

Native Species Reforestation in Singapore

How much
can we restore?

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Nature Parks



BBNP

Bukit Batok Nature Park

BBTP

Bukit Batok Town Park

LNR

Labrador Nature Reserve & Berlayer Creek

ZP

Zhenghua Park

AP

Admiralty Park

CIP

Coney Island Park (future)

TBT & TEG

Tampines Bike Trail & Tampines Eco Green

YP

Yishun Park (Dipterocarp Arboretum)

Outline

- **Introduction**
- **Recent research**
- **NParks' efforts in reforestation**
 - Reforestation in parks and nature areas
 - Reforestation and the community
 - Comparison of top 20 tree species used in NR and BBNP
 - Mangrove reforestation
- **Lessons learnt and research gaps**



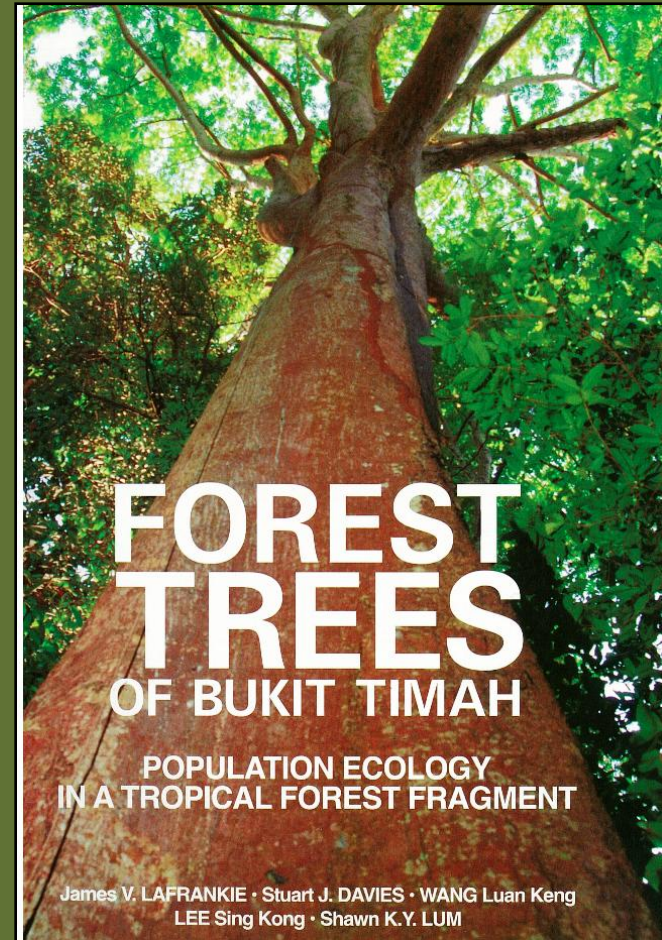
Introduction

- NParks - reforesting areas of degraded vegetation since 1991.
- Objective: restoration to mature secondary forest containing significant primary forest components.
- Technique: staggered planting of primary forest species + framework species method (Goosem & Tucker 1995).
- Inter-planting of fast-growing native species with diverse range of late secondary and primary forest species.
- Planting species of conservation interest



Recent research

- BTNR forest is “hyper-dynamic”; changing composition; tree diversity steady; monitoring required - LaFrankie *et al.* (2005)
- Intervention needed in forest regeneration; seed dispersal and landscape matrix more important as saplings grew and canopy formed - Shono *et al.* (2006)
- Review of 45 tree species; some primary forest trees performed well in open areas; site-species matching important - Shono *et al.* (2007)
- Lack of seedling recruitment in secondary and degraded forests > **delayed or arrested succession** - Goldsmith *et al.* (2011)



Reforestation sites outside the rainforest reserves



Reforestation and the community

- Plant-A-Tree (PAT) program for public and private organisations, MNCs, schools and individuals.



PLANT-A-TREE PROGRAMME

PLANT-A-TREE NOW



We don't respect things that we don't understand.

And it's very hard to understand something without experiencing it.

- Canadian environmentalist
David Suzuki



[PLANT-A-TREE PROGRAMME](#)

[HOW DOES THE PROGRAMME WORK?](#)

[HOW TO TAKE PART](#)

[TREE PLANTING SCHEDULE](#)

TREE PLANTING SCHEDULE

Public Planting Schedule (Open For Booking)*

| Year 2012 | Date | Registration |
|---|--------------|--------------|
| Central Catchment Nature Reserve (Upper Peirce) | 14 Jan 2012 | Closed |
| Bedok Town Park | 25 Feb 2012 | Closed |
| Zhenghua Park | 24 Mar 2012 | Available |
| Pasir Ris Park (Earth Day) | 22 Apr 2012 | Available |
| Ang Mo Kio Town Garden West | 26 May 2012 | Available |
| Tiong Bahru Park | 30 Jun 2012 | Available |
| Punggol Waterway Park | 28 Jul 2012 | Available |
| Tampines Eco Green | 25 Aug 2012 | Available |
| Bukit Batok Nature Park | 29 Sept 2012 | Available |
| Clementi Woods Park | 27 Oct 2012 | Available |
| Sembawang Park | 24 Nov 2012 | Available |
| Woodlands Ave 7 PCN | 29 Dec 2012 | Available |

* Donors are required to submit their donation request at least 6 weeks prior to planting date.

* Please fill up this form and mail it together with the donation payment to Garden City Fund. More details on how to take part in



Reforestation and the community

- Plant-A-Tree (PAT) program for public and private organizations, MNCs, schools and individuals.
- Accessible locations in nature reserve and parks on green-letter days, private requests or CSR efforts.
- Site briefing and planting demonstration, followed by guided walk.
- Tree-related projects: Dipterocarp Arboretum, Forest of the Giants, Singing Forest.



Comparison of top 20 species used in reforestation

*Central Nature Reserve Bukit Batok Nature Park

Syzygium polyanthum

Pometia pinnata

Dyera costulata

Elaeocarpus mastersii

Syzygium lineatum

Cinnamomum iners

Kompassia malaccensis

Sindora wallichii

Sandoricum koetjape

Alstonia angustiloba

Gnetum gnemon

Pouteria obovata

Garcinia atroviridis

Hopea mengarawan

Cratoxylon formosum

Strombosia javanica

Lepisanthes rubiginosa

Syzygium grande

Emblica officinalis

Syzygium syzygioides

Aquilaria malaccensis

Sterculia parviflora

Syzygium glaucum

Hopea sangal

Hopea megarawan

Callophyllum soulatrii

Palaquium obovatum

Kompassia malaccensis

Fagraea fragrans

Pometia pinnata

Syzygium zeylanicum

Xylopiya ferruginea

Monocarpia marginalis

Gnetum gnemon

Dipterocarpus kunstleri

Gardenia tubifera

Elaeocarpus mastersii

Sterculia rubiginosa

Neobalanopcarpus heimii

Shorea leprosula



Mangrove reforestation

- Efforts in parks (Admiralty Park, Pasir Ris Park) and Sungei Buloh Wetland Reserve
- Propagules/saplings of mangrove species planted
- Common species: *Avicennia alba*, *Rhizophora mucronata*, *Sonneratia alba*
- Pasir Ris Park: added 0.62 ha with species of conservation interest such *Bruguiera hainesii*, *Bruguiera sexangula* and *Sonneratia caseolaris*
- Most ambitious and interesting mangrove reforestation project – Pulau Tekong



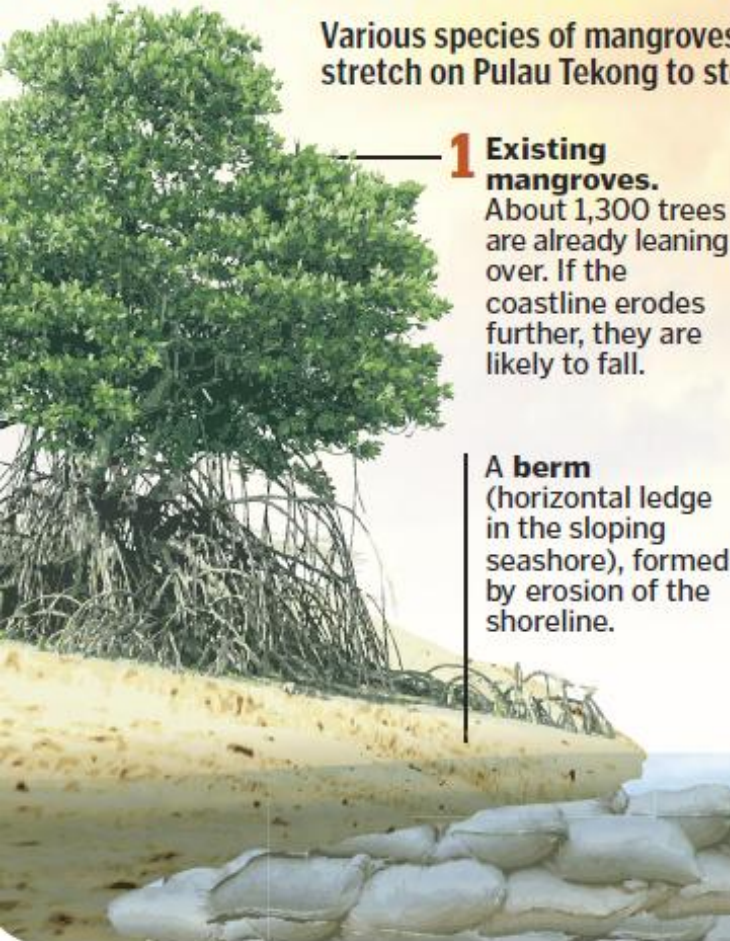
Mangrove reforestation

MANGROVE ENGINEERING

Various species of mangroves to be planted at 1.65km stretch on Pulau Tekong to stop erosion



NOTE: Project area is along a roughly 1.65km stretch of shoreline on the north-east coast of Pulau Tekong, about 760m from the Singapore-Malaysia international boundary.



1 Existing mangroves. About 1,300 trees are already leaning over. If the coastline erodes further, they are likely to fall.

A **berm** (horizontal ledge in the sloping seashore), formed by erosion of the shoreline.

2 Biodegradable sacks filled with suitable mud and put in the undercut beneath the berm.

3 Rocks of varying sizes, to add support to the shoreline.

4 Mangrove saplings encourage more natural growth of mangroves, and replace those already lost. About 6,000 to 8,000 will be planted in all.

Mangroves that reproduce quickly will be planted here to shore up the coastline

Hardy mangrove species that can withstand high tides and strong waves

5 Bakau wood poles to dissipate wave energy



12 MAY 2010 THE STRAITS TIMES

TEXT: GRACE CHUA GRAPHICS: LIM YONG

Landward

- *Brugueira gymnorhiza*
- *Sonneratia caseolaris*
- *Xylocarpus granatum*

- *Rhizophora apiculata*
- *Brugueira cylindrica*
- *Ceriops tagal*

- *Rhizophora stylosa*
- *Sonneratia alba*

Seaward



Lessons learnt and research gaps

- Documentation and data management is important
- Treat every plot like an experiment!
- Species selection and verification crucial for success
- Good communication between nursery staff and restoration/conservation managers
- Research gaps
 - Framework species – local context
 - Disperser fauna – roles and limitations
 - Planting more non-animal dispersed trees?



Thank you

- **ELTI (David Neidel)**
- **National Parks Board**
- **Geoffrey Davison , Hassan Ibrahim, Lua Hock Keong**
- **Nature Parks Team (past and present)**
- **Raem Tan, Adelle Wang, Toh Yuet Hsin**
- **Yang Shufen, Mohamad Yusoff, Sharon Chan**
- **Shawn Lum, Kenichi Shono, Chua Yen Kheng**