

# abundant growth

The balance between the conservation of our country's natural heritage and economic progress is a delicate one. As the guardians of our natural environment, NParks constantly innovates and implements unique solutions to conserve and enhance the biodiversity in our urban city-state. Each year, we spearhead new initiatives which bring flora and fauna closer to people, enriching the quality of life at home, work and play.

Gardens by the Bay comprises three distinctive waterfront gardens in the heart of Singapore's new downtown. When completed, the 101-hectare Gardens will create habitats for urban biodiversity such as birds and dragonflies.





- 01 The 18 Supertrees in Gardens by the Bay are covered in a 'living skin' planted with bromeliads, ferns, orchids and other climbing plants.
- 02 With its cooled conservatories and Supertrees, Gardens by the Bay will be an iconic feature of Singapore's new skyline.

### **A Bayfront Garden for All**

Gardens by the Bay represents a major step in enhancing Singapore's urban biodiversity conservation. When its first phase opens in June 2012, it will house an impressive variety of plant species – right in the heart of Singapore's new downtown.

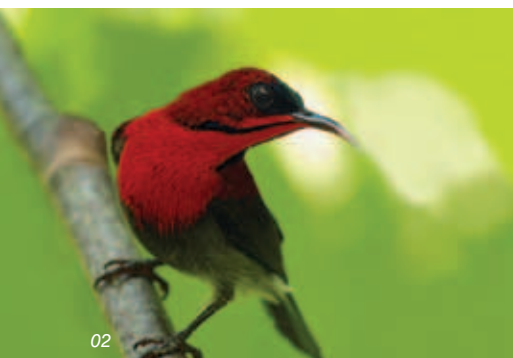
The Gardens celebrated a major milestone in February 2011 with the completion of the first of its two cooled conservatories, the Flower Dome. The Flower Dome replicates the cool-dry climate of the Mediterranean and semi-arid subtropical regions. Together with the Cloud Forest which replicates the cool-moist climate of the Tropical Montane region, the two cooled conservatories will feature a rich collection of unique plants not commonly seen in this part of the world and with high conservation value.

When completed, the Gardens will also feature a sustainable lake ecosystem, with aquatic plants in the lake system that will filter and cleanse the water, and provide a habitat for wildlife. In November 2010, a groundbreaking ceremony took place for Kingfisher Lake, one of the Gardens' two major lakes. The lake, which will act as an eco-filter for the Gardens, is being enhanced with a \$1 million sponsorship from Kikkoman Singapore.

Besides these unique ecological features, visitors can also look forward to a myriad of food and beverage options located throughout the 54-hectare Bay South. Dining facilities will be located among the Gardens' key features – the cooled conservatories, the Supertree Grove, and even at the top of the tallest Supertree, with its panoramic skyline view.



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01&02 The fast-fruiting native trees in the Singing Forest will attract birds like (from top) the Pink-necked Green Pigeon (*Treron vernans*) and the Crimson Sunbird (*Aethopyga siparaja*).

03 The Forest of Giants features tree species that can grow to astounding heights within 50 years, like this towering Jelutong (*Dyera costulata*) at the Singapore Botanic Gardens.

### Giving a Boost to Native Forest Life

From rainforests to freshwater swamps, mangroves and coastal forests, Singapore is home to many forest types. Not only are these important to biodiversity, they also improve our well-being by regulating our climate, cleaning our air, and providing shade. In 2010, NParks launched a variety of projects in support of Singapore's forest biodiversity.

The Singing Forest at the Southern Ridges is a new collection of bird-attracting native trees, planted to intensify the area's already high diversity of native bird species. This project, launched in May 2010, is supported by STMicroelectronics through the Garden City Fund.

These fruiting trees will provide a variety of food sources to native birds – including green pigeons and hornbills – as well as shelter and nesting areas. They will also regenerate the existing forest around Mount Faber, Telok Blangah and Kent Ridge Parks.

The Southern Ridges also houses a living gallery of giant tree species which are threatened in the region. Launched in April 2010, the Sembcorp Forest of Giants is an arboretum of 600 giant trees which can grow to heights of up to 80 metres in the wild – around the height of a 30-storey HDB block.

This project is supported by a \$1 million donation by Sembcorp Industries to the Garden City Fund, which will also fund ongoing research and outreach programmes to promote

awareness and enjoyment of the forests. The trees can be viewed along two loops in Telok Blangah Hill Park.

Our forests are also home to a number of endangered species. In a joint study with the National University of Singapore and the Wildlife Reserves Singapore Conservation Fund, NParks discovered breakthrough evidence that the numbers of the critically endangered Banded Leaf Monkey have been increasing.

Although it was on the verge of extinction in the 1980s, this species was found to be breeding successfully in Singapore's forests. A 2010 survey of the Central Catchment Nature Reserve revealed 50 – 60 Banded Leaf Monkeys sighted in the eastern part of the Reserve. This was more than expected, given that only 10 were estimated to be living in the forest 20 years ago. NParks and its partners are exploring ways to encourage a further increase through habitat improvement.

**The Banded Leaf Monkey is one of only three species of non-human primates that are native to Singapore. The other two are the Long-tailed Macaque and the Sunda Slow Loris.**





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01 Along the Northern Explorer Loop, cyclists can explore rustic areas such as this stretch along the Mandai Park Connector.

02 A haven for biodiversity, Tampines Eco Green promotes a deeper appreciation for nature among those living in the nearby housing areas.

03 You can spot butterflies like this Lemon Emigrant (*Catopsilia pomona pomona*) along the Northern Explorer Loop, especially at the Butterfly Corner near the Admiralty West Park Connector.

### Creating and Enhancing Green Spaces

Outside our nature areas, biodiversity is also found in various urban ecosystems throughout our parks, gardens and even in built-up areas. This harmonious sense of green space grows with every new park and park connector created for the enjoyment of all.

Tampines Eco Green was created as a tranquil sanctuary for biodiversity in the heart of Tampines North. A rich variety of native flora and fauna thrives in this ecologically-themed park. It spans 36.5 hectares, and features various natural habitats such as marshes, secondary rainforest and freshwater ponds.

The park amenities are also uniquely eco-friendly. Its furniture and signage are made from recycled materials and environmentally friendly products, and it features the first odour-free and waterless eco-toilet in Singapore's public parks. The Tampines Park Connector links Tampines Eco Green to Sun Plaza Park and the Tampines Bike Trail.

Jalan Kemuning Park is another recently launched eco-friendly park. Located in Sembawang, this park is the first to make use of a fully solar-powered lighting system, with enough backup energy stored to last up to five days. The park design reduces the need for open drains along footpaths by closely following the site's natural topography. It also retains the site's existing bird habitats by minimising tree removal during the development process.

With the completion of the 25-kilometre Northern Explorer Loop in November 2010, 150 kilometres of park connectors have been completed island-wide.

This is the third completed park connector loop, following the Eastern Coastal Loop and the Western Adventure Loop. Four other major loops have been earmarked, which will bring the total Park Connector Network (PCN) mileage to an estimated 300 kilometres by 2015.

The Northern Explorer Loop offers a range of experiences to those living in the north of Singapore. They can enjoy the view of the Straits of Johor from Woodlands Waterfront, discover over 100 species of flora and fauna at Admiralty Park, and bike along a rustic stretch at Ulu Sembawang which leads to the fringe of the nature reserves.

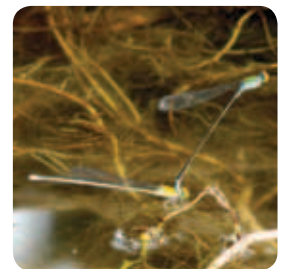


### Biodiversity Snapshots



**Jade Tree Snail**  
*Amphidromus*

*atricallosus temasek*  
A master of camouflage, this snail is incredibly difficult to spot in its tree canopy home. It is known to be found in the older forests of Singapore, such as the Central Catchment Nature Reserve.



**Orange-faced Sprite**  
*Pseudagrion rubriceps*

This damselfly is very rare in Singapore. It had previously only been sighted in nature reserves, but now has a small population in Toa Payoh Town Park.



**Greater Racket-tailed Drongo**  
*Dicrurus paradiseus*

This forest bird has a distinctive long tail: the shafts of the two outermost feathers are extended and end in the rackets which give this species its name. It can imitate sounds and calls from other birds, and can be seen in many gardens and nature areas.





### Flora and Fauna within the Cityscape

A two-year study by NParks, completed in 2010, found that many species of dragonflies are able to thrive in Singapore's urban settings. Forty species were found at key locations such as Bishan Park, Kent Ridge Park, and Toa Payoh Town Park, including the rare *Pseudagrion rubriceps* found at Toa Payoh Town Park.

The dragonflies' presence outside of nature reserves and rural areas indicates that the parks' waterbodies are healthy freshwater ecosystems. The results of the study have also helped NParks to better maintain and design dragonfly habitats in its various park developments.

NParks has an ongoing collaboration with PUB to transform utilitarian drains, canals and reservoirs into streams, rivers and lakes. The Active, Beautiful and Clean Waters or ABC Waters Programme has integrated waterbodies and waterways with parks including Bishan Park and Sengkang Riverside Park, as well as the Alexandra and Whampoa park connectors. These efforts have helped to enrich the native biodiversity, allowing water plants, dragonflies, and even birds to thrive.

In residential areas, Streetscape gardens have been introduced to improve the neighbourhoods' greenery. To date they have been launched in Boon Lay, Tampines and Thomson. These small pockets of linear gardens beautify the area, provide shade and are also refreshing spots to relax and socialise. Streetscape gardens are also envisaged as collaborations with the community, to develop strong and cohesive community bonds and to build a gardening culture among community groups. These gardens are cared for by residents and community leaders to cultivate a sense of ownership and pride.

Even the bustling Orchard Road is included in biodiversity conservation initiatives. Under NParks' orchid reintroduction programme, the spectacular Tiger Orchid – which is already extinct in the wild in Singapore – was chosen as the first native orchid to be reintroduced to Orchard Road in May 2010. The programme aims to propagate and reintroduce native orchid species into natural, semi-natural, and urban environments. It addresses the extinction of most of Singapore's 226 native orchids, mainly due to habitat loss.

As of 2010, the orchid reintroduction programme has seen 2,100 native orchids planted in Bukit Batok Nature Park, East Coast Park, West Coast Park, Pasir Ris Park, Labrador Park, Kim Seng Park and Napier Road. The reintroduced orchids have already begun flowering at various locations including Labrador Park and Pasir Ris Park.

NParks also supports the Nature Society (Singapore) in its efforts to develop a four-kilometre Butterfly Trail along a stretch of Orchard Road, beginning at the Singapore Botanic Gardens and ending at Fort Canning Park. Other partners in this project, launched in June 2010, include Singapore Environment Council, Singapore Tourism Board and the Orchard Road Business Association.

**One-third of the world's dragonfly species exist in Singapore's urban parks and gardens.**



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01 The picturesque Yellow-barred Flutterer (*Rhyothemis phyllis*) is one of the 40 dragonfly species found to be thriving in Singapore's parks.

02 The Thomson Streetscape Garden was planned and planted by over 50 residents and students living nearby, who are also actively involved in its ongoing maintenance.

03 In conjunction with the planting of a Tiger Orchid outside the TANGS store along Orchard Road, a display of native orchids was exhibited inside TANGS. Clarins' Chairman Christian Courtin-Clarins (right) was present for the launch, seen here with Dr Yam Tim Wing, NParks' Senior Researcher (Orchid Breeding).