

# Biodiversity loss in urban areas



## Rainforest Reforestation / Wildlife Gardening **Singapore**

Maya Olcer

# Singapore's urbanisation 1950-80s

- 1959, Legislative Assembly pass the Planning Ordinance
- UN representatives visited Singapore in 1962 and 1963, and their recommendations eventually led to the launch of the State and City Planning Project (SCP) in 1967
- 1967, MRT project begins
- The first expressway, Pan-Island Expressway, and the Changi Airport Terminal 1 were completed in 1981
- MRT network was opened in 1987



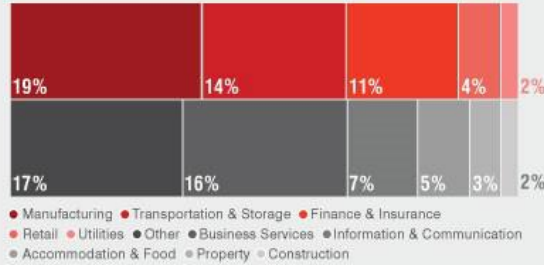
# Singapore Today



## SINGAPORE: THE CITY-STATE BUILT ON TRADE

Singapore may be one of the world's tiniest nations, but its small stature hasn't stopped it from becoming one of East Asia's most powerful trading hubs.

### Breakdown of economy (%)



### World economies GDP per capita (World ranking)



### Port of Singapore

The port of Singapore is the world's second busiest container port behind Shanghai



### Size matters



### Changi Airport

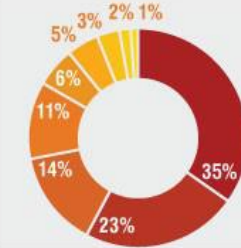
Singapore Changi Airport was recently crowned the world's best at the World Airport Awards. The giant facility catered for **51.1 million** passengers in 2012, that's **10 times** Singapore's population.



### Cultural makeup

Singapore's historical status as a trading hub is reflected in the ethnic diversity of the population and the number of official languages recognized within the city state.

While Mandarin is the dominant language, English, Malay, Hokkien and Cantonese are also common.



- Mandarin ● English ● Malay ● Hokkien ● Cantonese ● Teeochew
- Tamil ● Other Chinese Dialects ● Other

**56**

square kilometres, the equivalent of **6,746** football pitches, of extra land that Singapore plans to reclaim from the sea by 2030 due to an ever expanding population and cityscape.

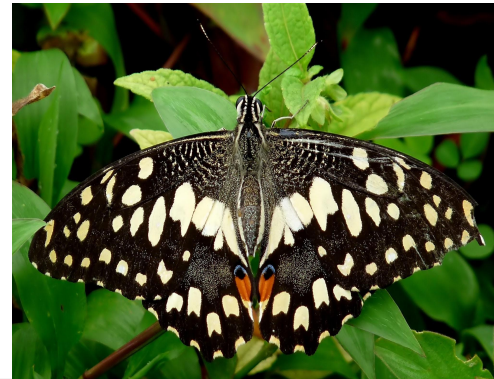
SOURCES: Airport Council International; Journal of Commerce; CIA World Factbook; Department of Statistics Singapore; Changi Airport; Singapore Ministry of National Development; Mastercard Global Destinations Index; MPA Singapore; Statistics Singapore.



# Biodiversity in Singapore



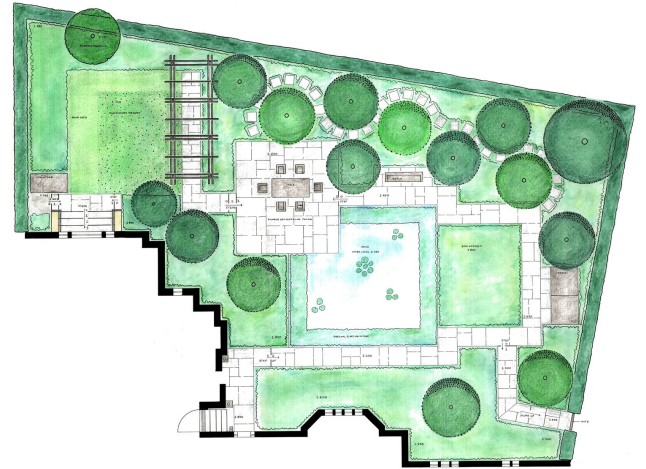
- 392 species of birds
- 2,100 native vascular plants
- 65 species of mammals,
- 110 species of reptiles
- 30 species of amphibians,
- 300 butterfly species
- 127 dragonfly species and over
- 2,000 recorded species of marine wildlife



# Wildlife Gardening



- A system of gardening which mirrors the environment before the residence was built. Giving way for natural systems to interact and establish an equilibrium, ultimately minimizing the need for gardener maintenance and intervention.
- Reserves and parks usually employ this method to keep the biodiversity active in an initially artificial environment



# Nature Reserves in Singapore

- 68 parks and reservoirs
- The Singapore Botanic Gardens is a UNESCO World Heritage Site.





- The UWCSEA Rainforest Restoration Project's mission is to raise trees from seed in our campus tree nursery so we can plant them in the UWCSEA community and elsewhere in Singapore.
- The group has planted over thirty indigenous trees in the last two years and recently cloned itself by establishing a Nursery at East Campus in March 2013.
- Current projects include an exciting partnership with Singapore Botanic Gardens to raise critically endangered tree species for reintroduction here on the island.

## UWCSEA RAINFOREST RESTORATION PROJECT

*Think global. Plant local.*



## Case Study - Pulau Ubin

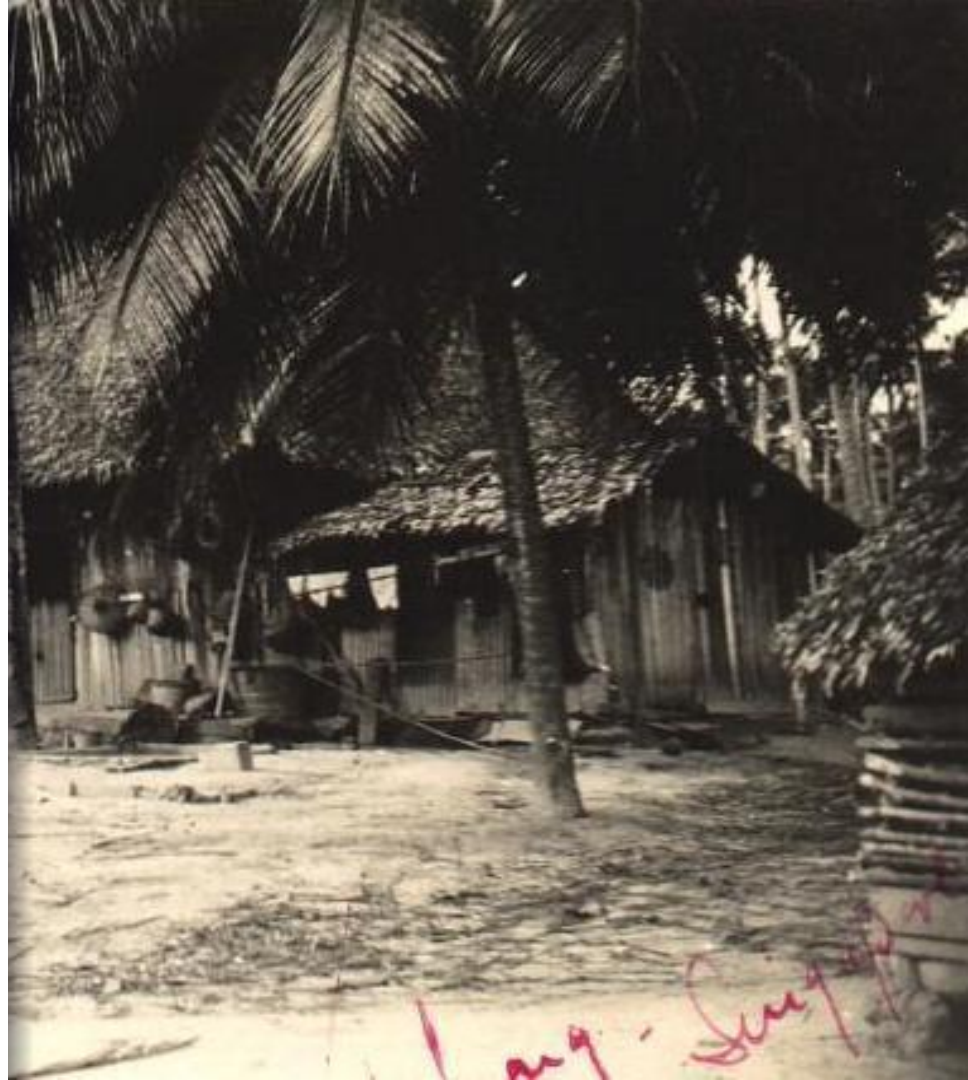
- Pulau Ubin's vegetation was once cleared for the cultivation of **rubber** and crops like **coffee**, **pineapple**, **coconut** and **jasmine**
- One of the last rural areas in Singapore having been preserved from urban development, concrete buildings and tarmac roads.
- In 2009, the mouse-deer, which has been thought to be extinct for over 80 years, was **discovered on Pulau Ubin**.
- Chek Jawa is a **5,000 year old coral reef** on Pulau Ubin. Relatively well preserved Wetlands can still be found on Chek Jawa





## Case Study - Pulau Tekong

- Exclusively used for **military training**.
- One of the largest remaining mangrove forests in Singapore
- Coastal erosion is putting **0.92 km<sup>2</sup> of mangroves in danger**. Erosion is being caused by the movement of ships and strong sea waves
- In 2010, the National Parks Board undertook a project to restore and stabilize the coast line. **8,000 mangrove saplings have been planted** to help deflect sea waves and increase the biodiversity on the island.



## Case Study - Sungei Buloh

- Sungei Buloh holds extensive mangrove environments with their associated rich biodiversity
- **2.02 km<sup>2</sup> of mangroves, mudflats, ponds and forests**
- Treks allow visitors to see mudskippers, crabs, shellfish, water snakes, birds, spiders, monitor lizards and otters
- This site is of global importance as it has a **high variety of bird species** which include **migratory birds** that stop over from as far as Siberia on their way to Australia.





# Local Perspective

The Singaporean Government

# National Parks Board

## “City in a Garden”

Sub-branches :

- Garden City Fund
- Center for Urban Greenery and Ecology

Goals :

- Optimising the green spaces in Singapore
- Supporting the urban biodiversity conservation model
- Engaging the community
- Enhancing competencies of the landscape industry in Singapore



# Dr. Lena Chan

Dr Lena Chan is the group director of the National Biodiversity Centre at the National Parks Board (NParks) and member of the advisory committee for the Cities and Biodiversity Outlook for the Convention on Biological Diversity.

*“We should instil the values of biodiversity conservation in young children and students. Incorporating biodiversity into the school and tertiary institution curricula opens them to the science and the art of biodiversity conservation in our formal education.”*



# Singapore's National Biodiversity Strategy and Action Plan (NBSAP) - **Goals**



## **Conserve and enhance biodiversity at the genetic, species and ecosystem levels.**

“Singapore’s habitats and ecosystems should be conserved for long-term sustainability of the ecosystems. The rates of decline in biodiversity should be slowed down as expressed in the World Summit on Sustainable Development target of reducing the rate of biodiversity loss by 2010. Concerted efforts should be made to conserve existing species, habitats and ecosystems, and to re-establish species known to have been present in the past.”

## **Ensure sustainable use of Singapore’s biodiversity resources.**

“The use of Singapore’s biodiversity, including its benefits such as ecosystem services or by-products, should be sustainable. Multi-agency cooperation should be central to the assessment, monitoring and regulation of conservation processes.”

## **Ensure fair and equitable sharing of benefits that result from the use of our genetic resources.**

“Policies on sharing of benefits derived from the use of our genetic resources are to be formulated and implemented, at the same time balancing the twin goals of biodiversity conservation and sustainable use.”



# Local Perspective

Singapore's Community

# Nature Society - SG

The NSS is a non-government, non-profit organisation dedicated to the appreciation, conservation, study and enjoyment of the natural heritage in Singapore and Malaysia

## Achievements:

- Staving off plans to develop part of **Peirce Reservoir forest** into a golf course in 1992
- **Relocated coral reefs** which were threatened by land reclamation.
- Published the **Master Plan for the Conservation of Nature in Singapore**, which has influenced Government policy and planning.
- Persuading the Government to set aside **Sungei Buloh as a mangrove and bird sanctuary** in 1993,
- Agitating for the **preservation of Chek Jawa**, a unique marine habitat on Pulau Ubin in 2001.





# Dr. Shawn Lum

President of Nature Society - SG

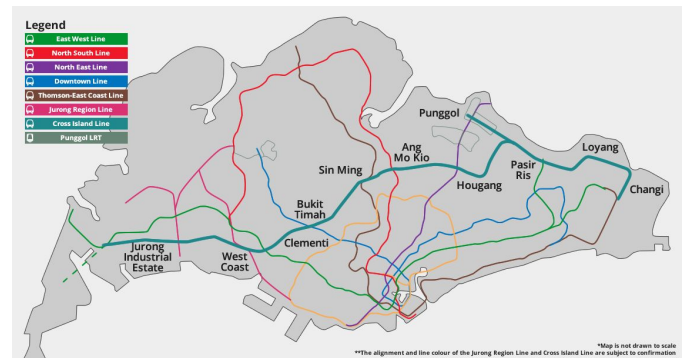
*“So many of us have lost the strong connection our ancestors had to the land. We’ve turned land into this commodity, something we buy and sell, or extract some direct economic value out of, like crops or eco-tourism. We have to show that nature in its wild state is just as valuable, if not more so, than nature that is cleared and converted.”*





# Cross Island MRT line

The center of the issue



# Facts and Figures of the CRL



- **Currently under planning**

- Targeted to be completed by 2030
- 30 stations
- 600 000 daily passengers
- 50 km of tracks



» The direct alignment has 2km of the tunnel planned to run beneath the Macritchie Reservoir (CCNR).

» The line will begin from **Changi**, passing through **Loyang, Pasir Ris, Hougang, Ang Mo Kio, Bukit Timah, Clementi, West Coast** before terminating at **Jurong Industrial Estate**.



# Opposition to the CRL - Report from Nature Society



- The Nature Society- SG argues that the alignment should not pass through the CCNR or the Bukit Timah Nature Reserve (BTNR) due to the **potential for damage to highly valued ecosystems**. As indicated by LTA Transport engineers that due to the variability of below surface geology it will be **necessary to undertake soil investigations** that involve the **drilling of core bore samples** at regular intervals along the proposed CRL alignment.
- The primary forest patches are scattered in small clusters throughout the forests of the BTNR and CCNR. Regrowth forests have recovered to the point where they can support a range of native forest dependent fauna.
- **We cannot afford to risk the loss of any primary forest nor interfere with the continued progression of the regrowth forests to higher levels of biodiversity.**



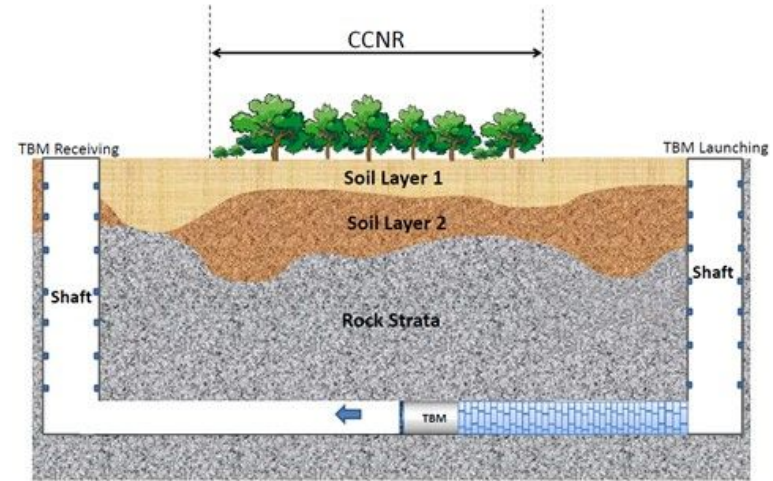
# Government's response - EIA



An Environmental Impact Assessment (EIA) evaluates the possible impact of a proposed project on the environment. The EIA on the two possible CRL alignments assesses the impact to the ecology, geology and hydrology of the Central Catchment Nature Reserve (CCNR).

## Findings :

Options currently being proposed are all underground and any tunnels beneath the CCNR will be located deep below the nature reserve at about 40m . **There is no need to remove any vegetation for the site investigation works.**



# Measures to be taken by the LTA



- 16 boreholes will be drilled to extract vertical columns of soil samples . These boreholes are 10cm in diameter and will be **confined to public trails/existing clearings** so as not to affect any vegetation.
- The drilling machines will also be modified to **reduce the noise level** and **prevent spillage** of slurry and fluid.
- Engineers will use **non-invasive geophysical survey methods**.
- Imposing strict criteria to guide off-trail movements. The **contractors will be supervised by NParks officers at all times**.
- **Avoiding ecologically sensitive areas such as streams, and swampy areas**. For example, a 30m buffer zone is applied from these areas and no boreholes are allowed.
- All site investigation activities will also be **restricted to daylight hours**, so as not to affect nocturnal animals.
- With the mitigating measures, the **number of machines and human movement within the reserve will be minimised**.



# Global Perspective

Articles from the BBC, CNN and Eco-Business

# BBC's Article

*“Why wild cities are good for our health”*

- By Christina Holvey

This article explores how Singapore's Gardens by the Bay is a revolutionary botanical garden and how it offers a path of health and happiness of its citizens.

## **Benefits to the city:**

- Their mechanical columns literally support a huge range of plant species, which are in turn habitats for wildlife.
- The 'super trees' also host solar panels to help reduce the city's electricity bill,
- Keep the city cool by providing shade, reflecting sunlight, and releasing water into the environment via evaporation.
- They provide a valuable space for the local residents to enjoy.

*Singapore has boldly prioritised this ecologically rich and sustainable space, around which it plans to build skyscrapers with wonderfully nourishing views*





# CNN's Article

## *"How did Singapore become such a green city?"*

- By Meera Senthilingam

This article highlights the reasons for which Singapore is credited with being so skilled with balancing city and nature

- **Green Ratings**
  - For example UWCSEA EAST has achieved the Greenmark Platinum award, which is the highest green building rating available from Singapore's Building and Construction Authority (BCA)
- **The importance of shelter**
  - Singapore has the need to cool and protect people from direct sunlight and shelter them from the rain
- **A happy future**
  - Singapore pledged to reduce its greenhouse gas emissions by 16% below business as usual levels in 2020, under the UN Framework Convention on Climate Change.



## Eco-Business' Article

### *“Planet Earth II ignores threats to Singapore’s last forests”*

- By Robin Hicks

*The BBC nature documentary portrays Singapore as a green urban utopia where man has invited nature back into the city. The development of Singapore’s last forests suggests the opposite is happening.*

#### Documentary Vs. Reality

- Conservation experts say it is misleading to suggest that Gardens by the Bay is a magnet for animals when none of the hundreds of plants species growing on the supertrees - which light up at night and blare music - thereby have limited appeal for local wildlife.
- Dr Ho Hua Chew, the vice-chairman of Nature Society -SG, notes there were larger populations of species such as Lesser Whistling Ducks in the area before Gardens by the Bay was built.
- **Is greening a substitute for forests?**
- Half of the forested area in Coney Island, is to make way for an adventure park

In Singapore, Planet Earth II shows a world where artificial nature parks are an acceptable substitute for forests. This is a worrying vision of the city of the future.





# Personal Perspective

Drawn from a collection of information

## My personal perspective - Maya Olcer



Going through this whole research experience only added to the strong emotions I felt for nature conservation. What I gained through this task, however, was the knowledge of Singapore's current situation on the issue. By completing this presentation I was able to explore the issue from both sides, exploring the diverse perspectives that I came upon and understanding the reason for which their actions have been carried out.

In conclusion, after completing the task, I've solidified my learning and the standpoint on the biodiversity loss in Singapore. I can now confidently say that my perspective is well balanced and derived from reliable sources of information.

Compared to other countries, far and near, Singapore is the best example for the perfect metamorphosis of a wild rainforest terrain into a nature inclusive bustling city. What has brought on this strict regimen of balance was due to Singapore's nature of being inclined towards an emphasis on rules and regulations concerning every aspect of life in the Lion City. Yet this thirst to strive for perfection has made a gash between the residents of the island. Some of them opting for a more developed and industrialized city while others would rather devote more time and energy to wildlife and nature conservation. Even though the government is trying to push the population towards a more eco-friendly side, their efforts are not always met with acceptance, some of us still prefer our own personal comfort, like 5 minutes taken of our daily commuting time over the expulsion of Singapore's native animals from their homes.

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