

About the Author

A former National Parks Board Assistant Director, Bonnie Tinsley was part of Dr Kiat W. Tan's team that helped establish the National Parks Board under the Ministry of National Development. She has worked as a professional writer in Southeast Asia, including a stint as a feature writer for *The Straits Times*, Singapore, and is the author of three books on the Singapore Botanic Gardens.

Two soaring conservatories, filled with cool-climate plants from around the world. An indoor mountain and waterfall, wreathed in mist. Eighteen towering Supertrees, rising as high as 16 storeys, clad with a profusion of ferns, bromeliads, orchids. More than 1.5 million plants, consisting of some 18,000 plant groups, spread over an area equivalent to 90 football fields. A haven for wildlife in the new downtown. A recreational hub for the people of Singapore. A shining beacon for travellers from all corners of the globe. A dream of perpetual springtime in the Tropics. A vision made reality.

In just five years of operation, Gardens by the Bay has taken root, blossomed, and matured into a true Singapore icon. Illustrated with stunning photographs, *The World in a Garden* looks at the ingredients of its success, its array of signature programmes, and its plans for the future, while shining a spotlight on its world-class plant collection.

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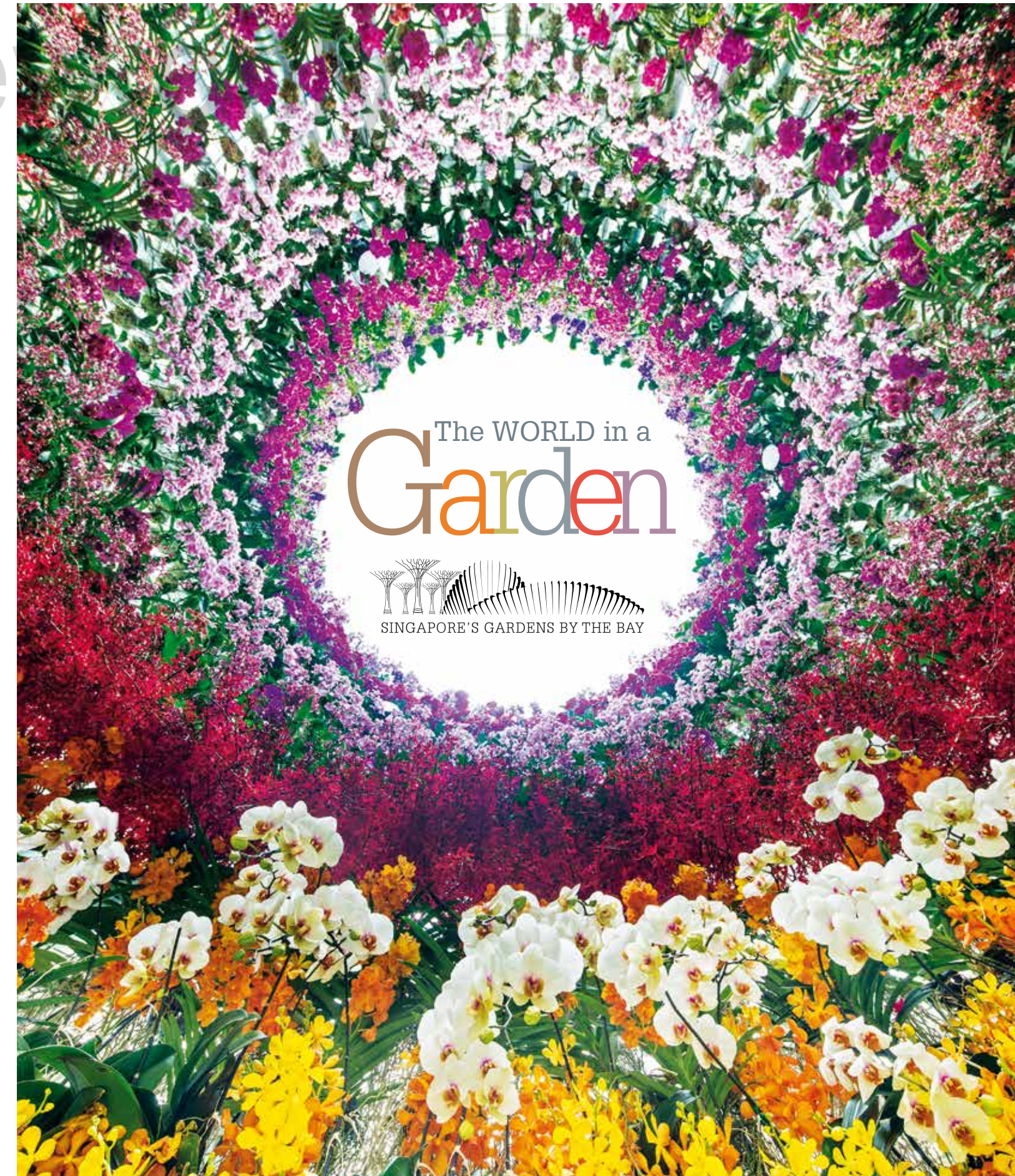
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Bonnie Tinsley

The WORLD in a Garden



“Gardens by the Bay plays three key roles in Singapore. First, it enhances Singapore's branding as a City in a Garden... Second, the botanical and horticultural necklace of the Bay South, Bay Central and Bay East Gardens celebrates the botanical and horticultural diversity accorded by its phytogeographical site 1°15' north of the Equator at the centre of origin of Southeast Asian plants... And third, displaying its botanic and horticultural largesse in a strikingly unique setting of Supertrees and Glass Domes, Gardens by the Bay has since its opening in June 2012 entertained more than 25 million visitors... This entrenches Gardens by the Bay as a landmark destination in Singapore.”

— Dr Kiat W. Tan, CEO, Gardens by the Bay

Cover: Orchid display at the Flower Field

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THE WORLD IN A GARDEN

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The WORLD in a
Garden



Bonnie Tinsley

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Foreword

Gardens by the Bay was envisaged as a national garden that strives to meet the expectations of Singaporeans and their guests. As one of the very few botanic gardens situated on the Equator, it would be able to draw upon specific features of its unique location in the creation of an iconic destination for visitors from all corners of the globe.

Land in Singapore is a very precious commodity. The largesse of the expansive site in Marina Bay is a once-off opportunity that had to be capitalised upon with little room for failure. Every aspect of the project was deliberated on carefully – the aesthetics and functionality of the garden design, the diversity of plant materials, the sustainability of the systems, the educational value and social benefit that the Gardens could offer, and of course budgetary considerations. We set out to create a new icon for Singapore that would encompass the needs and fulfil the expectations of generations of Singaporeans to come.

In order to showcase the wonders of the plant kingdom to visitors, a multidisciplinary team led by our horticulturists and botanists traversed the globe to study renowned gardens for ideas to bring to bear upon our ambitious project. This is how the concept of iconic cooled conservatories and Supertrees came about, linked by a strong storyline, where the diversity of plants, the innovative cooling and water solutions, and the accompanying narrative illuminating the hard structures form the core and essence of the Gardens. The finishing touches that include vibrant programming, essential amenities, and human interface were then put in place to continuously attract visitors to the Gardens.

When the Gardens was unveiled officially on 28 June 2012, the response was gratifying. How to sustain this positive response became the next challenge. The introduction of new ideas, displays, and programmes for our visitors became a necessity. Since our opening, we have staged more than 30 major floral displays, with each display offering valuable lessons and opportunities for creating the next spectacular display. I am confident that Gardens by the Bay is on the right track. We received more than 8.5 million visitors in 2015, bringing the total number of visitors since inception to more than 25 million. This takes us beyond the realm of traditional botanic gardens.

Today, a barren reclamation site has blossomed into a tropical paradise. As we continue to grow, we remain rooted as a People's Garden and what that entails. We will never cease to refine and enhance our offerings to make Gardens by the Bay a place where our people can feel pride of ownership, a place for everyone to cherish and enjoy.

Dr Kiat W. Tan
Chief Executive Officer
Gardens by the Bay

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Dedication



Mr and Mrs Lee Kuan Yew, with Dr Kiat W. Tan, at the Istana in 2003

It is with the greatest pleasure and no little sadness that the Board of Gardens by the Bay, the CEO, and staff members dedicate this book to the memory of Mr Lee Kuan Yew and Mrs Lee Kwa Geok Choo.

No one else in Singapore's history has had his level of dedication to and influence over the development and nurturing of the island's green spaces. One could fill an album with the photographs of the then Prime Minister at traditional tree-planting ceremonies, often with Mrs Lee by his side, for she was equally dedicated. With a sturdy grip on the shovel, never too proud to turn the earth, he planted Tembusu (*Fagraea fragrans*), Senegal Mahogany (*Khaya senegalensis*), Common Pulai (*Alstonia angustiloba*), and any number of varieties of tree saplings all across the island, at least one every year.

Through his world travels as national leader, he garnered fresh ideas and introduced new species to cultivate in the Garden City. While his staff was learning the art and science of urban greening, so was the Prime Minister. When he felt special expertise was needed, he brought in professionals from abroad – horticulturists, soil scientists, landscape architects from Japan, an ornithologist from the UK to study the dearth of songbirds in the city.

During their stay at the Istana Domain, Singapore's presidential palace, Mr and Mrs Lee worked closely with the plant curators to insure the

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well-being of the estate. They re-introduced nutmeg to the grounds and directed the planting of mature clove trees at the Spice Terrace, an avenue of Rain Trees (*Samanea saman*), and a good representation of the tree species planted in the city's parks and along roadsides. Mr Lee personally re-introduced his particular favourite Pisang Raja (King of Bananas) to the Istana in 1999 after a cluster had succumbed to the Panama Wilt in the 1980s. Mrs Lee's preference for fragrant plants was expressed in her choice of shrubs for a fragrant garden established there. And the couple always stopped at a trellis Mr Lee had planted with a Bread Flower or Sukudangan climbing bush, its white flowers known to give off the aroma of pandan that filled the evening air around the house.

In 1995, when Dr Kiat W. Tan, as Director of Singapore Botanic Gardens, launched the National Orchid Garden, it seemed fitting to acknowledge the Gardens' gratitude for Mr and Mrs Lee's support and honour Mrs Lee with an orchid naming. Visitors to the National Orchid Garden today may see *Ascocenda Kwa Geok Choo* on display during its flowering season.



As early as 1963, the new Prime Minister initiated the Garden City movement with the planting of a pink flowering Mempat (*Cratoxylum formosum*) at Holland Circus (the junction of Queensway with Holland and Farrer Roads). That gesture would signify the beginning of an island-wide annual tree-planting tradition that would continue unbroken for the next 51 years of Mr Lee's lifetime. With that initial planting, Singapore's Gardener-in-Chief asked for 10,000 trees to be planted every year, including 5,000 trees along new roads, on traffic circuses, in housing estates, school grounds, and car parks. In his total approach to building a healthful environmental infrastructure, shade trees were essential, especially the "instant trees" like angšana, rain tree, jambu air laut, and Senegal mahogany.

In the late 1960s, the Garden City Campaign was launched, followed by the formation of the Garden City Action Committee. The Committee was formed at the direction of the Prime Minister and composed of representatives from all the relevant land-use ministries, who met monthly to review the Garden City programme. PM Lee monitored the Committee's progress and sent suggestions for follow-up. As his successor PM Goh Chok Tong famously noted, Singapore's Prime Ministers had to have been the only world leaders who routinely monitored the work of a gardening committee.

In view of the concrete structures being built at a rapid rate across the island, during the 1960s the Prime Minister mooted the idea of replacing the green that had been removed as a result of industrialisation and urbanisation. Planting more trees would serve two purposes: encourage cloud formation and retain moisture for a more pleasant home environment, and a Singapore enveloped in green would give visitors the right impression of the country. Using the metaphor of a gardener, he once said that a well-gardened and maintained city conveys the right message to visitors and potential investors. Once the airport at Changi had been built, Mr Lee used the shrub- and tree-lined passage from airport to hotel to his office at the Istana to convey that message to incoming CEOs before they made their investment decisions. In Volume 2 of his *Memoirs*, he wrote: "When they (CEOs) drove into the Istana Domain, they would see right



in the heart of the city a green oasis, ninety acres of immaculate rolling lawns and woodland... Without a word being said, they would know that Singaporeans were competent, disciplined, and reliable, a people who would learn the skills they required soon enough.”

Mr Lee did not stop with the Garden City Campaign. In November 1971 he launched National Tree Planting Day and announced to the nation that it would take place annually on the first Sunday of November, when the northeast monsoon would help give the young saplings a good start.

Throughout the 1970s, efforts to green the city were supported by Mr Lee's full commitment. One measure after another to beautify and cleanse Singapore required his vision and leadership. He called a special meeting and at his urging the money was found to expand the Parks and

Recreation Division into a full-fledged Department with 200 additional posts dedicated to the Garden City campaign. Flowering trees and shrubs were introduced, and Mr Lee asked for the greening of retaining walls, overhead bridges, metal lamp-posts, flyovers, and those “cavernous depths” under the flyovers. Climbing plants like *Ficus pumila* moved swiftly to soften the concrete cityscape. The East Coast Parkway was landscaped to provide an attractive approach from the airport to the city.

The 1980s saw the establishment at Changi Airport of its own 18-hectare nursery to take care of the tree planting and landscaping both inside and out. At the PM's direction in 1988, palm trees were planted at Changi in order to distinguish Singapore from other cities. Palms would make it clear that Singapore was the Tropics, the Equator, the exotic East. The decade culminated in the establishment of the very popular Park

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Connector Programme, the greenway links between Singaporeans and their major parks, nature reserves, and natural open spaces, a measure integral to the “City in a Garden” concept.

In 1990 the National Parks Board (NParks) was formed, Bukit Timah Hill and the Central Catchment were declared Nature Reserves, and Clean and Green Week was launched. Every year thereafter marked new Garden City initiatives, backed by Mr Lee, in his capacity as Senior Minister and latterly Minister Mentor: Skyrise Gardens to encourage home-gardening, the redevelopment of Singapore Botanic Gardens, the “Adopt-a-Park” programme, the “Singapore Green Plan: Towards a Model Green City,” the “Active, Beautiful, Clean Waters (ABC Waters)” programme, the Singapore Garden Festival, and finally, the development of Gardens by the Bay.

In view of his half-century-long commitment, conscientious planning, and strong political will to grow a “City in a Garden” that made Gardens by the Bay possible, it was important to the Gardens team that the Minister Mentor be the first to see the finished or near-finished product. Therefore, on 15 November 2011, the Gardens’ CEO Dr Tan took Mr Lee on a tour of the Flower Dome in a special preview. A smiling Mr Lee praised the world-class Gardens as testimony to how far Singapore had progressed in greening the city-state. Urging Singaporeans to work with their Government, he said, “The Gardens will no doubt continue to grow and this is where the support of the corporate community and individuals will make this Garden the pride of Singapore.”

In the Golden Garden near the main entrance to Gardens by the Bay, a plaque marks the planting site that had been reserved for Mr Lee. Sadly, he did not live to plant the sapling Sepetir daun tebal (*Sindora wallichii*), a strong timber tree found on Bukit Timah Hill and native to Singapore’s primary forests. Four days after his demise on 23 March 2015, Gardens by the Bay Board Members and staff gathered at the site on 27 March to plant the chosen tree and pay their respects to the man who spearheaded Singapore’s tree-planting tradition and the immeasurable benefits that tradition had inspired. When it reaches maturity, the tree will stand as



tall as 76m, or 25 storeys, even taller than the tallest Supertree in the Gardens. A plaque also marks the Rain Tree that Mr Lee planted in 1986 at the old Marina City Park, now transformed into Gardens by the Bay. No one had the heart to move the tree when the bulldozers rolled in to build the new Gardens.

Standing next to Mr Lee’s *Sindora* is another tree of the same species, planted and dedicated *in memoriam* to Mrs Lee, who died on 2 October 2010. Those familiar with classical mythology may remember the story of Philemon and Baucis, an aged couple whose hospitality to Jupiter earned them their greatest wish: to live out their years and die together. When the time came, they were joined in death as a pair of trees with interlocking branches. Visitors may honour the Lees’ devotion to each other at the Golden Garden main entrance to Gardens by the Bay. Or they may acknowledge the Lee legacy in the two million large, sturdy trees growing all across Singapore’s city in a garden.

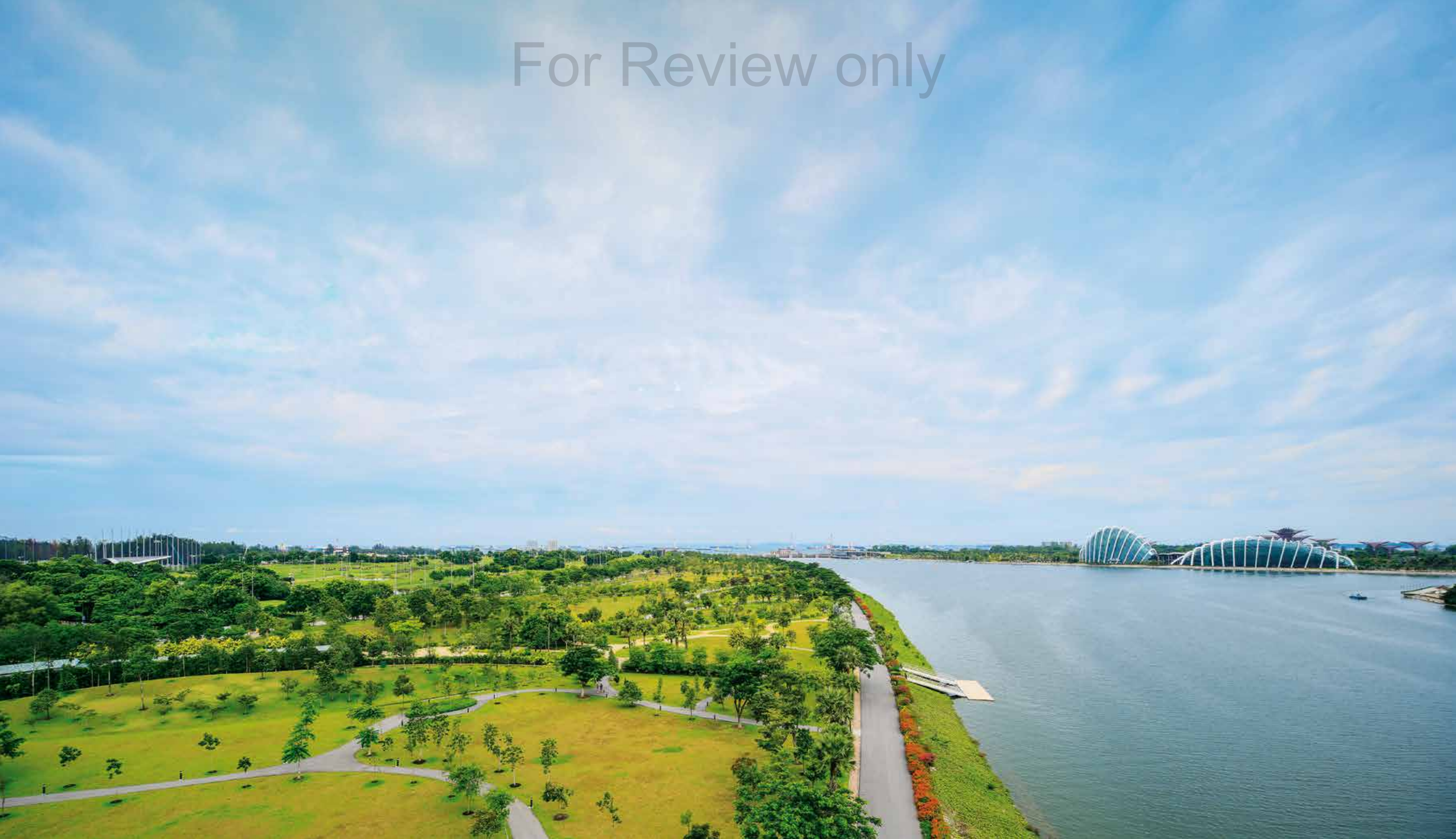
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Introduction:
Singapore's
Botanical
Envoy to the

World

“We bring the world's
plants to Singapore
to showcase Singapore
to the world.”
– Dr Kiat W. Tan, CEO,
Gardens by the Bay

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Gardens by the Bay is the first and only garden in the Tropics that displays a unique diversity of flowers and trees and myriad plant forms from every continent on the globe (with the exception only of Antarctica) within its flagship Garden, the 54-hectare site at Marina Bay South just on the edge of the South China Sea.

IN THE HEART of the new downtown Singapore, the sea-sky-and-landscape beckons local and foreign visitors of all ages in record numbers to this amazing floral spectacle. With its glass-domed conservatories, man-made Supertrees, and a landscape the size of 90 football fields, the Gardens is dedicated to the exposition, wonder, and preservation of our plant world.

In less than five years of operation, Gardens by the Bay has managed to garner the world's admiration as a horticultural phenomenon and an irresistible travel destination. To understand the full measure of success of Asia's largest man-made garden built in one of its smallest countries, ambassadors from botanical institutions far and wide have been beating paths to these doors that welcome visitors into a plant world totally new to the Tropics. In an incredible feat of engineering and environmental sustainability, two gigantic conservatories, or biomes, create the environments required for cool-climate plants to flower here, just north of the Equator, as freely as they do in their native habitats.

To capture the interest and imagination of visitors, this futuristic concrete-and-steel infrastructure houses subtropical/cool-climate plant collections never before seen in Singapore, along with their support facilities. The Flower Dome features Mediterranean and semi-arid regional flora. The Cloud Forest exhibits exotic plants from the planet's tropical and temperate rainforests – high-elevation habitats cloaked in mist and

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fog. These plants, many rare and endangered, have been carefully chosen and collected from their native habitats and strategically deployed in these cool safe havens to tell their stories. Next to the two domes, a grove of mechanical Supertrees rises 25 to 50 metres, or as high as 16 storeys, clad with vertical gardens featuring colourful bromeliads, orchids, ferns, and climbers, much like how epiphytes find homes on tall forest trees.

A historical crossroads between East and West, Singapore continues to be a global hub of trade, commerce, finance, travel, and shipping.

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In land-scarce Singapore, 50 years of greening efforts have reaped a truly unique balance – a “City in a Garden.”



The Gardens is uniquely positioned to enjoy every geopolitical advantage of its global location. One chief advantage is its location on the Equator, where the climate of constant summer and high rainfall produces a wealth of flora that pervades the urban fabric. A historical crossroads between East and West, Singapore continues to be a global hub of trade, commerce, finance, travel, and shipping, capitalising on its strengths: its clean and safe environment, its multicultural heritage and cosmopolitan society, and its energetic and welcoming people.

Gardens by the Bay, which is built entirely on reclaimed land – a total of 101 hectares, with 54 hectares already developed and some 47 more to be completed in the coming years – and located at the southern part of that “little red dot” at the tip of the Malay Peninsula, is typical of the success stories Singaporeans like to tell about their “up-from-under” history. To quote Prime Minister Lee Hsien Loong at the 2015 May Day rally, “to survive you have to be exceptional.” The realisation of these exceptional Gardens numbers among Singapore’s chief achievements as it celebrates a half-century of nationhood.

It took an act of courage in August 1965, after facing expulsion from Malaysia, for then Prime Minister Lee Kuan Yew and his government to forge ahead. In spite of race riots, economic hardship, regional recriminations, and 50 years of nation-building challenges, this “little red dot” the size of Manhattan survived and rose to become one of the world’s most prosperous countries. Forty years later, when Dr Kiat W. Tan and his Gardens by the Bay team went before the Government with a proposal to “create the greatest gardens in the Tropics,” it also took an act of courage. He was asking for the conservation of more green space in land-hungry Singapore, a piece of prime real estate including seven kilometres of waterfront that held the financial gravity of shopping malls, office blocks, housing, with a more lucrative commercial use of space than a “Central Park” for the people to enhance their quality of life.

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Gardens by the Bay is built entirely on reclaimed land, exemplifying the island's "up from under" history, its track record of building success out of very limited resources.





From the moment of its initial conception in the mind of Dr Kiat W. Tan, Gardens by the Bay was intended to be a people's garden, a place of relaxation representing the best of horticulture, and the culmination of his vision for Singapore.

Fortunately, with the backing of then Minister Mentor Lee, who understood the social value of a garden city and had initiated efforts to green Singapore with a tree-planting campaign over 50 years ago, the Ministers voted in favour of green space. And so it was, another Singapore success story, unprecedented, fulfilling the promise of a "City in a Garden."

ARDENS BY THE BAY forms the green lung in Singapore's newest downtown district, Marina Bay, with three emblematic Gardens providing an all-encompassing garden setting. Bay South Garden marks Phase I of an unparalleled development: a waterfront horticultural experience built on a scale never seen before, defining Singapore as the world's premier tropical garden city. It showcases garden craftsmanship and floral artistry at its finest. It is designed to allow visitors to gain easy access to the Gardens with key pedestrian and vehicular linkages from surrounding developments and public transport hubs. Landforms have been created with wind direction and comfort zones in mind to ameliorate the island's heat and humidity. It bustles both day and night with activity, shows and guided tours, educational and recreational opportunities, and comprehensive visitor amenities, including enough food and beverage outlets to satisfy any taste or purse.

Phase II of the Gardens by the Bay project is slated for development after the Thomson-East Coast MRT line is completed at Bay East. The 32-hectare Bay East Garden will focus on showcasing plants for the use of Man. The 15-hectare Bay Central will complete the Gardens' "trilogy" forming part of the park connector network linking the waterfront promenade and Marina Bay to the Sports Hub. Pedestrians and joggers currently take advantage of these promenades and enjoy breathtaking views of the cityscape and Bay South Garden.

From the moment of its initial conception in the mind of Dr Tan, the Gardens was intended to be first and foremost the people's garden, designed to entertain and educate, a place of respite and relaxation representing the best of horticulture in the heart of the city, and the culmination of his vision for Singapore – not just as "Garden City" but as "City in a Garden." Visitors encounter countless vistas as they make their way through the Gardens and enjoy a feast for all the senses at every turn of a pathway or avenue.

One specialty garden after the other leads the visitor on paths of discovery. At the intersection between the Supertree Grove and the conservatories,

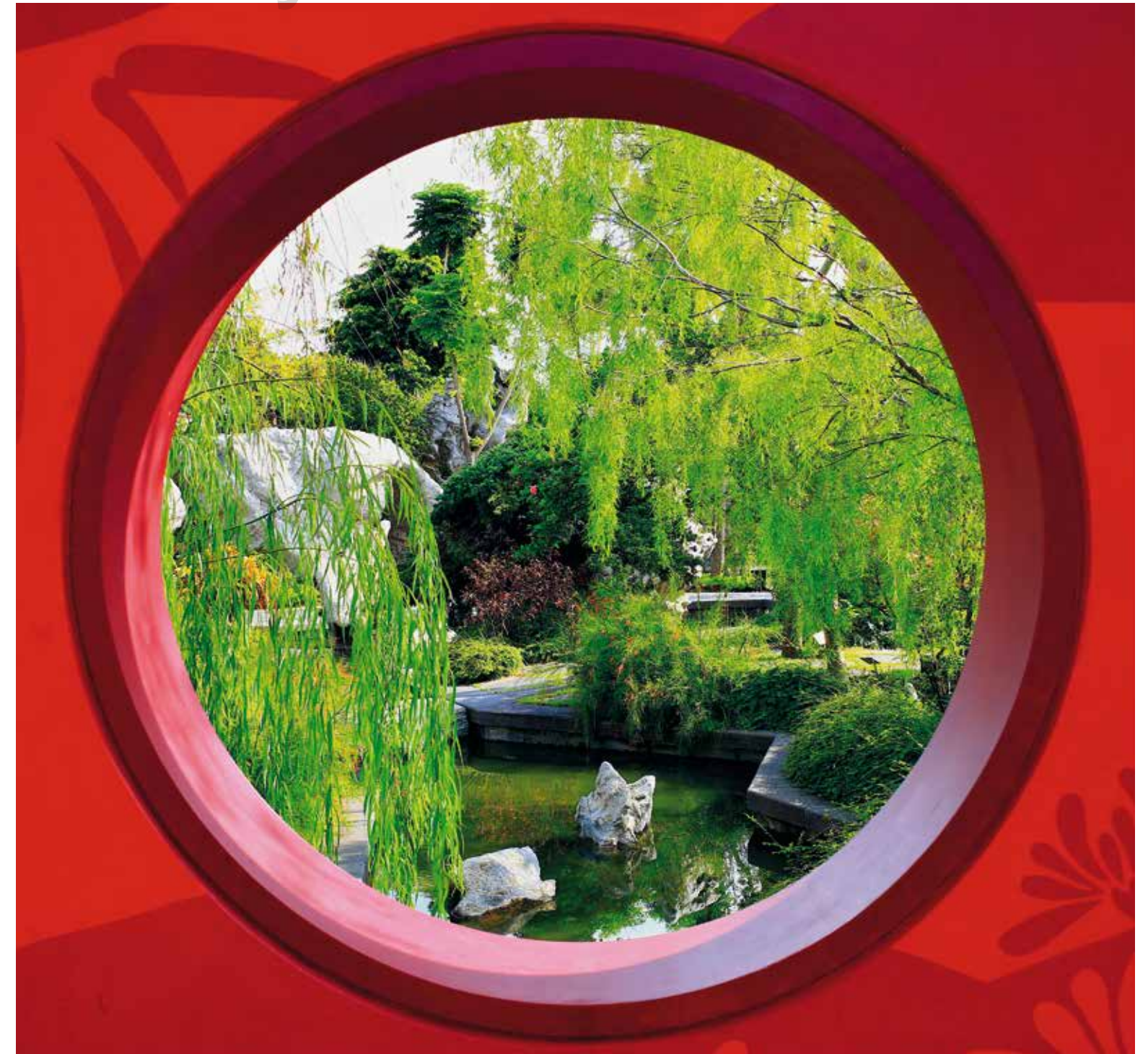
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Early Singapore's four main cultural groups are celebrated at the Gardens, rooting the Gardens in the nation's diverse heritage.

a floral clock combines time-keeping precision with floral artistry. Twenty varieties of tropical plants – including pink Madagascar Periwinkle (*Catharanthus roseus*) and purple Wishbone Flower (*Torenia fournieri*) – complete the checkerboard dial.

Heading south, two paths diverge in a Supertree “wood.” The one to the right of the Supertree Grove winds through the Heritage Gardens, a celebration of early Singapore's main cultural groups (Indian, Chinese, Malay, and colonial), illustrated by pockets of plants common to each. The other pathway guides visitors toward an appreciation of the essential role of plants in our ecosystem and celebrates the wonder of the plant kingdom. The “World of Plants,” a collection of six pocket gardens, illustrates the many unique forms of trees in the Secret Life of Trees, an array of palms in the World of Palms, features of the forest in Understorey, a colourful variety of foliage in Fruits and Flowers, a topiary garden illustrating the Web of Life, and the first plants that colonised the Earth in the Discovery Garden. An astonishing diversity of plants, some 60 percent or more exotics, has been assembled here from all parts of the world.

For those who prefer to ride, Garden Cruiser tram services begin at the Golden Garden, named for the golden-hued foliage and flowers that surround and climb the Supertrees there. Towering in front is the 65-metre-tall Cloud Forest dome, and on the right the Sun Pavilion displays cacti and other desert plant families. Just ahead, the ever-popular Far East Organization Children's Garden devotes a full hectare to nature-themed play areas for family enjoyment, including a water play experience. Children are also drawn to the nearby Big Fish Aquarium, where the giant Amazonian Redtail catfish swim in the waters. The Gardens displays a number of such fish tanks containing rare ornamental fish, drawing attention to this popular hobby in Singapore.



A window in the walled Chinese Garden designed to frame a scenic view



In a quiet corner, the Silver Garden glistens with Bismarck palms (*Bismarckia nobilis*) from Madagascar and other silver-toned plants growing around and on three Supertrees. It is one of several rentable spaces available in the Gardens for family or corporate events. The Meadow, capable of accommodating 30,000 people, opens its vast living green to major community events. Its concert space is landscaped in the shape of a bowl to provide the best acoustics.

At the Supertree Grove, visitors can scale the OCBC (Oversea-Chinese Banking Corporation) Skyway bridge connecting two Supertrees at 42 metres high to catch a bird's-eye view of the Gardens and the surrounding Marina Bay area by day or night. The bistro that tops the tallest Supertree offers fine dining and an amazing view of Singapore's city skyline at 50 metres.

COLLECTION HIGHLIGHTS

BLOOMS AT THE GARDENS



BOTANICAL NAME	<i>Catharanthus roseus</i>
COMMON NAME	Madagascar Periwinkle
FAMILY	Apocynaceae
NATIVE DISTRIBUTION	Madagascar
LOCATION	Heritage Gardens, Floral Clock, Satay by the Bay

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The Flower Field's bright floral sea gives prominence to alternating exhibits of orchids, tulips, chrysanthemums, dahlias, poinsettias, and other season-specific flowers.

Architectural-scaled rocks from China are a prominent feature placed strategically throughout the landscape, and a great assortment of sculptures provides artistic touches. Life-sized representations of creatures from the animal kingdom serve to animate the plants, depict their natural habitat, or contribute to the display's cultural significance. Sourced world-wide, this eclectic collection includes carved springstone lions from Zimbabwe and stylised horse-and-riders from East Timor. Giant dragonflies hover over the lakes, larger-than-life ants climb hollowed-out trees, and "Planet," a bronze sculpture of a baby, appears to float weightlessly in The Meadow. Visitors are amazed to see that its seven tonnes rest on one supporting fist. Like most of the sculptures, this is a gift to the Gardens from one of many sponsors.

The vistas change dramatically inside the 1.2-hectare, 45-metre-tall Flower Dome, named in the Guinness World Records 2015 as the Largest Glass Greenhouse. Visitors enter this "world in a garden" at the second level and follow a spiral pathway through plant displays representing five continents. The temperature here is kept low to accommodate the growing conditions of cool dry climate plants such as California tree poppy, kangaroo paw from Australia, Chilean wine palm, a grove of baobabs from Senegal, bottle trees from Queensland, and four olive trees aged between 500 and 1,000 years old from Spain. One 500-year-old surprised everyone by flowering in its new equatorial home.

Stairways lead down to a wide-open exhibition space below. The Flower Field's bright floral sea, covering 848 square metres, gives prominence to alternating exhibits of orchids, tulips, chrysanthemums, dahlias, poinsettias, and other season-specific flowers. Decorative props, such as red lanterns for Chinese New Year or reindeer for Christmas, help depict festive scenes and stories.

Next door, the smaller and taller Cloud Forest contains vegetation from tropical montane regions such as Mount Kinabalu in East Malaysia and the mountainous regions of South America that rise 1,000–3,500 metres above sea level. This cool moist conservatory is built around an artificial



Two aerial walkways descend the Cloud Forest mountain to give close-up views of the masses of orchids, ferns, bromeliads, begonias, and pitcher plants that cloak its surface.

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mountain standing 35 metres tall and clad in lush vegetation moistened by the regular use of foggers and the constant flow from the world's tallest indoor waterfall. The Forest floor is planted with several examples of trees and shrubs that grow in the cloud forest foothills, such as tree rhododendron, fuchsia, and bald cypress.

A lift takes visitors to the Lost World at the very top of the Cloud Forest. This is where carnivorous plants, ferns, and mosses grow. Two elevated aerial walkways descend the mountain to give close-up views of the masses of orchids, ferns, bromeliads, begonias, and pitcher plants that cloak the mountain surface in dense profusion. Special exhibits along the way – stalactites and stalagmites in the Crystal Mountain, the Secret Garden in the Ravine, the Earth Check, and altogether nine zones – tell the story of the unique biodiversity and geology of cloud forest habitats and the environmental threats they face.

In both conservatories, special “smart glass” has been installed to let in sunlight while cutting off most of the heat. Thousands of these glass panels of differing sizes have been fitted together and set upon a grid-shell structure to spread the load, like the shell of an egg. Outside, steel trusses counter-balance the gridshell against lateral forces, such as wind. The results are glass domes without supporting columns that allow the plants inside them both more light and more space.

Over 1.5 million plants fill these conservatories and the surrounding Gardens, growing diverse flora for a multiplicity of signature events and exhibits, recreational activities, and educational programmes that engage the community. Over 1,700 volunteers contribute thousands of man-hours per year towards growing the Gardens and supporting its programmes, and over 21,000 Friends of the Gardens enjoy special membership privileges while lending their enthusiastic support. In a three-way partnership with schools and the Ministry of Education, the Gardens invites children and youth to participate in outdoor environmental projects designed to tie in with the school curriculum, including subjects such as music, languages, arts, and mathematics. As a national garden, Gardens by the Bay



At the very top of the Cloud Forest is the Lost World, where carnivorous plants, ferns, and mosses grow.

aspires to engage the whole community and offer something for everyone, to be the “welcome home” that Singaporeans and visitors alike return to again and again.

Cooling waters surround the periphery of the Garden at Bay South. The Dragonfly and Kingfisher Lakes, placed on opposite sides of the cooled

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A great variety of wildlife is drawn to the waters around the Gardens – visitors will spot butterflies, birds, monitor lizards, terrapins, and even a playful family of otters.

conservatories, are integrated with the calm waters of the Marina Reservoir through a series of channels and feed two ponds, the Water Lily and Victoria Lily Ponds. These waterbodies, covering a total surface area of five hectares, capture the ground rainwater run-off along with water pumped from the Reservoir to enhance circulation. The water then is filtered and cleaned by aquatic plants chosen as natural eco-filters before being discharged back into the Reservoir. The lake system is a model of a healthy functioning ecosystem that is essential for sustaining biodiversity.

A great variety of wildlife is drawn to these waters, especially where water meets land. Along the Dragonfly Lake shoreline, for example, animals find food, shelter, and nesting sites. Visitors will spot butterflies, birds, monitor lizards, terrapins, and even a playful family of otters. The dragonfly is a welcoming presence, a survivor smaller than its dinosaur ancestors of over 300 million years ago whose wingspan fossils show to be 75 centimetres (30 inches). This captivating insect seems aptly chosen as symbol for Gardens by the Bay given its preference for plentiful, clean water and the legend and lore that surround it on every continent. Then factor in its many coloured species – blue, green, scarlet, amber – and its graceful, transparent wings that allow flight in all six directions, like the helicopter it is said to have inspired.

In support of Singapore's green initiative, Gardens by the Bay utilises environmentally sustainable technology wherever possible, in terms of water and energy use. Instead of conventional air-conditioners, a number of alternative cooling technologies are used to achieve savings in energy consumption in the biomes: specially treated glass lets in 70–80% of the light and keeps out the heat; water pipes embedded in the conservatories' floors cool only the occupied spaces; a steam turbine generates electricity from burning tonnes of horticultural detritus collected from Singapore's parks and gardens; and the cooling process is made more efficient by taking moisture out of the air with liquid desiccant. In all, the domes' energy consumption is no more than that of an ordinary air-conditioned building in Singapore.



COLLECTION HIGHLIGHTS

BEGONIAS



BOTANICAL NAME *Begonia* 'Marmaduke'
COMMON NAME Marmaduke Begonia
FAMILY NAME Begoniaceae
LOCATION Cloud Forest

Begonia is one of the largest genera of flowering plants in the world. It has more than 1,500 species and 10,000 hybrids. The family Begoniaceae includes only two genera, *Begonia* and *Hillebrandia*. Begonias are grown mainly for their attractive foliage colour, pattern and texture, and are used widely in ornamental landscapes and as indoor houseplants.

Plumeria obtusa 'Singapore White' flourishing at the Colonial Garden

A number of Supertrees harvest solar energy by way of photovoltaic cells on their canopies in order to illuminate the Gardens at night. Other Supertrees are integrated with the conservatories to serve as outlets for hot air exhaust. In terms of water usage, the Gardens is almost completely self-reliant. The rain and water run-off from the Gardens along with the water pumped from the Marina Reservoir through the Lakes' aquatic plant filtration system is naturally cleansed and used in the built-in irrigation system for the Gardens.

WELCOME TO this newest, most celebrated, visited, and award-winning gardens in the Tropics. Its wow factor, according to one very enthusiastic visitor, "is like visiting the Taj Mahal," except that Gardens by the Bay is a loving tribute to the world's plant life in living mosaic.

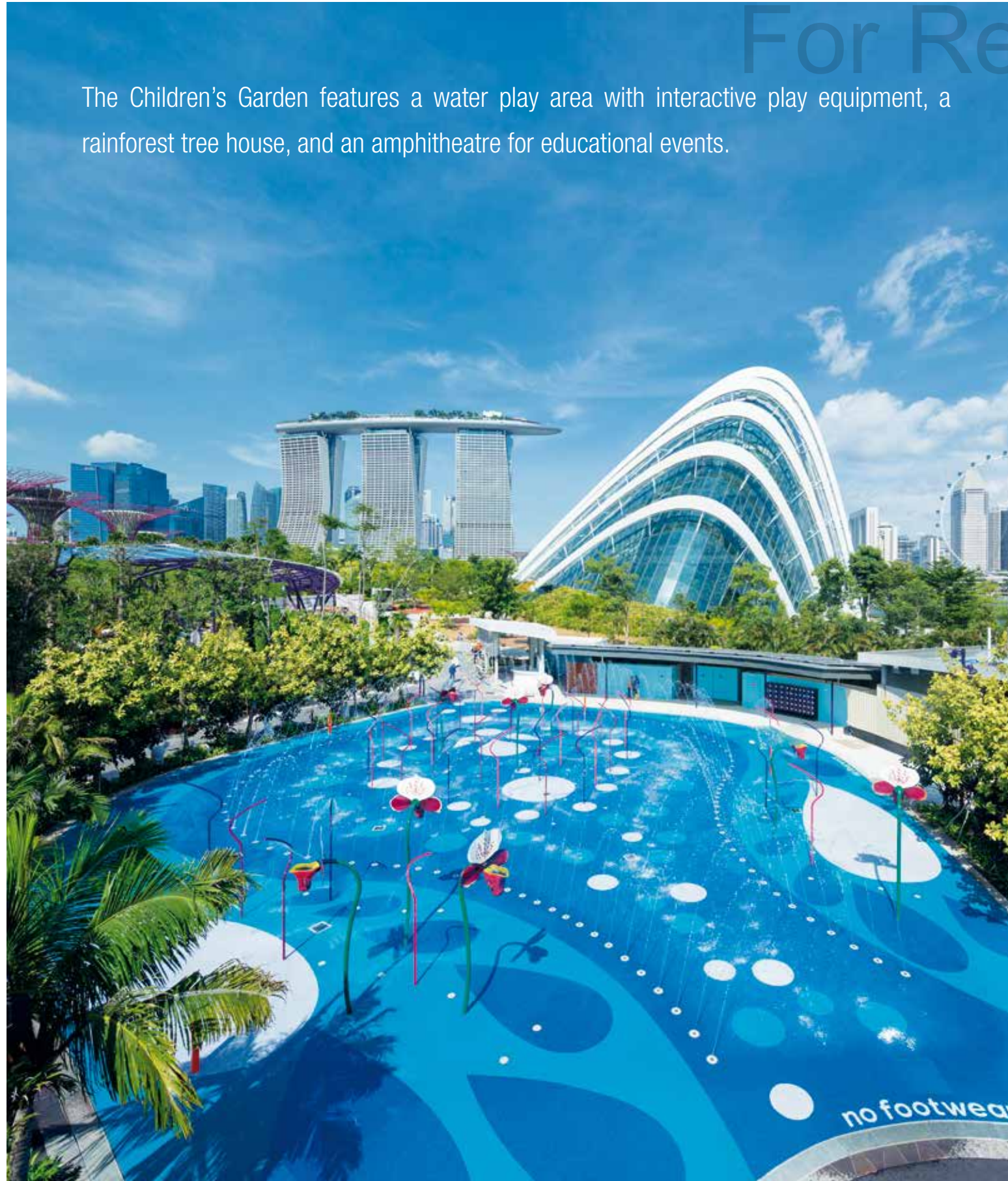
Since it is the tradition of Singapore-born enterprises always to be looking to future growth and improvement, Gardens by the Bay is constantly exploring unconventional ways for visitors to learn about and engage with the greenery around them. By continuing to cultivate the creative spirit that encourages new ideas, the Gardens will grow its reputation as Singapore's prime urban outdoor recreational hub and a national icon worthy of the name. Beyond these issues of cultural infrastructure is the challenge of furthering the development of unique alternative energy systems embedded in the Gardens that may be applicable to the larger tropical world.

In a relatively short period of time, the Gardens has won a place in the hearts of millions of visitors, both local and from abroad, and enjoys an established position in the pantheon of botanical institutions world-wide. In partnership with the Singapore Botanic Gardens, the other national garden and a recently inscribed UNESCO World Heritage Site whose purview is largely botany and research, Gardens by the Bay has taken the lead in delivering to Singapore and the world the best of horticulture combined with education and recreation in ways before unimaginable. This is no colonial invention but the work of Singapore's sons and daughters.

Night view at the Dragonfly Lake enhanced with LED lighting



The Children's Garden features a water play area with interactive play equipment, a rainforest tree house, and an amphitheatre for educational events.



NEW AND IMPROVED INFRASTRUCTURE

Physical development of new attractions has continued apace. In keeping with the Gardens' commitment to the family, a \$10-million children's garden was developed in partnership with Far East Organization on a one-hectare site between the Cloud Forest conservatory and the Kingfisher Lake. This immensely popular family destination features a toddler play zone, a rainforest tree house, a water play area with interactive water play equipment, and an amphitheatre for educational events. The Adventure Trail attracts 6–12-year-olds with trampolines, balance beams, and hanging bridges. The Far East Organization Children's Garden was officially launched in January 2014.

With the well-being of seniors and visitors on foot in mind, the footpaths along the Gardens' perimeter have been widened and three additional bridges constructed across the Dragonfly Lake to facilitate movement of pedestrian traffic around The Meadow and the Bayfront MRT station, especially during major events that draw large crowds.



The Sun Pavilion is home to an 800-square-metre outdoor display of one of Southeast Asia's largest cactus and succulent collections.

Next to the Far East Organization Children's Garden, the Sun Pavilion spreads an 800-square-metre outdoor display of one of Southeast Asia's largest cactus and succulent collections. This garden extends the experience of the Flower Dome's indoor desert plant collection from the highland and montane regions with the addition of plants from lowland areas, tropical deciduous forests, and semi-arid regions, such as Mexico, Argentina, Bolivia, Kenya, Tanzania, and Madagascar – over 1,000 desert plants of about 100 different species and varieties in all. Sponsored by Woh Hup (Private) Limited, the Sun Pavilion opened in February 2014, with free admission to all visitors.

COLLECTION HIGHLIGHTS

BROMELIADS



BOTANICAL NAMES *Alcantarea regina* (foreground);
Alcantarea imperialis (background)

LOCATION Cloud Forest