

a It's in There!

Stunning flora, valuable lessons in conservation and cutting edge landscapes prove when it comes to designing today's zoos, horticulturists don't monkey around.

Text and photos by ROB HALPERN

I know this sounds like the opening for a barroom joke, but this story captures the soul of modern zoo design: An African ambassador and a zoo's chairman of the board were walking down a forest path, when the ambassador stopped and said, "I know where I am. This is where I grew up." But he was only partly right. They were in New York, strolling down a re-created Congo rain forest path at the Bronx Zoo.

The ambassador was surprised at how much the landscape resembled his home 6,000 miles away. Even though none of the exhibit plants was from central Africa, the landscape for the Congo Gorilla Forest was a successful replication. Using 15,000 plants of more than 400 species, the zoo was determined to show what the Congo forest looked and felt like in an effort to get casual zoo visitors involved in saving African forests

and wildlife. To accomplish this, I — as the zoo's curator of horticulture and landscape designer — spent five years researching African flora; studying gorilla behavior; visiting nurseries, botanical gardens and natural history museums; talking with field biologists working in Africa; brainstorming with gunite rockwork sculptors; and studying videos of the Congo.

Telling stories. Zoo landscape design is more than a sensory experience. These gardens and surroundings have stories they must share. While working as the Bronx Zoo's curator, I also designed a landscape for the grizzly bears of Kodiak Island. I was thrilled to learn their Alaskan habitat was Zone 6, allowing us in New York to use plants important to the wild bears' survival in Alaska:

A brief history



Hundreds of plant varieties — and 30 gorillas — at the Bronx Zoo re-create the species diversity of the Congo rain forest.

When it opened in June 1999, the Congo Gorilla Forest at New York's Bronx Zoo was the most ambitious zoo landscape ever created. But the importance of landscaping to the exhibit's success is not a new idea. Zoos have been serious about horticulture from their earliest days. When 19th century zoos were established for the amusement and entertainment of families with leisure time, landscapes were as important as the animals. Renowned landscape architects and designers were commissioned to direct the planting at early zoos, such as Adolph Strauch in Cincinnati, Harold Caparn in New York and Frederick Law Olmsted in Washington, DC.

From the 1800s to 1930s, zoos were admired for their beautiful grounds. But after World War II, when labor — specifically grounds maintenance — became expensive, most public parks and zoos turned more to asphalt and cement than to plants for their design solutions. It appeared that horticulture was no longer valued by the zoo community.

Many people still think of zoos as sterile prisons for animals. Visitors today, however, will find those depressing facilities are pretty much gone, replaced since the 1970s with magnificently landscaped grounds and dramatic exhibits that re-create every wild corner of the planet.

Zoo designers, usually architects and landscape architects working with zoo directors, have reimagined the zoos of our memory into new conservation parks. Zoo horticulture emerged as a profession requiring a vast knowledge of plant varieties (including toxic species), botany, animal behavior, geography, wild habitats, grounds maintenance, arboriculture, interpretive design, business management and even public relations.

Where horticulture and landscape design once only provided a pleasant backdrop for a visit to the zoo, they now make or break the success of the facility as a popular destination and conservation center. A number of zoos, recognizing the importance and popularity of their plant collections, are now botanical gardens as well. To name a few: the Arizona-Sonora Desert Museum, Tucson; Calgary Zoo, Botanical Garden & Prehistoric Park, Calgary, Alberta, Canada; Cincinnati Zoo & Botanical Garden; Erie Zoo & Botanical Gardens, Erie, PA; Mesker Park Zoo & Botanic Garden, Evansville, IN; The Oklahoma City Zoo and Botanical Garden; Riverbanks Zoo and Garden, Columbia, SC; and the San Diego Zoo. In addition to their plantings and displays, many establishments offer special horticulture events, classes, plant tours and volunteer opportunities.



A shady Asian forest is re-created at Woodland Park Zoo with Asian and native plants.

Cornus canadensis, *Elymus arenarius*, *Rubus spectabilis* and *Viburnum*. This gave the exhibit a certain authenticity. It also helped the zoo tell the story of these omnivorous animals that eat wild sedges in spring and berries in fall — in addition to their meals of salmon and ground squirrels.

Landscapes have become vital components of a zoo's mission of conservation education. Animals exist in plant habitats. Whether they eat plants or hunt prey that eat plants, make nests of plants or climb up into them, all animals trace their existence back to the green

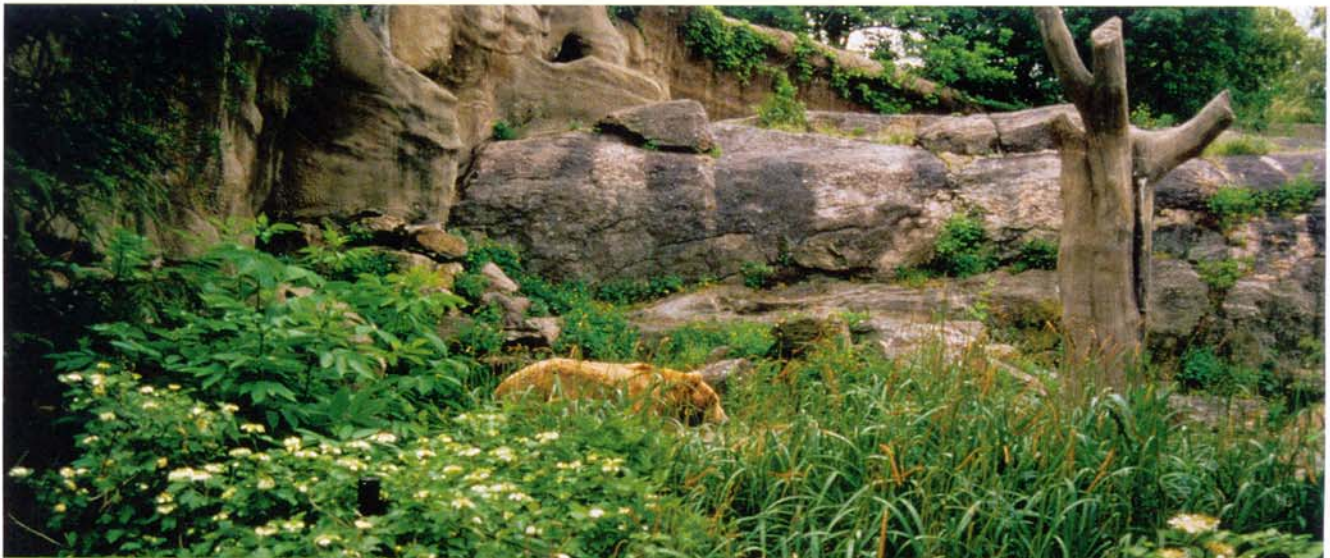
ecosystems they inhabit. The best zoo exhibits demonstrate this.

Zoo horticulturists, in order to re-create or suggest these faraway habitats, must often work with plants that are rarely grown in their region. Many plant experiments result in the introduction of promising ornamental species to local gardeners. Of the 400 plant species I used to re-create the Congo, I think the most commented upon were *Idesia polycarpa*, *Liquidambar styraciflua* 'Rotundifolia' and *Sinocalycanthus sinensis* — the last two being terrific choices for area gardens.



Rain forest trees of steel and epoxy hold live African orchids, while epoxy vines support a tangle of hardy *Actinidia* at the Congo Gorilla Forest.

Some displays, like the gorilla exhibit at the Bronx Zoo, require a variety of exotic plants to turn New York into the forests of Gabon or western China. Others use only native plants to tell the story of local habitats. When it opens in 2006, the upcoming Oklahoma Trails exhibit at The Oklahoma City Zoo and Botanical Garden will be a trip through many of the state's varied habitats: Black Mesa, the Great Plains, the Flint Hills prairie, Crosstimbers and more. Horticulture curator Pearl Pearson and the park's design team have selected plants appropriate to each of these regions to create a stunning survey of Oklahoma's botanical richness, as well as a series of beautiful natural landscapes. As a result,



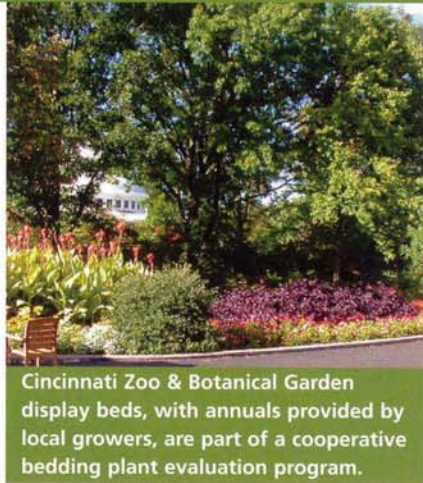
Alaska's Kodiak Island and New York are both Zone 6, enabling the Bronx Zoo bears to be observed in a realistic setting.

visitors will gain a new awareness and love for their local flora and what can be done with native plants.

Immersion landscaping, in which visitors and animals are surrounded with realistic habitat re-creations, requires more than collecting plants from a particular country or state. African rain forest species and New York winters are a bad combination. Tropical palms or banana selections may be planted out for summer, but you can't design 6 acres like that. To tell the Congo story, hardy look-alikes and related species were used. It's amazing how much the leaves of our native *Acer pensylvanicum* resemble those of an African understory tree, *Sparmannia africana*, or how the leaves of *Aesculus* spp. suggest foliage of the tropical kapok tree, *Ceiba pentandra*.

Wild landscapes are more than a collection of plants, though. Rocks, water, leaf litter and other elements together give a zoo landscape its sense of place. The most convincing zoo exhibits may include artificial mud banks or rock faces, boulders, or even huge vines of latex and massive rain forest trees of epoxy. Setting the right balance of all these pieces turns an awkward zoo exhibit into a thrilling, wild adventure. The best exhibits don't appear as exhibits at all, as fences, sheds, irrigation, food bowls — even entire buildings — disappear into the natural scene.

Just for zoo. Today's zoo landscape is a tremendous benefit to visitors, and certainly the animals prosper when they have the space and natural materials that allow them to behave more as they might in the wild. For the horticulturist, it's a toss-up between which is the greater challenge: maintaining the



Cincinnati Zoo & Botanical Garden display beds, with annuals provided by local growers, are part of a cooperative bedding plant evaluation program.

grounds on a day when 15,000 visitors show up, or maintaining the exhibits when monkeys, elephants, bears and the rest of the ark's passengers see the landscape as dinner.

The pressures on the public landscape at a zoo are very different from those on the animals', and yet the two must appear as one. Zoo horticulturists become experts on toxic plants; spiny shrubs; leaves that just taste bad; and subtle, but powerful, barriers. Zoo exhibits must be regularly replanted and often redesigned to stay ahead of the animals and summer crowds.

Over the past 10 years, zoo horticulturists have reached outside the zoo gates to address horticulture issues in their communities and beyond. Two recent projects deserve particular attention.

In 2002, Steve Foltz, director of horticulture at the Cincinnati Zoo & Botanical Garden, partnered with the Cincinnati Flower Growers Association; The Ohio State University Cooperative Extension Program in Hamilton County, Cincinnati; Ball Flora Plant, West Chicago, IL;

PanAmerican Seed Co., West Chicago; and Proven Winners LLC, Sycamore, IL, to conduct summer trials of annual bedding plants at the zoo.

So far, 140 varieties have been tested. The growers and seed companies provide plants, and the zoo's staff and Master Gardeners plant more than 14,000 annuals to beautify the grounds while the selections are being evaluated. The varieties are labeled so the public can discover their own favorites. Each year the recommendations are posted on the zoo's Web site (www.cincyzoo.org) and promoted locally through brochures. This collaboration benefits everyone involved: the zoo, growers and seed companies, as well as the gardening public.

In the high desert of Colorado, the Cheyenne Mountain Zoo in Colorado Springs has tackled a different local need. In a region where water can get scarce but landscapes are often designed to be dependent on irrigation, the zoo's horticulturists designed and installed a "No Water" Garden in 2002. Wanting to push Xeriscaping to the limit and create a garden that required no supplemental water, vice president and COO Bob Chastain selected the harshest site imaginable: a planter between two parking lots, surrounded by asphalt and supporting only four existing hawthorns. As the horticulturists write on the zoo's Web site (www.cmzoo.org/nowatergarden.html), "At the time of planting the entire bed was thoroughly watered and then we walked away."

Dozens of species have since been tested in the garden and monitored as to their survival. Staff members took their story to the green industry, the press and regional conferences. Today the idea is being replicated in other Colorado

A sense of style



The Bronx Zoo's Butterfly Zone is a giant caterpillar-shaped shade house with butterflies inside and demonstration gardens outside.



Tender tropical palms and *Alocasia* planted each summer with hardy landscape plants create exotic effects at the Cincinnati Zoo & Botanical Garden.

cities, as well as in desert communities as far away as El Paso, TX. (Information, plant lists and evaluations on this project can be found at the zoo's Web site.) In 2003, the "No Water" Garden was recognized with the Conservation Award from the Association of Zoological Horticulture Inc. (AZH).

Making introductions. Zoos have been under-recognized as leaders in American horticulture. In the summer of 1905, Hermann Merkel, chief forester at the Bronx Zoo, observed American chestnuts were declining rapidly, so he sent twig samples of the native plants to the USDA for analysis. The resulting diagnosis of chestnut blight was the first indication of what would become a devastating epidemic. While the infestation was traced to shipments of imported Japanese chestnuts from a Rochester, NY, nursery into the New York area, the Bronx Zoo (which had no Japanese chestnuts) has often been mistakenly associated with the disease, rather than celebrated for the sharp eyes and inquiring mind of its forester.

Zoos have introduced the general public to a host of plants and gardening

visitors can enjoy more than a dozen specialty gardens created by its Horticulture Department: dwarf conifers, ornamental grasses, plants native to Asia, species that attract hummingbirds, endangered plants of Ohio and more. The zoo also has a conservatory. Don Krock, park manager of horticulture, has been collecting rare and interesting plants for decades and introducing them to the northern Ohio public.

Other landscape styles have emerged as well. At the opposite end of Ohio, Dave Ehrlinger, formerly in charge of horticulture at the Cincinnati Zoo & Botanical Garden for 28 years, led the movement toward exotic planting design at zoos. With few lawns or formal beds at the 67-acre site, the public paths are lined with rich mixes of trees, shrubs, perennials and grasses from many parts of the world.

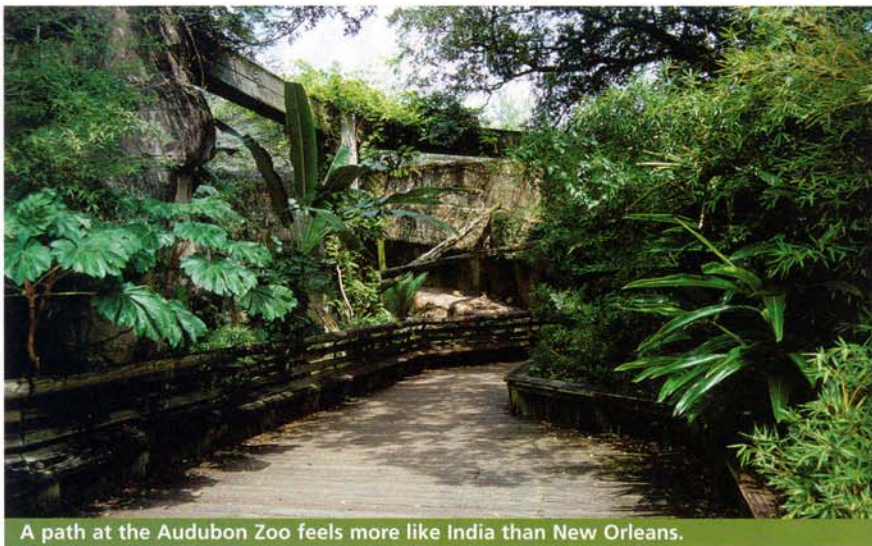
More than 3,000 plant species and cultivars are used to make the Cincinnati facility one of the most renowned zoo landscapes in the world and a destination garden in the Midwest. As the second-oldest zoo in the country (opened in 1875), the property boasts magnificent trees, including the state champion Japanese pagoda tree, *Styphnolobium japonicum* (formerly known as *Sophora japonica*), probably planted in the 1880s. The zoo's annual spring garden event, begun in 1987 as the Spring Floral Festival, attracts thousands of visitors to the zoo every April to stroll among more than a million bulbs, surrounded by blooming shrubs and trees. At a time of year when zoo attendance was traditionally low, this garden event helped put the zoo back in the headlines.

A third influential style of zoo design can be seen at New York's Bronx Zoo, the Woodland Park Zoo in Seattle and the North Carolina Zoological Park in Asheville. These large operations — the North Carolina zoo covers 500 developed acres, with another 900 acres available for future growth — maintain a more natural style.

When the Bronx Zoo was founded in 1895, one goal was to maintain its 265 acres in as natural a state as possible. A trip to the zoo can still take visitors back in time, into the oak beech forest that once covered parts of New York. The impression is one of natural landscape rather than developed park. Each animal exhibit immerses the visitor in the habitat of the animals. For example, the Himalayan foothills — where red pandas live — are represented at the zoo in a wooded exhibit with dozens of plant species from that region, including *Betula jacquemontii*, *Potentilla nepalensis* and *Rosa sericea* var. *pteracantha*. The backdrop for the exhibit is the park's natural forest, and a sign draws visitors' attention to the evolutionary connection between the flora of North America and northeast Asia.



The Cleveland Metroparks Zoo, featuring more than 3,400 plant taxa, has special collections labeled for zoo visitors.



A path at the Audubon Zoo feels more like India than New Orleans.



A mix of exuberant grasses and native shrubs at the Toledo Zoo turns an out-of-the-way path into a garden event.

trends. Many gardeners first saw the possibilities of ornamental grasses at their local zoos. These establishments also promoted the use of native plants and IPM to the general public long before such concepts became commonplace.

For example, butterfly gardening is an expanding segment within the green industry today, and zoos were in the lead from the beginning. In 1978, the Cincinnati Zoo & Botanical Garden created one of the first walk-through butterfly exhibits. Soon after, the zoo featured a butterfly garden, encouraging guests to plant their own landscapes that attract the pretty pollinators. In 1995, when I proposed the Bronx Zoo build an exciting walk-through butterfly exhibit, many on the staff doubted such a thing could ever be popular with the public. However, the Butterfly Zone opened the following year: a 6,000-square-foot shade house shaped like a 20-foot-tall, 40-foot-wide, 170-foot-long caterpillar.

In addition to the planted indoor exhibit featuring 1,000 butterflies, gardens outside demonstrate a variety of designs sure to attract the stunning creatures. They also urge gardeners to use restraint with pesticides and allow the “weeds” many caterpillars require to remain in

their gardens, such as *Asclepias* spp., *Cirsium* spp., *Plantago* spp., *Trifolium pratense* and *Urtica* spp. Today almost every zoo features some type of butterfly garden or exhibit, introducing millions of potential gardeners to the satisfaction of butterfly gardening.

Gaining knowledge. Zoo architects are now talking more about green design and Leadership in Energy and Environmental Design certification. Increasingly, zoo buildings are being designed with green roofs, such as the Animal Nutrition Center at the St. Louis Zoo, Zoo Atlanta’s Conservation Action Resource Center and the Point Defiance Zoo & Aquarium’s Animal Health Care Facility in Tacoma, WA. But the architecture of green roofs is relatively young in the US. Expect zoo horticulturists and landscape architects working with zoos to be even more creative and ambitious in their plant use in such spaces.

Conservation issues of all kinds are priorities for zoos as well, including water conservation and efficient irrigation, IPM and reductions in environmental hazards, and, increasingly, invasive plants. Zoos are well-aware that with the popularity of ornamental grasses comes the escape of *Miscanthus*. *Berberis* — an essential plant for keeping zoo animals and visitors well-behaved around plants — have escaped, too. Almost every escaped ornamental plant has value in the zoo landscape. It is unlikely that zoos introduced any of these invasive plants (any more than zoos are responsible for chestnut blight), but they do depend on the vast palette of ornamental plants in order to fulfill their mission of entertainment and conservation education.

There is a tremendous need for zoo horticulturists and the nursery industry

to discover noninvasive forms of — or replacements for — many of our popular ornamentals. The Cincinnati Zoo & Botanical Garden’s collaboration with the local green industry and universities may be a model for other useful collaborations in the future. Zoos have large properties with diverse plant collections, attentive grounds people and a conservation mission. They may be the perfect testing and evaluation sites for new varieties. And with their huge attendance and public support, zoos can educate local gardeners and civic leaders about the problems of invasive plants, as well as the work being done in the green industry to respond to those problems. To succeed, zoos would need plants and funding help from the nursery industry, and perhaps evaluation and modeling help from university staff.

At the other end of the nursery-zoo spectrum is the problem zoos have obtaining the interesting plants they need. During my days at the Bronx Zoo, I would purchase small, mail-order plants of unusual species and grow them on for years for eventual use in an exhibit. Few zoos currently do that. Now, as a zoo designer, I find that my biggest limitation is not only the exhibit budget, but the lack of landscape-size, native plants for Oklahoma City; or spiny, tropical-looking shrubs for gorillas in Wichita, KS; or bamboo and other unusual plants for Springfield, MO.

Nursery professionals who believe in growing unusual or unappreciated plants have an outlet and an opportunity in zoos. Chet Halka of Halka Nurseries Inc., Englishtown, NJ, grows a few “oddball” large trees, knowing some zoo, botanical garden or collector will want them. Don Shadow of Shadow Nursery Inc., Winchester, TN, has been an important supplier of interesting plants to a number of zoos.

Trees with character may be unpopular for new housing developments, but they are gold for zoo designers. Some nurseries have joined and supported the AZH, yet many others have been hesitant to grow unusual plants even under contract. Few zoos have the space or the staff to grow small plants.

Perhaps the problem is that neither party realizes how they can support each other and what it takes to work together. Once a new zoo exhibit opens there is a fresh demand for plants. When Oklahoma Trails is opened and the public gets excited about native plants in that state, will nursery professionals be ready to meet that need? When the Nashville Zoo at Grassmere, Nashville,

For the love of zoos

Founded in 1980, the Association of Zoological Horticulture Inc. (AZH) is a professional association of zoo horticulturists that supports the growing contributions of horticulture to zoos and reaches beyond to support plant conservation around the world. Keeping zoo horticulturists in touch with each other through an online discussion group, six annual newsletters and an annual conference, the AZH funds internships for students, provides grants for plant conservation projects and recognizes conservation designs with annual awards.

In recent years, plant conservation has become a focus of the group, and award-winning projects have been noted since 1993. They range from the Congo Gorilla Forest exhibit at New York's Bronx Zoo to the pioneering work of Dr. Margaret From at Omaha's Henry Doorly Zoo, Omaha, NE, on the Western Prairie Fringed Orchid Project.

Zoos achieve conservation objectives in very creative ways. At the Oregon Zoo in Portland, for example, horticulture staff propagate *Viola adunca*, the larval host plant for the endangered Oregon silverspot butterfly. The plants are used in the zoo's breeding programs to increase the butterfly population. At the North Carolina Zoological Park in Asheboro, curator of horticulture Virginia Wall works with Limbe Botanic Garden, located in the African nation of Cameroon, to support that facility's development with technical assistance and advice.

For more information on the AZH, visit www.azh.org.

TN, opens its 4-acre African Plains exhibit this spring and visitors see a beautiful African savanna with 4,500 ornamental grasses of 17 species dancing in the breeze, where will they find a nursery to supply their gardens?

As zoos continue to reinvent themselves to compete with theme parks, television and video games at a time when the natural world faces its greatest threats from human expansion and land development, zoo landscapes assume a greater burden in the effort to save wild terrain. But if zoo professionals and members of the green industry find new ways to collaborate, both wild places and gardens will benefit.

Rob Halpern is the owner of Zoo Horticulture Consulting & Design in New York. He is formerly the curator of horticulture at New York's Bronx Zoo and the horticulturist at the Cincinnati Zoo & Botanical Garden. He may be contacted through his Web site at www.zooplantman.com. ♡