Urban Forestry in the Marvelous City of Rio

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Urban canopy in Ipanema, a neighborhood in the southern part of Rio

In late fall of 2011 I had the good fortune to visit the city of Rio de Janeiro, Brazil—nicknamed "the marvelous city"—through SMA's Municipal Arborist Exchange Program. I was hosted by Parks and Gardens Foundation Director of Arboriculture Flavio Pereira Telles along with his colleagues and family. I had previously hosted Flavio in the City of Sacramento, and this second half of the exchange allowed me to witness firsthand some of the practices, problems, and opportunities in Rio's urban forestry program that we had discussed during his visit.

Rio's forestry program differs from the model that we most often see in the U.S. and Canada in that tree planting and replacement is separated from routine tree maintenance by the department or agency under which it is managed. Mature street and park tree care, including pruning and removal, is performed by the solid waste department, responsible for solid waste management citywide, including cleanliness and general maintenance of all municipal streets, parks and gardens. Conversely, the Parks and Garden Foundation is responsible for administration, project planning and design, forestation and conservation of over two thousand public plazas and squares, urban and natural parks, and streetscapes. The Parks and Gardens Foundation is housed under the Secretariat of the Environment.

Flavio had prepared an ambitious schedule for my visit, and from the moment I stepped out of customs we were on the go. First up was a visit to Quinta da Boa Vista ("pleasant view"), a park of great historical importance

Pond on the estate of Burle Marx

From left to right: Rio Parks and Gardens Foundation staff Roberto Okabayashi, Alessandra Veloso, and Luciane Valente; Burle Marx Estate guide Marlon Souza; exchange host Flavio Telles; and exchange participant Joe Benassini.

in the city. Originally a Jesuit farm with a hilltop view of Guanabara Bay, the site eventually became the estate of the emperors of Brazil. Today, the park is home to the National Museum and Rio's Zoological Garden. Quinta da Boa Vista is one of the largest and most popular parks in the city, and many of the trees are original to the time of the emperors. Included were many figueiras, a name applied to any number of species of the genus Ficus. The characteristic root flare of these ancient trees gave them away from a distance.

We spent the rest of the day touring local neighborhoods in the North Zone, checking the growth and progress of newer street trees in the area. This is one of the most congested and busiest zones of the city, and typical of large cities everywhere, establishing and maintaining street trees is challenging. Overhead utilities present significant barriers. Nonetheless, shade and flowering trees are abundant, including amendoeira (*Terminalia catappa*), algodeiro (*Hibiscus tiliaceus*), and munguba (*Pachira aquatica*). Palms are commonly used, particularly where planting space is limited. Admirably, there is an emphasis on using species native to the region wherever possible.

The following day I was introduced to the staff at the Foundation, including landscape architects, civil engineers, biologists, and foresters. The staff of 20 was highly educated, very professional, and as interested as I am in common goals and challenges in arboriculture and urban greening in general. We agreed that our impediments are the same, and probably so everywhere. Urban trees tend to be undervalued, and successfully incorporating them into the fabric of city infrastructure requires strong partnerships. The Foundation office is located in Campo de Santana, another of the many historic parks in the city. Founded in the late 17th century as a military compound, it was transformed into a park in 1873. Over sixty thousand individual plants and trees were introduced, many of which are still in existence today. Here again were numerous ancient figueiras, including banyan fig (*Ficus religiosa*), rubber tree (*F. elastica*), and Indian laurel (*F. microcarpa*). Along with the many figuerias, oiti (*Licania tomentosa*) and sterculia (*Sterculia foetida*), so named for its unpleasant odor, were prominent.

From Campo de Santana, we walked to the Passeio Publico. Built in the 1779, it is the oldest public park in Brazil and one of the oldest in the Americas. Like many parks of the day, the Passeio Publico is a formal garden and includes lawns and trees, interspersed with statues, fountains, moats, and pavilions. Originally intended to be used by Rio's colonial high society, it was eventually opened to the public. Like Campo de Santana, the history of the park was evident in its oldest trees. The Passeio Publico contains the only baobob (*Adansonia grandidieri*) in the city and one of only 21 in all of Brazil. In the heart of Centro, or downtown, the park is heavily used by city residents and workers.

The infloresence of Talipo palm (*Corypha umbraculifera*) is the largest of any plant in the world. One of the largest palms in the world, it flowers only once at maturity, and dies after fruiting.

After an incredible lunch, we were off to yet another city park, although this one was closer to the Rio de Janeiro that we see in the travel brochures. Flamingo Park flanks Flamingo Beach for a distance of approximately 1.24 miles (2 km). Designed by world-famous landscape architect Burle Marx, the park's 296 acres (120 hectares) of land sits across from the famed Sugarloaf Mountain and holds 11,000 trees and 4,000 palms of approximately 150 different species. Of particular interest here were several examples of brazilwood (*Caesalpinia echinata*), after which the country is named. Once a common tree of coastal Brazil, it was brought close to extinction by the early traders who shipped the wood to the European continent to extract a highly valued red dye. Fruit trees such as jambu (*Syzygium samarangense*) and pitanga (*Eugenia uniflora*) were also abundant in Flamingo Park.

My third day held a special surprise. Rio de Janeiro is home to Floresta da Tijuca, a mountainous hand-planted rainforest and the world's largest urban forest, covering some 7,907 acres (3,200 hectares). The Atlantic Rainforest is home to hundreds of species of plants, many threatened by extinction, found only in that ecosystem. After the original forest had been destroyed to make way for coffee farms, it was replanted by hand in 1861 in a successful effort to preserve Rio's water supply. Now a national park, the forest includes some of the most famous attractions of Rio, including the Christ the Redeemer statue on Corcovado Mountain. With 79 inches (200 cm) of rain a year, the forest is dense and bromeliads, epiphytes, and ferns cling to ipê (*Tabebuia*), jequitiba (*Coriniana legalis*), painera (*Chorisia speciosa*), embauba (*Cecropia sp.*), and a host of other species. Researchers from the New York Botanical Garden catalogued 458 species of plants on one hectare of Atlantic Rainforest alone. Unfortunately, this incredible forest is in rapid decline as a result of human activity.

On my fourth day I had the opportunity to learn about the restinga, a distinct ecosystem within the Atlantic Rainforest. Restingas are coastal lowland plant communities and form on sandy and saline soils. Tree cover tends to be compact and mixed with bromeliads, ferns, shrubs, vines, cacti, palms and epiphytes, including some interesting orchids. Though occasionally punctuated by exotics such as beefwood (*Casuarina stricta*), canopy

height ranges from only 3.2 to 9.8 feet (1 to 3 meters). I was surprised to see Brazilian pepper trees (*Schinus terebinthifolius*), a medium size tree in California, growing as a low shrub and mixed with passion fruit vine (*Passiflora* sp.) and Brazilian cherry (*Eugenia braziliensis*). We toured several conservation areas dedicated to this unique plant community, including the coastal beaches of Recreio. Here, where there is tremendous development pressure, huge conservation easements to protect the restinga are placed between the white sand beaches and rows of modern new apartment blocks.

The afternoon brought a chance to observe some of the field staff at work clearing a coastal creek corridor of invasive exotics. Local residents are fond of tropical houseplants and *Ficus benjamina* seems to show up in parks and on streets everywhere. Interestingly, the clearing on this project also served an underlying purpose: to expose the creek to residents and call attention to a severe pollution problem of untreated sewage and runoff. The Foundation's hope is that pressure from residents and businesses will spur efforts to control water quality in creeks flowing to the ocean nearby.

The next day I had the pleasure of visiting several nurseries, including two that are owned and operated by the City of Rio, and a privately held palm nursery. Rio cultivates many of its own trees for street and park tree planting, the vast majority of which are indigenous to the Atlantic Forest. Smaller sized trees, shrubs, and groundcovers are grown at the City nurseries at Jacarepagua and Taquara. Horto de Palmeiras (Nursery of Palms) is privately owned and is more of an incredible collection than a nursery. It is inarguably the finest palm-growing operation in South America. Most species are incorporated into the lush landscape so that clients, primarily landscape architects, developers, and wealthy estate owners can see the palms in situ. One field, adjacent to a helipad for busy clients, held palms grown in-ground as multiples of three, including triangle palm (*Dypsis decaryi*) and royal palm (*Roystnea oleracea*). The gardens contain every cycad and palm imaginable, including sunset palm (*Areca vestiaria*), Bismark palm (*Bismarckia nobilis*), ivory cane palm (*Pinanga kuhlii*) and the beautiful lipstick palm (*Cyrtostachys renda*), a stunning contrast of scarlet red stems against jade green foliage.

The afternoon was one of the high points of my visit. After meeting up for lunch with Flavio's key staff, we took a short drive to the Estate of Burle Marx. Flavio had arranged a personal tour of this remarkable garden for me as well as his staff. Marx was an artist-turned-landscape architect. In 1949, Marx purchased approximately 99 acres (40 hectares) of an old plantation to store his many art

Bamboo tree protection cage

Sugarloaf Mountain with Floresta de Tijuca, the world's largest urban forest, in the distance

Avenue of the Palms at Rio's Botanical Garden

pieces. Over time, Marx became an expert collector of exotic and unusual plants and established an incredible landscape surrounding his house and studio. The estate, now a national monument, holds over 4,500 species of plants and includes a 5-acre (2-hectare) rare plant nursery. His use of broad swaths and large groupings of plants, free-form water features, and vistas punctuated by groves of trees and palms is classic Marx. The garden shows like a giant abstract painting with no edges. Here we saw rainbow eucalyptus (*Eucalyptus deglupta*), Brazilian ironwood (*Caesalpinia ferrea*), and countless other trees and palms at their best. Marx is considered by many to be the most influential landscape architect of the 20th century.

Over the following days I was able to spend some time at Rio's Botanical Garden. Originally intended for acclimatization of spices from the West Indies, the garden was opened to the public in 1822. The Botanical Garden houses the School of Tropical Botany, an important tropical plant research institute. Overall, the Garden contains more than 6,000 different species of tropical and subtropical plants, including 900 varieties of palm trees. The "Avenue of Palms" is a 2,460-foot (750-meter) double row of 134 royal palms leading from the entry into the garden itself. The palms, originally reserved for the royal family only, are descended from a single tree, the Palma Mater. Legend has it that the unused seeds were burned to keep them away from ordinary subjects. The Botanical Garden contains many threatened species of plants and trees, including a beautiful tree I grew to like, the pau mulato (*Calycophyllum spruceanum*). Reaching up to 131 feet (40 meters) in height with trunk diameters approaching 16.4 feet (5 meters), the bark is smooth and shiny, with thin green bark turning tan and dark brown. As the bark peels away in long, thin strips, it reveals a reddish layer of bark beneath. From a distance, the trunk looks almost varnished. Ancient mango trees almost 120 years old line paths, and huge figueiras with their giant root flares are evident in several areas of the garden.

Preparation for the 2014 World Cup, Brazil's four hundred and fiftieth anniversary, and the 2016 Olympic Games are evident everywhere. Five main avenues serve as the principal links between the hundreds of neighborhoods in Rio. Most are undergoing some degree of expansion. Roadways that were double lanes in each direction are being widened to accommodate high speed traffic in the center lanes and low speed traffic in outside lanes, with bus and bike lanes flanking both. Medians separate each set of lanes, providing ample opportunity to incorporate trees and other vegetation. Street trees in the inner city seem to be thriving everywhere, even with the hustle and bustle of one of the largest cities in the

Lipstick palm (*Crytostachys renda*) on the estate of landscape architect Burle Marx

Field-grown palms at Horto de Palmeiras Nursery

Americas. Emphasizing sustainability and environmental stewardship, this metropolis of over 10 million people has adopted goals to be a green city, and during the time I was there, Rio's Foundation of Parks and Gardens celebrated a milestone of 25,000 trees planted last year alone.

I was impressed by the professionalism of those I met who are responsible for the planning and planting of the urban forest. In a city where many less fortunate people are unable to access and experience forests and trees in their natural state, my colleagues in Rio ensure that everyone has an opportunity to enjoy a hint of Mother Nature's gifts, a task they take great pride in. Rio is immensely proud of its heritage, and its natural areas, parks, and streets are a testament to the value placed on its culture and identity. The Atlantic Forest is highly valued and public officials are well engaged in understanding the importance of their urban forests. Between a national forest in the middle of the city, the tenacity of its street trees, and the horticultural showplaces in its parks and gardens, Rio has an unparalleled natural beauty.

I am deeply indebted to Flavio Telles and his colleagues for their hospitality and for sharing their knowledge of the trees and plants and the parks and gardens of Rio. My thanks to Pedro Mendes de Castro of the Brazil chapter of the ISA for his assistance in introductions and arranging the partnership for this Exchange. I have made lifelong friends. I would like to extend my sincere gratitude to the Society of Municipal Arborists for their confidence in selecting me for this Exchange and to the Asplundh Tree Expert Company for their sponsorship of the program for 2011. It was an honor to represent the Society, and I would encourage any of our members to take the opportunity to participate in this very important and rewarding program.

Ficus root flare at Rio's Botanical Garden