

# World Building of the Year: Cooled Conservatories at Gardens by the Bay

Text by Kenneth Er, Ng Boon Gee, Andy Kwek, and Matthew Potter  
Images by Gardens by the Bay

The Cooled Conservatories at Gardens by the Bay were awarded the World Building of the Year at the recently concluded World Architecture Festival from October 3 to 5, 2012. Cited by The Straits Times as the "Oscars of the architectural world", the World Architecture Festival was an event that brought together over 1,500 international architects to compete and celebrate excellence in architecture.

The judging of the World Architecture Festival Awards took place during the three-day event, concluding with 37 category winners and three overall winners for "World Building of the Year", "Future Project of the Year" and "Landscape of the Year". The innovative displays in the Cooled Conservatories were singled out by the festival's jury, first topping a shortlist of nine entries in the "Display" category on the first day, followed by claiming the prestigious World Building of the Year Award, announced on the last day.

Occupying 101 hectares of prime waterfront land at Marina Bay, Gardens by the Bay comprises three interconnected gardens—Bay South (54 hectares), Bay East (32 hectares), and Bay Central (15 hectares). Situated at the heart of Singapore's new Downtown, Gardens by the Bay is an integral part of Singapore's "City in a Garden" vision, in which the island-state is woven into a floral tapestry and infrastructural development is nestled within a green oasis. The development of Gardens by the Bay currently focuses on Bay South Garden, a major public space within Marina Bay and the centrepiece of a green canvas from which greenery extends and permeates the urban fabric in Marina Bay.

At the core of Bay South are the two spectacular Cooled Conservatories, including the 1.2-hectare cool dry conservatory, the Flower Dome, and the 0.8-hectare cool moist conservatory, the Cloud Forest. Designed to complement the surrounding commercial and residential

developments, Bay South contributes to the planning intention of making the area a vibrant place to live, work, and play in. It also captures the essence of a garden in a downtown setting, providing a horticulture-themed leisure destination that showcases floral displays and celebrates city living.<sup>1</sup>

## Design of the Gardens

From the outset, Bay South was planned to set a new standard in the way gardens are developed and managed. It exemplifies how a multitude of disciplines, ranging from architecture and landscape design to structural and environmental engineering, can be successfully integrated with horticultural know-how and garden artistry.

The architecture and structural design of the Cooled Conservatories were deeply influenced by the horticultural narrative and environmental strategy—and vice versa. Possibly one of the world's largest spanning grid-shell structures, their distinctive forms blend into the rich landscape of the garden.



The composition of the two forms is based on a unique geometry, which maximises light levels in the conservatories for plants to flourish within. These unique and iconic forms allow a whole new world of plants to be sustained in Singapore. Mindful of the impact of climate change, the two conservatories also apply cutting-edge technologies that provide energy-efficient solutions in cooling. They are cooled by energy produced by a tri-generation system that uses horticultural waste as fuel.

Other sustainable aspects of the Gardens include the Supertrees as well as the Dragonfly and Kingfisher Lakes. The Supertrees draw inspiration from the emergent dominant trees in our rainforest, which otherwise cannot grow to such heights and maturity in the urban environment. Like the mature trees of the rainforest, the Supertrees support a living skin of bromeliads, ferns, and flowering climbers. They also mimic the ecological functions of trees through their

environmentally sustainable features, such as the photovoltaic cells. The Supertrees have massive heights that allow us to create vertical gardens to present tropical plants on a scale never before presented in a garden. They also counterbalance the visual impact of the conservatories and create height in the Gardens to balance current and future tall developments in the surrounding areas.

The lake system acts as a natural filtration system for water from the Gardens catchment. Water runoff from within the Gardens is captured by the lake system and cleansed by aquatic plants before being discharged into the adjacent Marina Reservoir. Naturally treated water from the lake system is also used in the built-in irrigation system for the Gardens. The lake system also provides an aquatic habitat for biodiversity such as fishes and dragonflies, and depicts the importance of plants in the healthy functioning of our ecosystem.

1. The interesting shells of the Cooled Conservatories of the Gardens may be spied from across the Marina Bay.

“If they can cool these glasshouses through natural cooling, we should ask why it can't be done in other buildings.”

—Paul Finch, Director of the World Architecture Festival 2012

On the visionary design of the Gardens, World Architecture Festival 2012 Festival Director Paul Finch said, “A first-rate client had a vision and a strategy. The result is not an experimental building, but its ventilation strategy has an experimental component. In a globalised environment, there is so much interest in how we deal with density and this combination of urbanism with a garden that is both an attraction and nature is a wonderful solution. If they can cool these glasshouses through natural cooling, we should ask why it can't be done in other buildings.”

### A Horticultural Showcase

Bay South presents the plant kingdom in a compelling way that not only brings forth the beauty of plants but also enables the story of biodiversity and sustainability to be told. The Cooled Conservatories, for example, showcase plants with high conservation value from the Mediterranean-type climatic regions (Flower Dome) and Tropical Montane regions (Cloud Forest)—two of the most threatened habitats in the world.

While the Flower Dome tells the story of plants and people in the Mediterranean climate zone and how the plants cultivated in these regions face the threats of climate change and habitat loss brought about by human activities, the Cloud Forest highlights the relationship between plants and the planet, showing how the warming of the cool tropical cloud forests will

threaten biodiversity. In the Flower Dome, impressive Baobabs and a changing flower field deliver the experience of seasonal change that is atypical of tropical Singapore. In the Cloud Forest, the showcase is more vertical, with a planted “mountain” and a dramatic 35-metre-tall waterfall. A permanent mist system creates the appropriate humidity for these precious plants at all levels of the dome.

By providing an opportunity for visitors to enjoy the uniqueness of these two habitats, it is hoped that this will create a better appreciation of nature and awareness of the impact of Man's activities on ecosystems. The role of plants in nature, as well as the use of plants by Man, are critical subjects that feature strongly in the horticultural displays, interpretative media, and programmes throughout the Gardens.

“Gardens by the Bay is a tropical garden conceptualised by the Gardens by the Bay Team comprised of staff from National Parks Board. Bay South is customised for Singapore in a unique working arrangement that entailed housing the consultants spearheaded by Grant Associates, the entirely local team of contractors, the government agency partners in the project, and the Gardens by the Bay staff under one roof. This synergistic arrangement facilitated in translating the dream into reality,” said Dr. Kiat W. Tan, Chief Executive Officer, Gardens by the Bay.

The commission to design the 54-hectare Bay South Garden was won in 2006 by a team led by Grant Associates.<sup>2</sup> The Cooled Conservatories were developed by Wilkinson Eyre Architects. It is this collaboration that ultimately delivered an award-winning Gardens. The jury for the World Architecture Festival was insistent that the project be recognised in the round. Since its opening on 29 June 2012, Bay South has received more than two million visitors. This is heartening and motivates the team to work towards Gardens by the Bay's vision of creating a world of gardens for all to own, enjoy, and cherish. 

<sup>1</sup> Kenneth Er, Michelle Lim, and Andrew Grant, “Designing a Nation's Garden in the Heart of Singapore's Downtown: Gardens by the Bay,” *CITYGREEN* 1 (2010) 32-39.

<sup>2</sup> The consultants that worked with Grant Associates were Wilkinson Eyre Architects, Atelier One, Atelier 10, Land Design Studios, Meinhardt Infrastructure Pte Ltd, Langdon & Seah Singapore Pte Ltd, PM Link Pte Ltd, and CPG Consultants Pte Ltd.



2. A dramatic manmade waterfall greets visitors at the entrance of the Cloud Forest Conservatory.

3. The Flower Dome features a changing flower field and grand Baobab trees from the Mediterranean-type climatic regions.

4. Supertrees are visually impressive but also mimic the ecological processes of trees in their roles in the sustainable design of the Gardens.