the second phase of the U.S. Environmental Protection Agency's (EPA) National Pollutant Dis-

**The 15-acre (6-ha) lake at the Bridgeport, a 70-acre (28.3-ha) development at Newhall Ranch in Valencia, California, serves as an aesthetic focus for the community, primary drainage conveyance and natural runoff water treatment facility.**



PACIFIC ADVANCED CIVIL ENGINEERING



**Water runoff will be filtered through a natural stormwater system at the Noisette Navy Yard, a 380-acre (154-ha) urban development in North Charleston, South Carolina, ending up in this series of cascading pools at the entrance to the community, creating an aquascape focus for the commercial district.**

(154-ha) sustainable development in North Charleston, South Carolina, by local developer John Knott, collects and filters runoff near the source before recharging the aquifer, says Harry Gordon, a principal at the Washington, D.C., architecture firm Burt Hill who heads up the project's design.

Gordon explains that the system consists of a string of interconnected rain gardens and bioswales—low spots and ditches, respectively, covered with native plants that collect water runoff from roofs, roads, and other impervious surfaces and naturally filter out toxins and other impurities before it seeps into the aquifer. The rain gardens and bioswales provide a lush natural landscape, he notes, and are engineered to remove standing water be-

**Xeriscaping was used around model homes and public areas at the Alamo Creek community in northern California to conserve water and create attractive landscapes, utilizing drought-tolerant native plants, gravel, rocks, and other natural materials.**



PHOTOS

charge Elimination System, which became effective in March 2003, requires communities nationwide to seriously address stormwater quality issues by implementing standard structural control measures, or “best practices.”

David Del Porto, president of Boston-based Ecological Engineering Group, which combines conventional engineering services with ecological design innovations, stresses the importance of water conservation and suggests that rainwater collection and storage infrastructure is a matter of homeland security, as no one is immune to the potential for a water supply crisis. Noting, for instance, that 60 percent of New York City's water supply comes through an aqueduct from Canada, he points out, “A terrorist attack could wipe out the supply instantly, leaving no water to fight fires or for routine use, so the city would have to be evacuated, making for a tragedy unlike anything ever seen in the movies.”

While some developers consider new water conservation standards an added entitlement burden, others view it as an opportunity to “do well by doing good” and are capitalizing on the push for sustainable water management solutions by creating desirable features that both fulfill environmental requirements and add value to real estate.

One way developers are accomplishing this goal is by replacing typical stormwater retention facilities with large-scale aqua systems that include lakes, ponds, creeks, and other aquascape features traditionally used as ornamental elements, providing a water amenity for residents and boosting profits.

“Typical stormwater holding tanks take up buildable space, use land that you don't get any benefit out of, and create giant unsightly pits,” says Bruce Phillips, senior vice presi-

dent for the stormwater management division at California-based Pacific Advanced Civil Engineering (PACE), contending that standard control measures defined by the EPA also have limited capacity to remove pollutants and numerous issues involving maintenance costs.

On the other hand, an aqua system recreates a natural ecosystem that cleans stormwater runoff more effectively than conventional methods and provides added benefits for people and nature, creating aesthetically pleasing landscapes, recreational opportunities, and habitats for plants and animals, as well as boosts real estate values. “Integrating a storm drainage lake system into a community puts value into a property while satisfying escalating stormwater pollution control regulations aimed at protecting watersheds and downstream waterways,” he points out.

One example of an application of aquascape treatment technology is the PACE-built aqua system at the 70-acre (28.3-ha) Bridgeport Valencia community in southern California, which comprises a 15-acre (6-ha) lake with strategically located biofilters that completely filter lake water every three days and bubble diffusion system on the bottom of the lake to aerate lake water every few hours.

Water quality was further improved by planting submerged wetland vegetation along the lake's edge to pretreat water runoff before it enters the lake. The wetland vegetation functions like kidneys, naturally filtering out impurities in water runoff, explains Phillips, pointing out that natural vegetation enhanced the appearance of the lake's edge and enabled the developer to charge a premium for adjacent lots.

Similarly, the stormwater system at Noisette Navy Yard, a high-density, 380-acre

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fore mosquito larvae can hatch. Excess water is channeled via bioswales into a series of three cascading pools at the main entrance to the community, creating an aqua feature and focus for the commercial district.

Open spaces in communities also are being engineered to do double duty as water treatment systems. For instance, runoff from the entire Sierra Lakes community, a 700-acre

water back into the aquifer. The community's natural water management system includes a wetlands component designed to provide flood control, create a natural habitat for plant and animal life, and filter runoff so that water is already fairly clean when it flows through the golf course, he notes.

San Francisco-based Catellus also is creating sustainable water-quality infrastructure at the 709-acre (287-ha) Mueller project in Austin, Texas, that involves a system of lakes and retention ponds that double as a natural storm drain and filtration system, says Jim Adams, lead architect on the project and principal at San Francisco-based ROMA Design Group, explaining that the ponds will be linked to cisterns installed underneath playfields to reclaim and store water for irrigation.

The water management system is part of a larger plan to green the barren former Mueller Airport property that calls for planting 15,000 trees and a variety of vegetation on the city's "grow green" list of drought-tolerant, indigenous plants, he says, noting that about one-third of the site will be dedicated to parks and open space.

Landscaping with native plants is catching on nationwide, as governments push for sustainable landscaping solutions to conserve water and ensure that clean water enters watersheds and travels downstream. "The idea of native plants is coming along," points out Jeff Stevens, senior project manager at Irvine, California-based JZMK Partners, noting that the concept got a shot in the arm recently from the U.S. Green Building Council, which referenced native plants in the latest Leadership in Energy and Environmental Design program, LEED 2.2.

Long an advocate of landscaping with indigenous plants and noninvasive adaptive imports, Stevens explains that it reduces water consumption, eliminates the need to amend soils and fertilize, and provides the opportunity to seamlessly tie a community into the surrounding landscape. The opposite is true for imported invasive exotics, which compete with native plants; do not provide habitats for native animals; and clog drainage systems and streams, causing flooding and costing governments millions of dollars annually to remove.

"The concept is not on the public's radar screen yet, so there's still a little fear on the

part of developers that the public isn't ready for adaptive landscaping," Stevens says. "But if the drought flag is raised, it will be a driver for adaptive landscaping," he continues. "The great thing about LEED is it brings everyone involved to one place for information."

A lack of consumer demand, however, makes it difficult to find nurseries with a good selection of native plants, points out Leslee Temple, vice president/CFO at Orange County, California-based NUVIS Landscape Architecture and Planning, which specializes in sustainable landscaping.

When NUVIS was selected by northern California developer Shapell Homes to landscape 13 model homes and public areas at Alamo Creek, a 575-acre (233-ha) master-planned community near San Ramon, California, Temple contacted local nurseries in advance to tell them what was needed. Even so, she says she had to settle for five-gallon rather than the usual 15-gallon plants, because native plants were not part of normal stock and had to be specially grown.

Suggesting that the public generally thinks of native plants as weeds that brown the landscape, Robert Cardoza, NUVIS president/CEO, contends that demand for native plants will increase as the perception changes with education about the aesthetic, environmental, and economic benefits of adaptive, or sustainable, landscaping. He notes that materials used at Alamo Creek created a lush, colorful environment at a cost similar to typical landscaping, but will save money over the long term in watering and maintenance once plants become established.

Shapell plans to fine residents who exceed an established water usage limit and, therefore, has commissioned NUVIS to develop an educational program and materials to teach residents about the benefits of xeriscapes and how to establish and care for them.

Shapell and Catellus are among a growing number of developers opting for sustainable landscape solutions. Centennial, a 12,000-acre (4,858-ha) new town in the northeast corner of Los Angeles County by local developer Centennial Founders LLC, also will impose strict sustainable landscaping standards, requiring exclusive use of native vegetation throughout the project to conserve water, provide a natural transition between developed



ED SNODGRASS

The sustainable landscape scheme at the Crossings at Corona, a regional shopping center in southern California, restored sensitive habitats and created an environment of pathways, gardens, and shade using noninvasive, drought-tolerant plants, native trees, and recycled hardscape materials.

(65-ha) master-planned development by Los Angeles-based Lewis Homes in Fontana, California, is channeled to the golf course, where local engineering firm VA Consulting created large "gravel galleries" underneath sand traps to filter water before recharging the aquifer.

Dan Villines, the firm's director of water resources, explains that the concept restores the ancient natural filtration system, using sand traps as the first-line filter and gravel galleries to finish the job and put drinkable

and nondeveloped land, and eliminate the potential for contaminating the ecosystem.

The developer's commitment includes providing on-site horticultural expertise to educate and assist residents in planting and caring for native plants. Stevens, who was involved in planning this project, emphasizes the importance of the program's success, noting, "Centennial is at the top of the watershed and could [affect] everyone downstream."

More and more commercial developers too are getting on board for sustainable building and landscaping strategies. NUVIS was also selected by California-based developer Castle & Cooke to landscape the Crossings at Corona, a 1.2 million-square-foot (111,483-sq-m) regional shopping center in Corona, California. One of the largest and most ambitious green retail projects in the nation, the Crossing at Corona has a landscaping scheme that includes development of ecological associations, reduced water consumption, use of recycled hardscape materials, restoration of sensitive habitat areas, and creation of serene pathways and garden environments to provide shade and beauty.

Large sites provide the opportunity for natural water conservation and management solutions and habitats for animal and plant life on a grand scale, but urban environments require lots of smaller, localized solutions that together significantly reduce the load on aggregate drainage systems, while also giving people a breather from urban density and a place to socialize.

Some cities, like Chicago, require developers to "green" a percentage of rooftops on new and redevelopment projects to reduce runoff, as well as conserve energy. Although developers can fulfill this requirement by planting sorghum, which turns brown, some are creating rooftop gardens and landscaped terraces as an amenity for occupants, providing the developer with a competitive edge and greater return on investment with higher rents and real estate values. Chicago-based Structured Development principal Michael Drew notes that his company invested in an outdoor roof terrace at its New-City development in downtown Chicago, but recovered the cost with the value it added to condominiums.

Green rooftops not only boost profits and provide city dwellers with an escape from the



ED SNOGRASS

Industrial buildings provide an opportunity for large green rooftops, like this one at a metal fabricating plant in Jessup, Maryland, that help operators cut energy costs and extend the life of roofing material.

concrete jungle, but also offer tremendous economic and environmental benefits, notes Lawrence Reed, landscape architect and principal at Sausalito, California-based architecture firm SWA Group.

A green roof costs two to three times more than a conventional roof, but extends the life of the roof by protecting roofing material from ultraviolet radiation and heat. It also reduces energy required to maintain human comfort inside buildings, insulates rooftops from heat and decreases the heat island effect, contributes to biotic diversity by providing a habitat for animals, has aesthetic value for building users, stores surface water, and ultimately helps minimize the effects of global warming, points out Reed.

"Green roofs serve a stormwater function, act as a sponge, and create evaporation cooling to release heat, says Ed Snoggrass, owner/operator of Street, Maryland-based Green Roof Plants, the only nursery in the nation dedicated exclusively to growing green roof plants. He points out that a green roof can cut radiant heat release from the surface by eight to ten degrees, depending on the size of the roof surface area, providing an air-conditioning benefit. But energy conservation is not the main reason developers do them, according to Snoggrass: "They do it to satisfy stormwater management, for aesthetic value, to provide personal gardens in cities, and for the competitive advantage."

Criteria for selecting plants suitable for a roof, however, differ from other sustainable landscaping strategies in that plants are picked for their ability to absorb moisture and grow in three to four inches (7.6 to 10 cm) of soil medium, he explains. Therefore, notes Snoggrass, "It's not always possible to stick with indigenous plants. It's preferable if you can satisfy other requirements."

The green rooftop, however, is just one element in planning urban landscaping that improves city livability and provides environmental accountability. Cory Shupe, senior planner/designer based in the Utah office of the Planning Center, a southern California planning firm, notes that the push for increased density in urban centers has created a greater need for open spaces and lively streetscapes, where people can escape the concrete and asphalt or let off steam.

"Designers are looking at every nook and cranny to find places to put space that provides a nice break from one building to the next," continues Shupe, pointing out that spaces might be programmed for activity or to offer quiet and relaxation.

One example of a successful pocket park is midtown Manhattan's Paley Park, named after its benefactor, former CBS chairman William Paley, says Reed, noting that Paley was involved in all aspects of planning the park from conception to selection of the right hot dog. He points out that the park, which

was built in 1967, is successful because of its location along East 53rd Street, which gets a lot of foot traffic and features the soothing trickle of a waterfall wall that invites passersby to enter this welcoming respite from the sights and sounds of urban living, with a canopy of shade trees, ivy-covered walls, and other landscaping features, as well as a café.

Ethan Kent, a sociologist and vice president of New York-based Project for Public Spaces (PPS), a nonprofit organization that assists communities with design and planning of public spaces, points out that programming is essential to place making in public spaces.

He notes that a PPS study indicates that people prefer sitting where they can observe activity going on around them, and that secluded spaces intended as a refuge from the concrete jungle actually end being used for negative activities. “Paley Park is quiet and calm, but works because it’s active in the sense a water wall is designed to provide white noise and the space for socializing.”

Great parks do not happen just because developers leave space for them. “Centering a development around a public space contributes to the success of the neighborhood and development,” Kent says, noting that there needs to be a plan for what to do there.

Even in industrial districts transitioning to residential use there are opportunities to create active streetfronts and rooftop gardens and terraces, where people can congregate and socialize. The Brewery Blocks in Portland, Oregon’s eclectic Pearl District is a successful example, notes Kent. “Every block has local authenticity and activity on the street.”

Similar to Paley Park’s designers, Shupe notes that designers today are putting a lot of thought into when, why, and how people use park spaces, focusing on details like solar aspects to provide sunny spots in winter and shade in summer so people can use them year round.

The focus on planning parks around how people use them, however, has triggered an evolution in urban park design, he continues, explaining that in the past urban parks were planned as islands, but today the emphasis is on creating a system of parks linked together by green causeways and hardscapes that provide pedestrian-friendly access to a variety of

parks and recreational facilities designed for different uses.

“An extensive linkage system is extremely important to people,” Shupe notes. “It doesn’t need a lot of space and can be done on existing roads, but has to be done thoughtfully—just changing materials can give unity to a park system.”

An example is the network of interconnecting walkways, parks, and greenbelt areas at Victory Park in Uptown Dallas that will connect with the \$23 million Katy Trail, a 3.5-mile-long (5.6-km-long) landscaped pedestrian and bicycle trail system under construction, which is replacing abandoned railroad tracks that ran through the most densely populated area of the city. (See “From Tracks to Trails,” by Charles Lockwood, April 2007, page 186.)

Today, with less emphasis on automobiles and more on building walkable neighborhoods and environmentally responsible communities, local governments and users have higher expectations for both function and sustainability of environments created and developers are setting aside more space for people activities than ever before.

The work of landscape architects, therefore, now requires greater knowledge of and attention to the scientific, land use, and social aspects of spaces created. Landscape designers are being challenged to create more from less—streetscapes and rooftops that function like parks—and provide aesthetically beautiful environments that meet multiple goals simultaneously: conserve water quality and quantity; lower maintenance costs; provide a sense of place and community amenities; and satisfy entitlement requirements, government’s vision for the space, and the client’s desire to increase real estate value.

“Unlike 50 years ago, gas prices are at the forefront of everyone’s mind,” says Shupe. “People are cognizant of water use and the need to create a way of life in urban centers. As a designer, it’s nice to be working in an era when these things are important to us,” he concludes. “This makes my profession interesting every day.” **UL**

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## New Cultural Landscapes

STEVE WHITEFORD AND YUN CAO

**A Japanese garden, noted building, or local playground—whether located on rural land or in carefully designed urban spaces—all offer examples of cultural landscapes as built environments that express human experience, culture, and history.**