



Management of Urban Trees in Singapore Upgrading of Arboricultural Work Practices

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Hong Kong

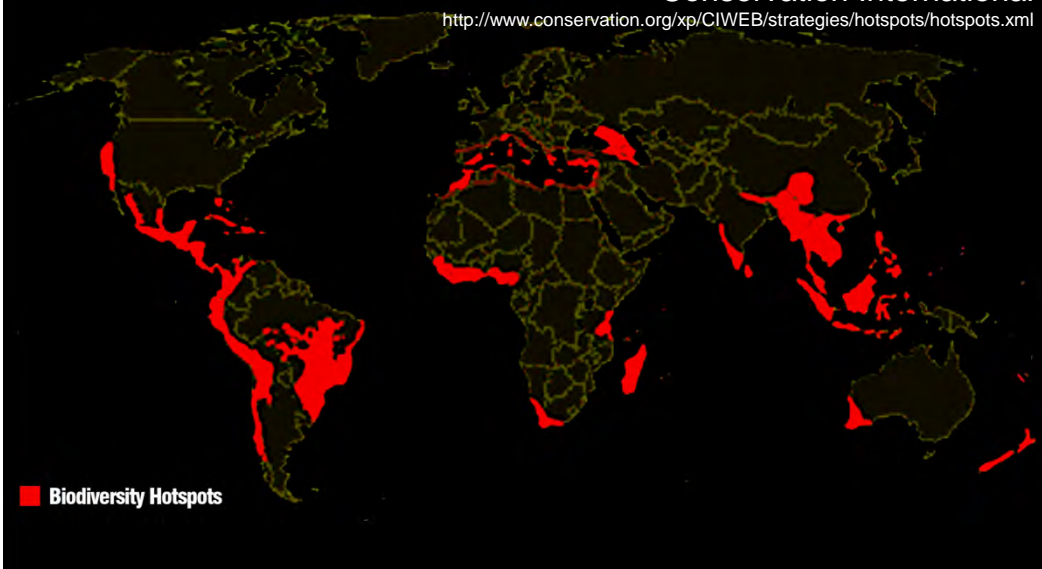
Pouteria obovata

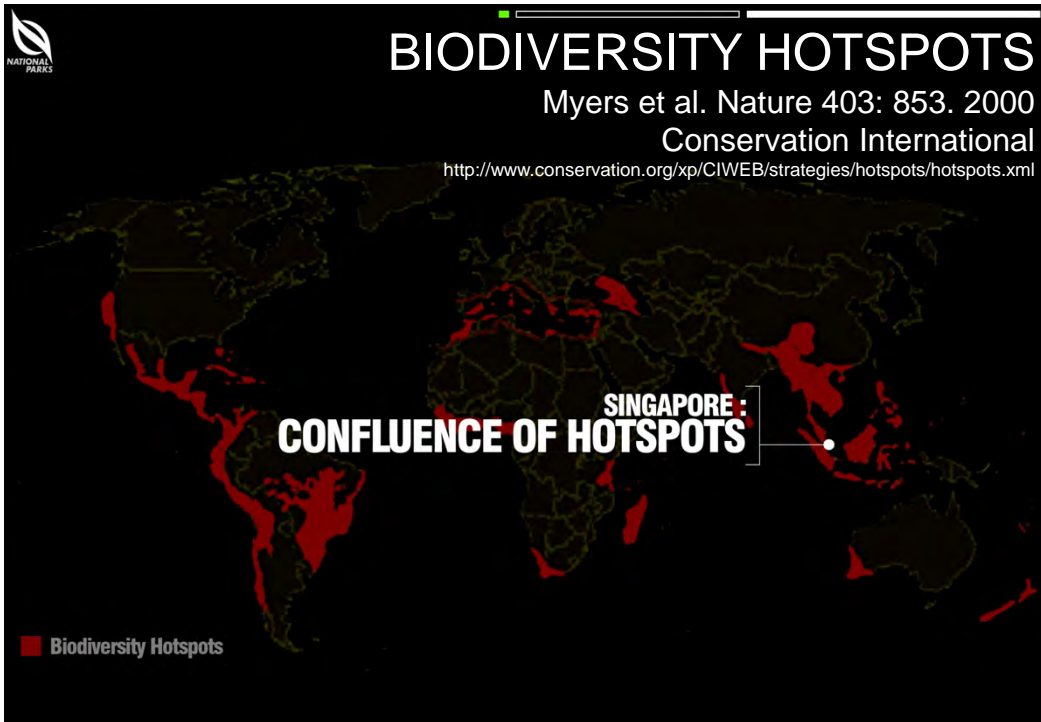
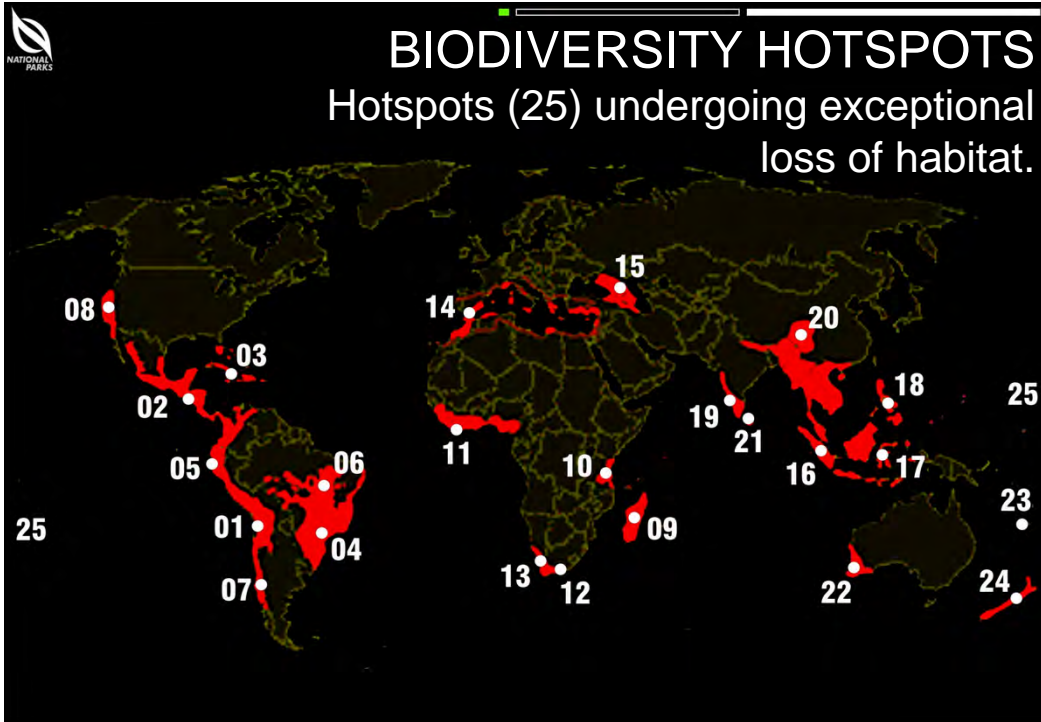


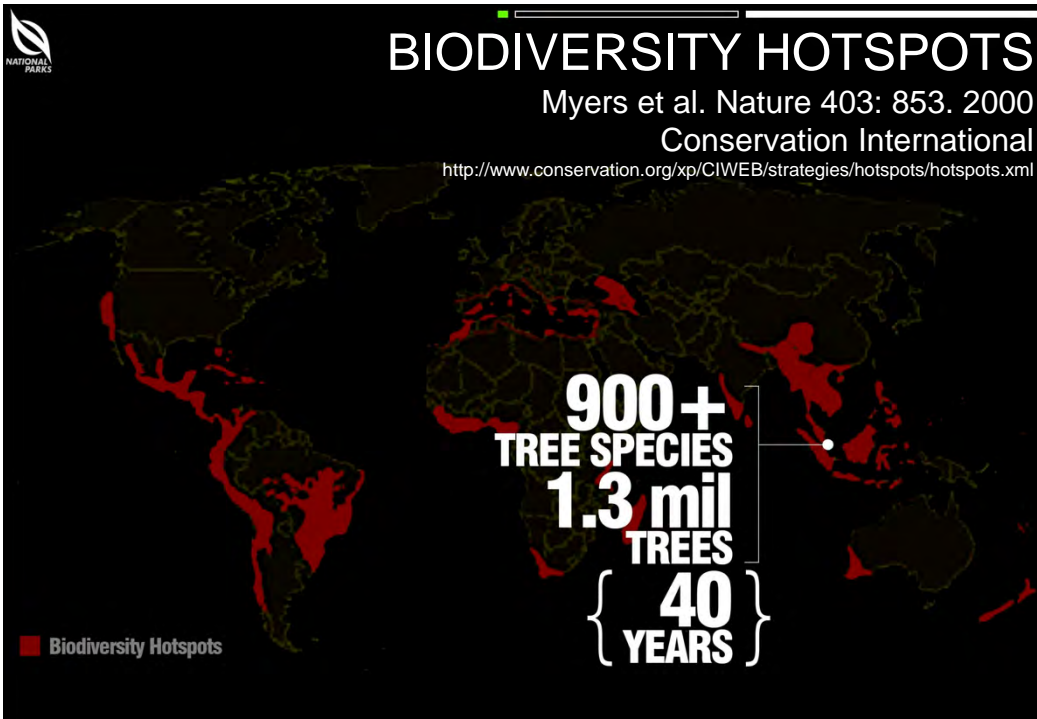
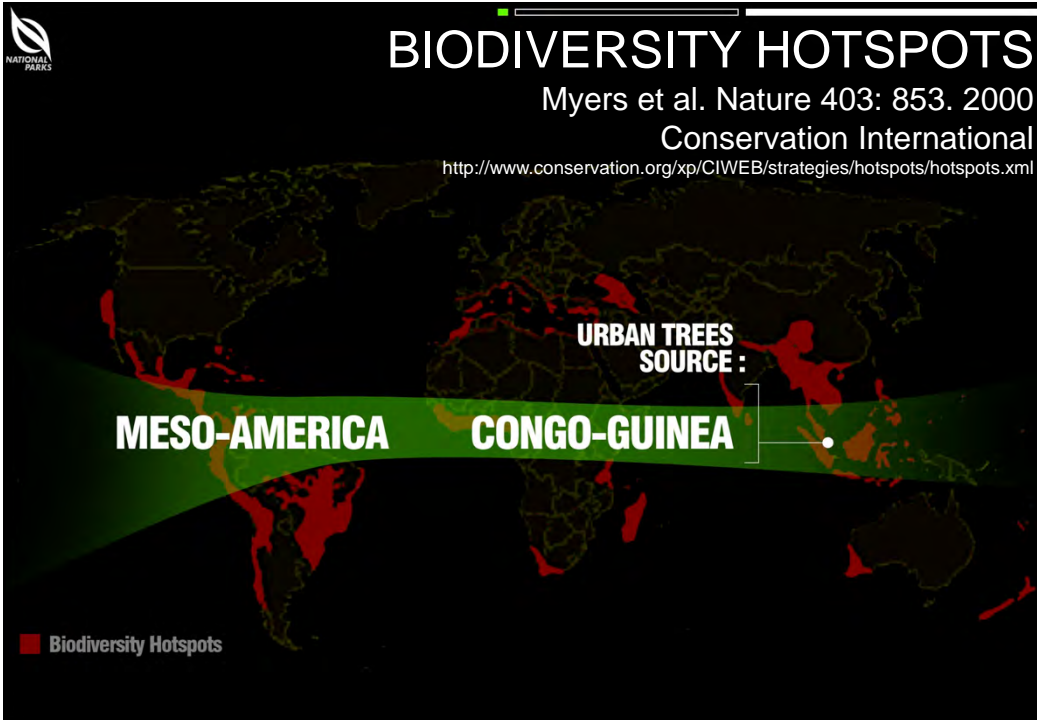
BIODIVERSITY HOTSPOTS

Myers et al. Nature 403: 853. 2000
Conservation International

<http://www.conservation.org/xp/CIWEB/strategies/hotspots/hotspots.xml>









COMMONLY PLANTED TREES

<i>Cinnamomum iners</i>	Wild Cinnamomum
<i>Samanea saman</i>	Rain Tree
<i>Peltophorum pterocarpum</i>	Yellow Flame
<i>Syzygium grande</i>	Jambu Laut
<i>Swietenia macrophylla</i>	Broad-leaved Mahogany
<i>Khaya senegalensis</i>	African Mahogany
<i>Tabebuia rosea</i>	Tecoma
<i>Pterocarpus indicus</i>	Angsana
<i>Cassia fistula</i>	Golden Shower
<i>Fragraea fragrans</i>	Tembusu

Pterocarpus indicus



NEWLY PLANTED TREES

Dipterocarpus cornutus
Pouteria obovata
Hopea odorata
Shorea roxburghii
Firmiana malayana
Sterculia parviflora
Pentaspodon motleyi
Agathis borneensis
Palaquium obovata
Bucida molinetti

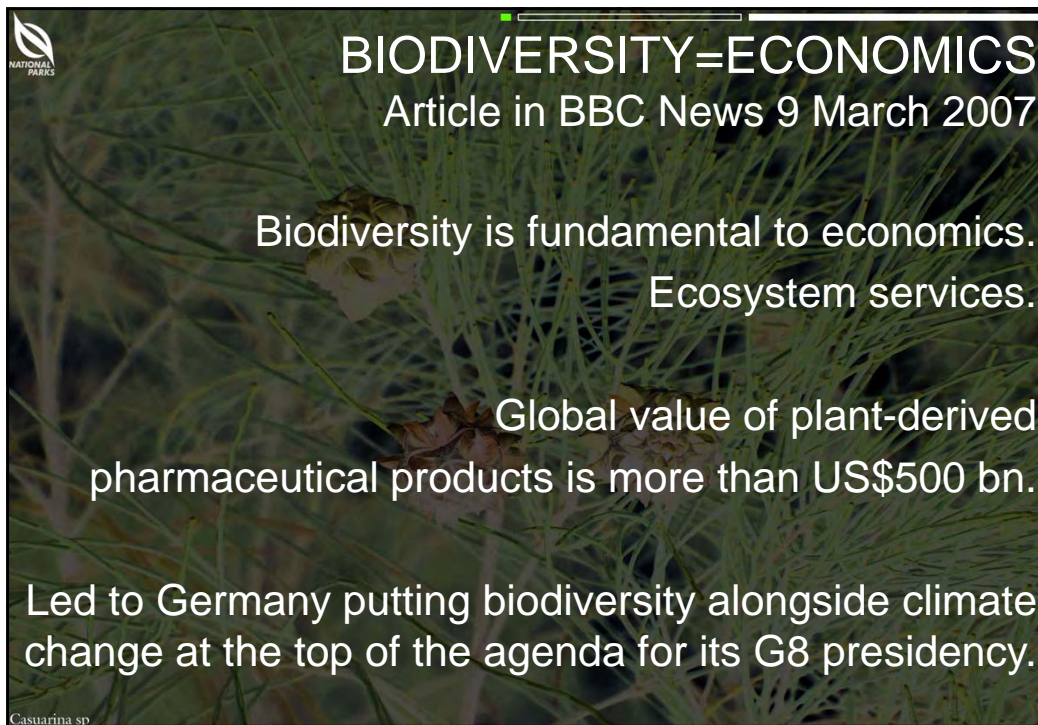


NEWLY PLANTED TREES

These trees range from equatorial trees to subtropical species that are planted in regions of Hong Kong/China and Australia.

- This mix of trees are unique and over the past 40 years we have built up our experience in managing these trees.

Dryobalanops aromatica



BIODIVERSITY=ECONOMICS
Article in BBC News 9 March 2007

Biodiversity is fundamental to economics.
Ecosystem services.

Global value of plant-derived pharmaceutical products is more than US\$500 bn.

Led to Germany putting biodiversity alongside climate change at the top of the agenda for its G8 presidency.

Castuarina sp



BIODIVERSITY HOTSPOTS

Arboriculture physically brings trees closer to people.

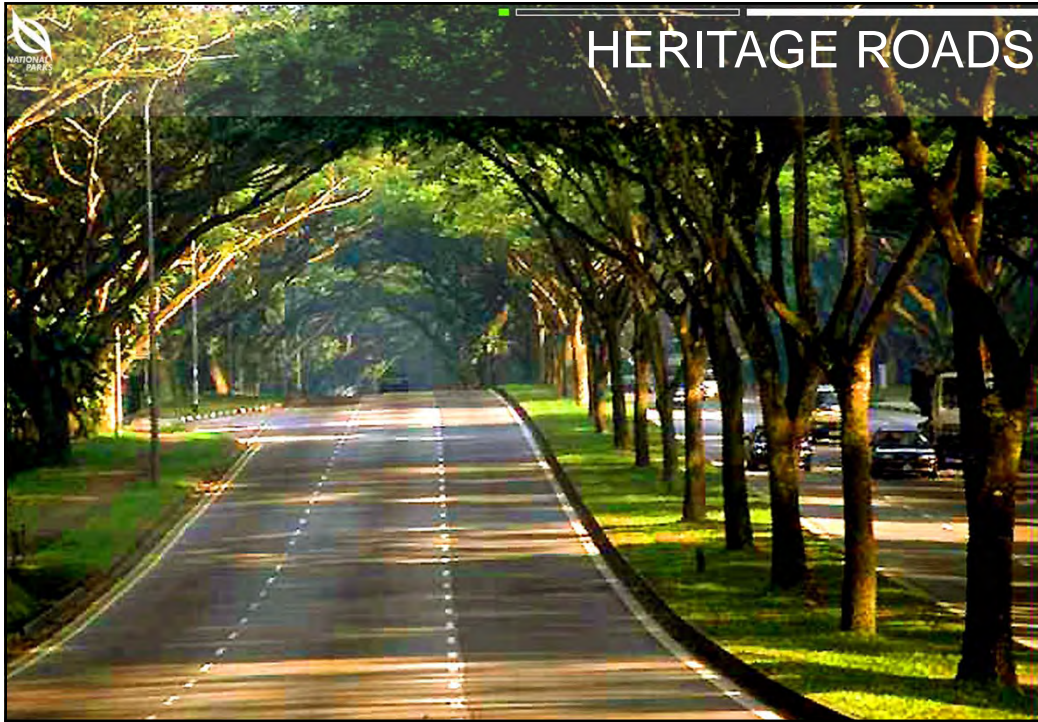
Through this, people are able to directly experience biodiversity.



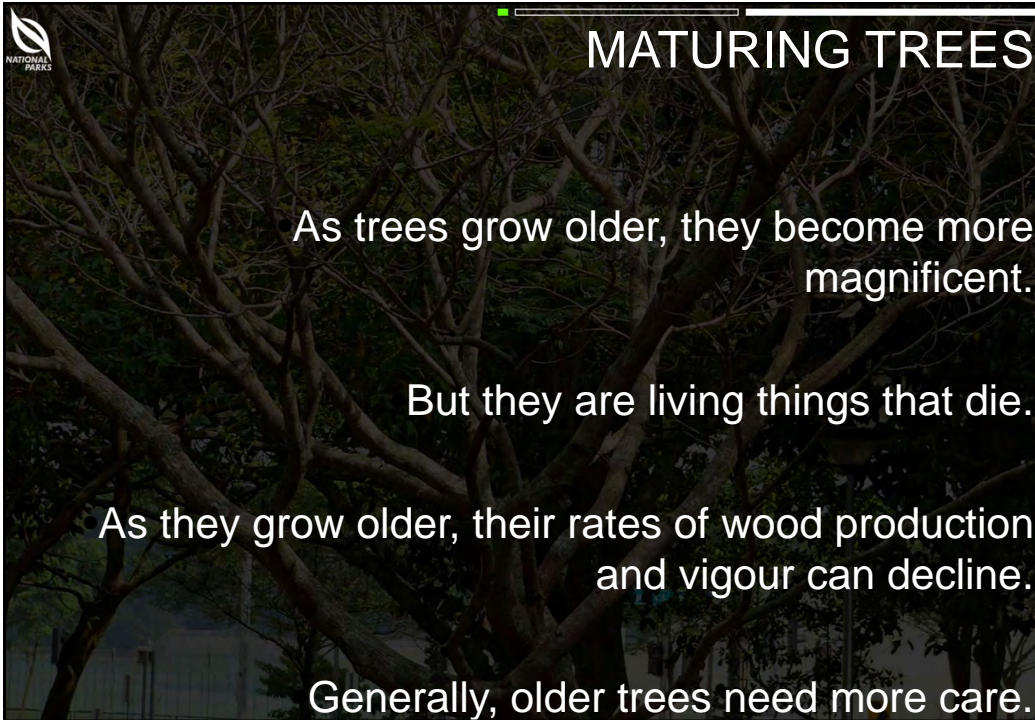
TRANSITION OF STREETSCAPES












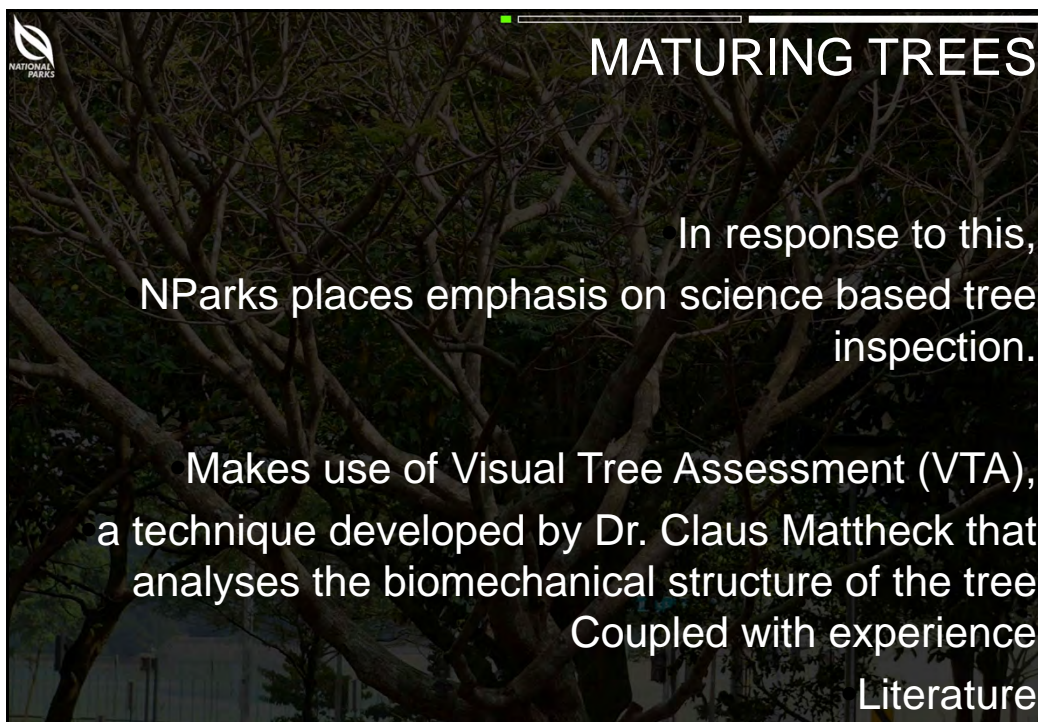
 **MATURING TREES**


As trees grow older, they become more magnificent.

But they are living things that die.

As they grow older, their rates of wood production and vigour can decline.


Generally, older trees need more care.



 **MATURING TREES**

In response to this, NParks places emphasis on science based tree inspection.

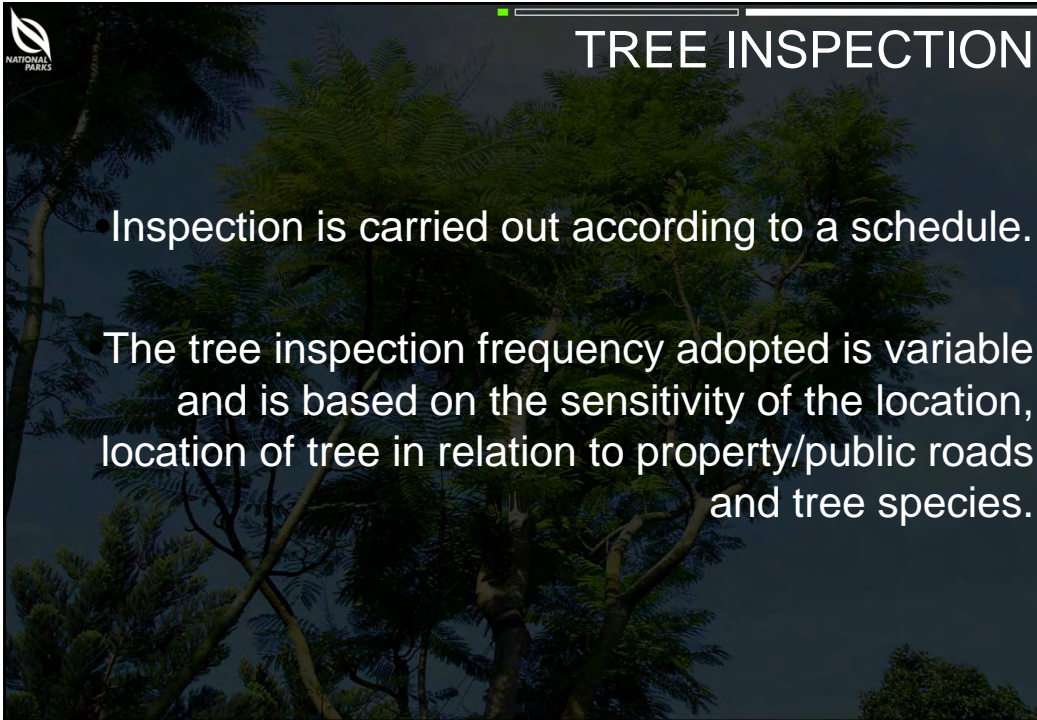
Makes use of Visual Tree Assessment (VTA), a technique developed by Dr. Claus Mattheck that analyses the biomechanical structure of the tree
Coupled with experience
Literature



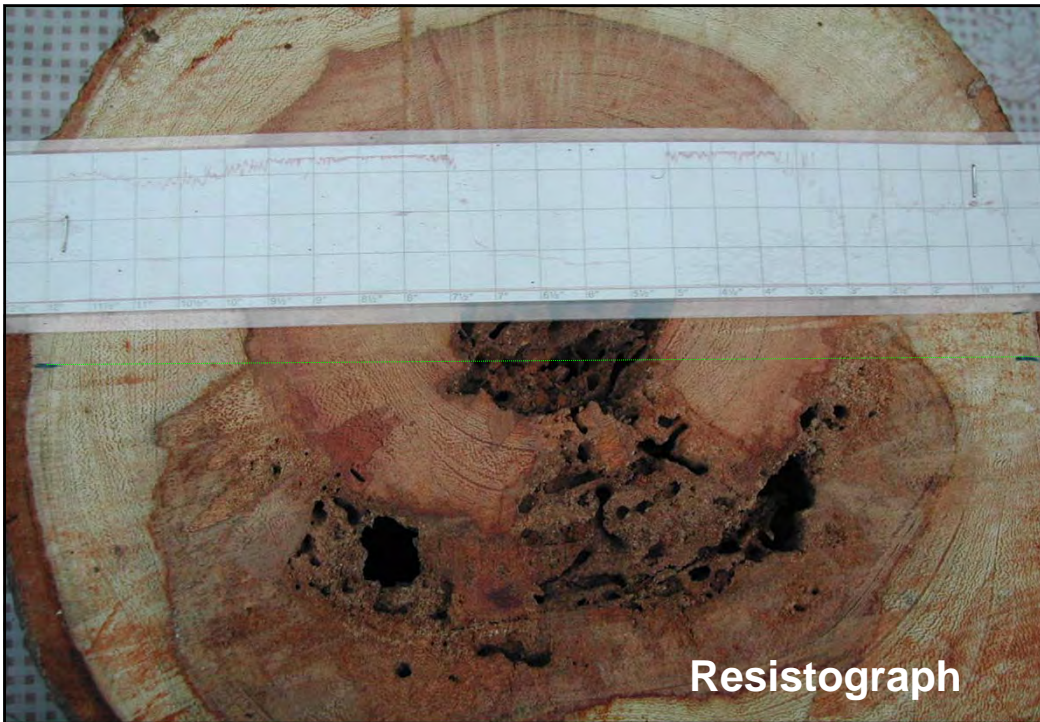
TREE INSPECTION

- Inspection is carried out according to a schedule.


The tree inspection frequency adopted is variable and is based on the sensitivity of the location, location of tree in relation to property/public roads and tree species.





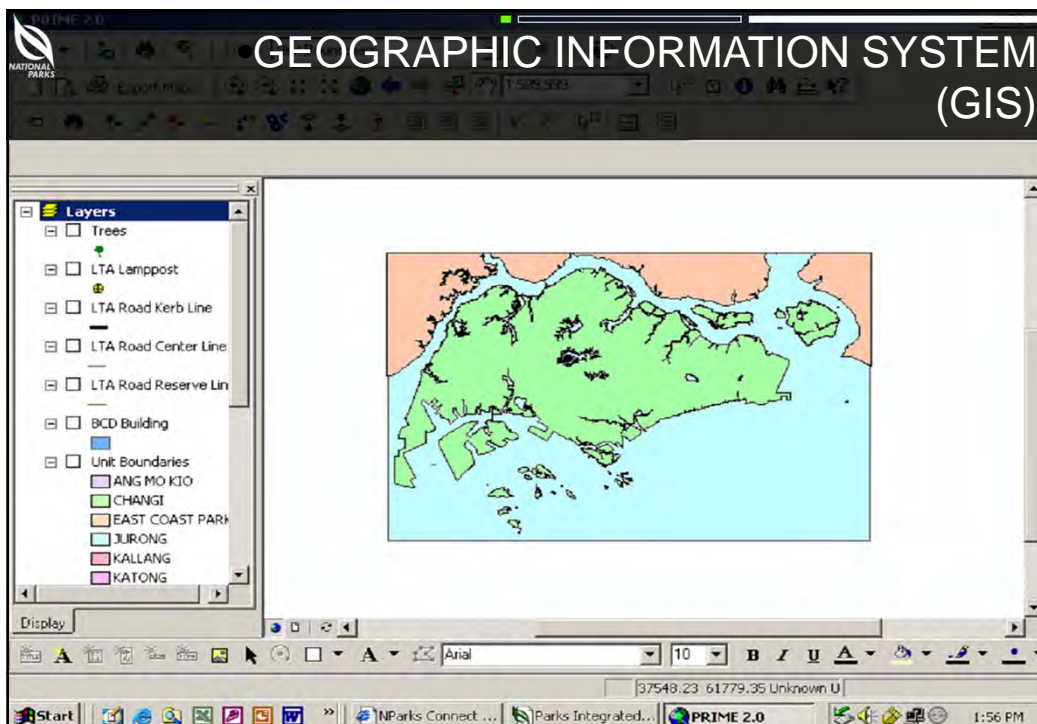
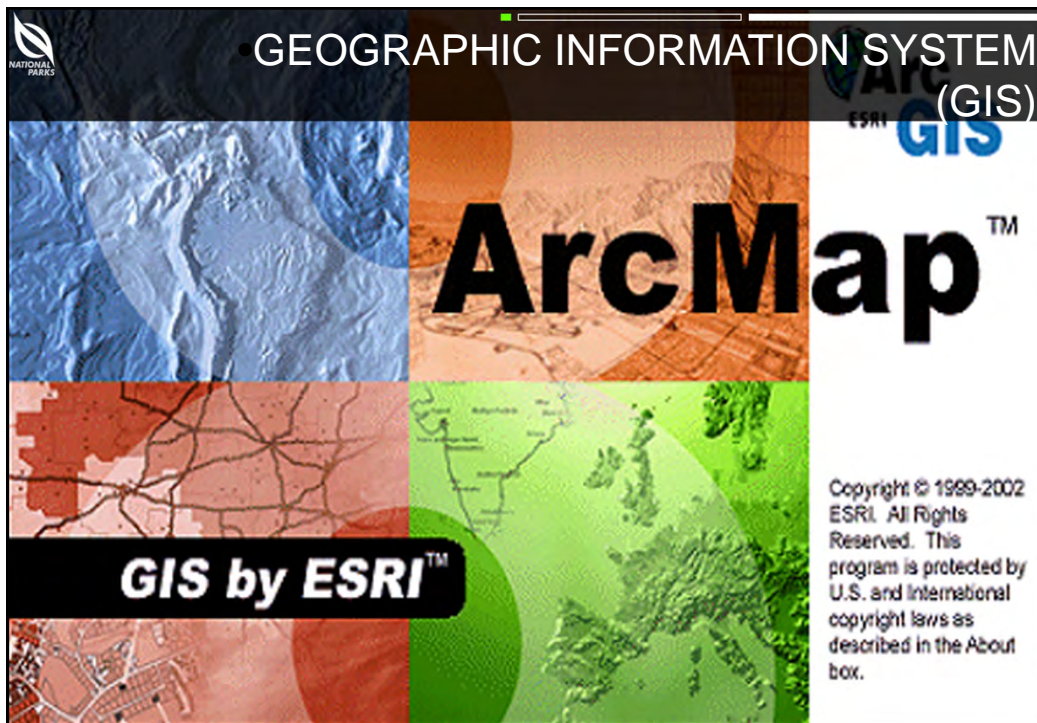


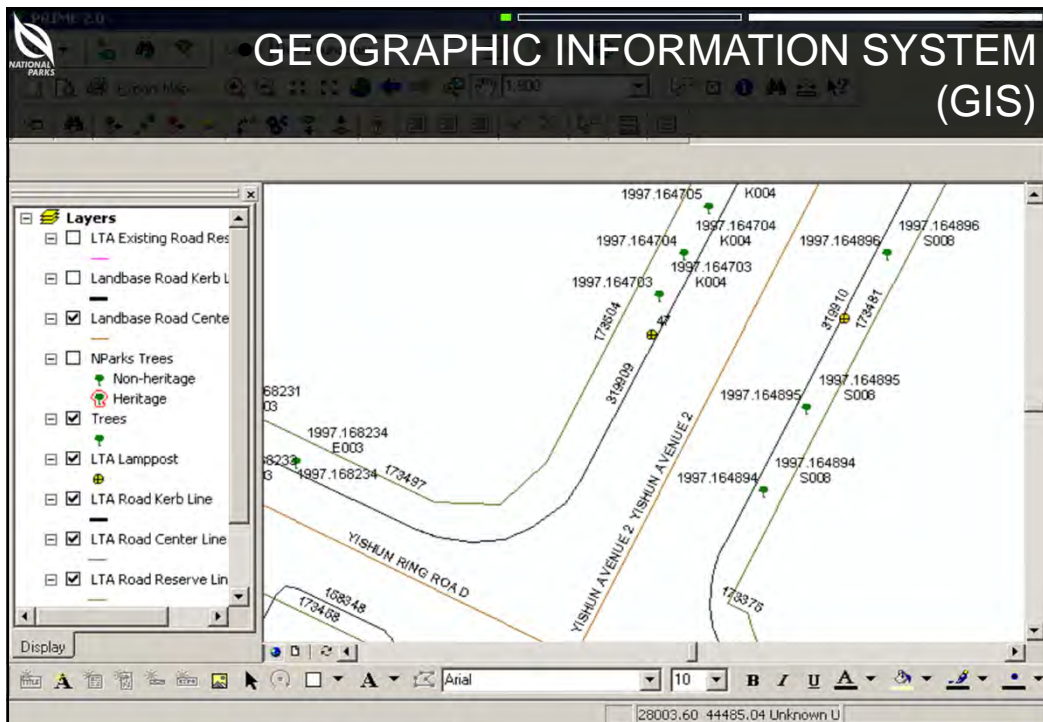
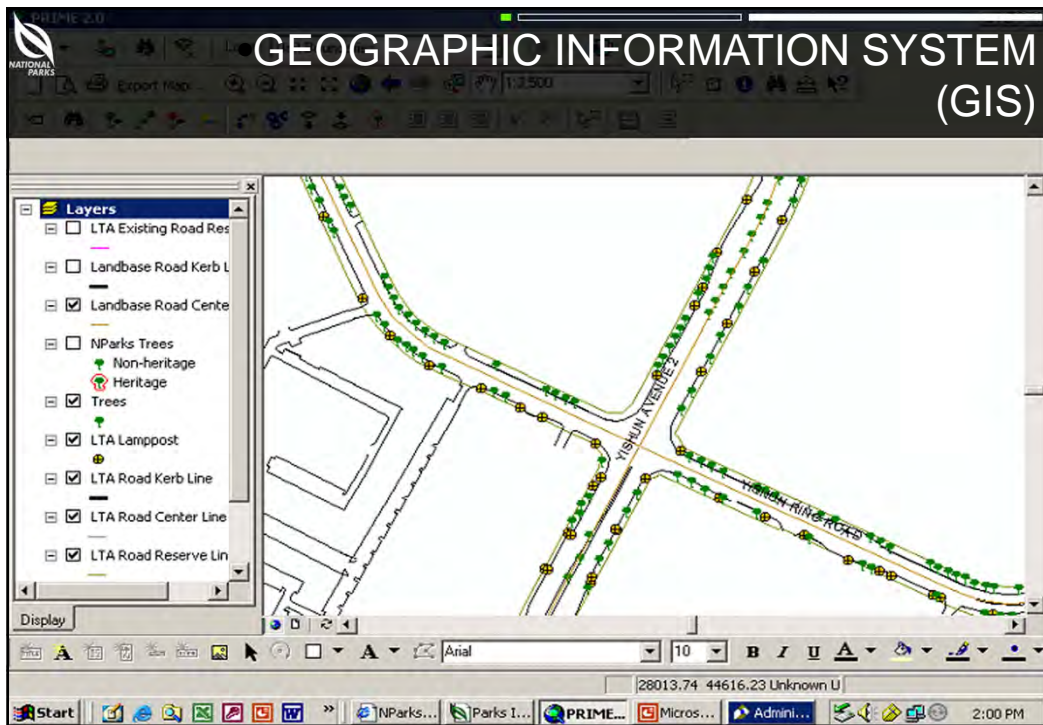


 NATIONAL PARKS

Over 1 m trees are managed with:

- A Geographic Information System (GIS).
- Each individual tree has a unique identification number.

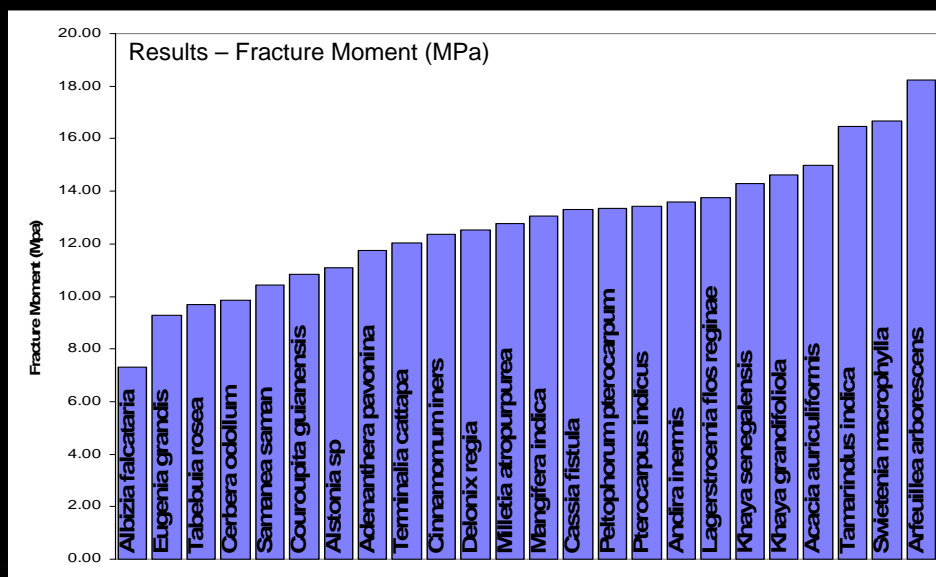




FIELD BASED RESEARCH

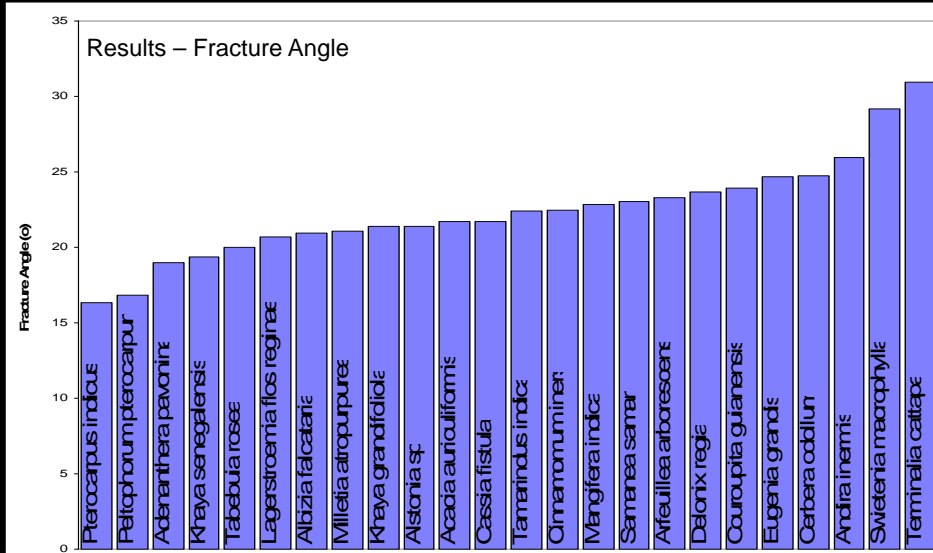
- Frequencies of failure for various tree species.
- Survey of the wood strength values of urban trees in Singapore.

Survey of wood strength properties of urban trees in Singapore using the fractometer

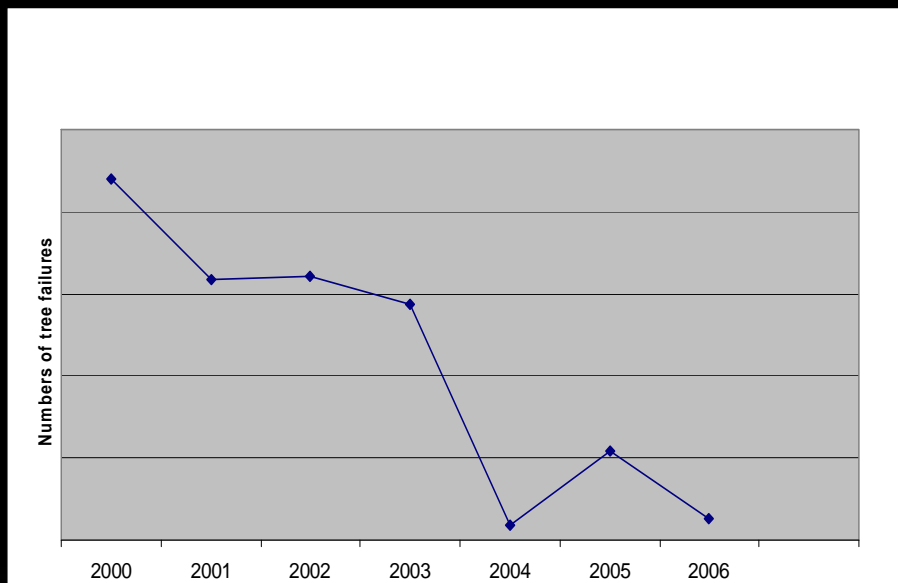




Survey of wood strength properties of urban trees in Singapore using the fractometer II



RESULTS : REDUCTION OF TREE FAILURE RATES





• REDUCTION OF TREE FAILURES


- For calendar year 2006 was 28 % lower than for calendar year 2005.
 - Has been consistently lower for the past 3 years.
- About 50 % lower than for the period 2001-2003.



• TRAINING & EXPERTISE



Benchmarking our expertise
with that from overseas
– Visual Tree Assessment




TRAINING & CERTIFICATION

International Society of Arboriculture

The Certified Arborist Programme

120 (241) of Nparks' staff have qualified as Certified Arborist

Training Networks and Partnerships



The following organizations are listed as training networks and partners:

- The University of Queensland Australia
- Sei Singapore Environment Institute
- AVA
- Learning Hub
- ISA
- NZ Sports-Turf Institute
- Australian Centre for Lifestyle Horticulture
- ntuc National Trade Union Congress
- CUGE Centre for Urban Greenery and Ecology
- WDA Singapore workforce development agency
- NUS National University of Singapore
- Nanyang Technological University
- REPUBLIC POLYTECHNIC
- TEMASEK POLYTECHNIC
- NGEE ANN POLYTECHNIC
- William Angliss Institute of TAFE
- The Australian Institute of Horticulture LEADERSHIP IN HORTICULTURE
- Duffill Watts Consulting Group

Collaborations



Skills Training Framework



Skills Training and Certification for all job levels

Continuous training and upgrading

	Landscape	Nursery	Parks Reserves & Gardens	Turf, Sports Ground & Greens	Arboriculture	Floristry	Nature Guiding /Eco-Tourism
Professional Certification	Certified Practising Horticulturist	Certified Practising Horticulturist Certified Nurseryman	Certified Park Manager	Certified Turfgrass Professional	Certified Arborist	Certified Floral Designer	Certified Interpretation Skills Guide
WSQ Diploma	Diploma (Landscape)	Diploma (Nursery)	Diploma (Parks Reserves & Gardens)	Diploma (Turf, Sports Ground and Greens)	Diploma (Arboriculture)	Diploma (Floristry)	Diploma (Interpretation Skills)
WSQ Advanced Certificate	Advanced Certificate (Landscape)	Advanced Certificate (Nursery)	Advanced Certificate (Parks Reserves & Gardens)	Advanced Certificate (Turf, Sports Ground and Greens)	Advanced Certificate (Arboriculture)	Advanced Certificate (Floristry)	Advanced Certificate in (Interpretation Skills)
WSQ Higher Certificate					Higher Certificate (Arboriculture)	Higher Certificate (Floristry)	
WSQ Certificate	Certificate in Landscape Operations (Generic)					Certificate in Floristry Operations	Certificate in Interpretation Skills

Career Pathway

Structured Career Advancement

Landscape Technician to Landscape Professional



Short Skills Courses



Steve Smith Tree Felling & Chainsaw Training



Sports Turf Management by NZSTI



Tree Climbing



Mower Operations and Turf Management



Chainsaw Operations

Trade Certificate in Landscaping Practices



9 Modules

- Plant Identification
- Horticultural Machinery
- Plant Protection
- Plant Propagation
- Planting and Maintenance
- Arboriculture
- Turf Management
- Design and Maintenance of Special Landscapes
- Plant Decoration and Arrangement



Certified Arborist Programme



10 Domains

- Urban Forestry
- Tree Identification / Selection
- Installation and Establishment
- Safe Work Practices
- Tree Biology
- Pruning
- Soil Management
- Diagnosis / Treatment
- Tree Risk Assessment
- Protection and Preservation

We Manage a Pool of 221 Certified Arborists



Certified Practising Horticulturist Programme



10 Domains

- General Landscape Industry Skills
- Soils & Media
- Water
- Plants
- Plant Maintenance & Landscape Health
- Irrigation
- Implementation Principles – Horticulture Site
- Project Costing & Estimation
- Business Practices of Project Planning & Supervision
- Practical Project – Implementation & Construction

We Manage a Pool of 25 Certified Practising Horticulturists



CUGE Seminar and Workshop Series



Regional Arboriculture Seminar 2007



Regional Soil Seminar 2007



Regional Water Seminar 2007



1st Regional Turf Seminar 2007



Best Practices in Parks & Recreation Facilities Seminar 2008



2nd Regional Turf Seminar 2008



Skyrise Greenery Seminar 2008



2nd Regional Arboriculture Seminar 2008

Capacity Building



Experiential Sharing on Greenery Initiatives
and Programmes

Executive Programme Series on Greenery
Leadership and Management



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LEARNING ON THE JOB



Tree-care workflow and processes have been certified as complying with ISO 9001 standards



QUALITY PROCEDURES FOR ARBORICULTURE

Tree Inspection

Tree Pruning

Tree Selection & Planting

Nominating of Heritage Trees



IN-HOUSE INFORMATION / GUIDELINES

Tree Inspection
Tree Pruning
Tree Transplanting
Tree Planting
Tree Spacing
Manuring
Report for the Calibration of the M series
Resistograph
Field Guide to Using the Resistograph M300
Tree Health Surveillance



UPGRADING OF ARBORICULTURAL WORK PRACTICES

Increasing the use of tree biodiversity
Increasing the number of species especially indigenous ones used in the Certified Arborist Exam in Singapore.



UPGRADING OF ARBORICULTURAL WORK PRACTICES

A great deal of Information about the identification and the conditions that trees grow can be obtained by consulting existing revisionary works (also called monographs)

Revisionary work can give an idea of the suitability of species to cultivation



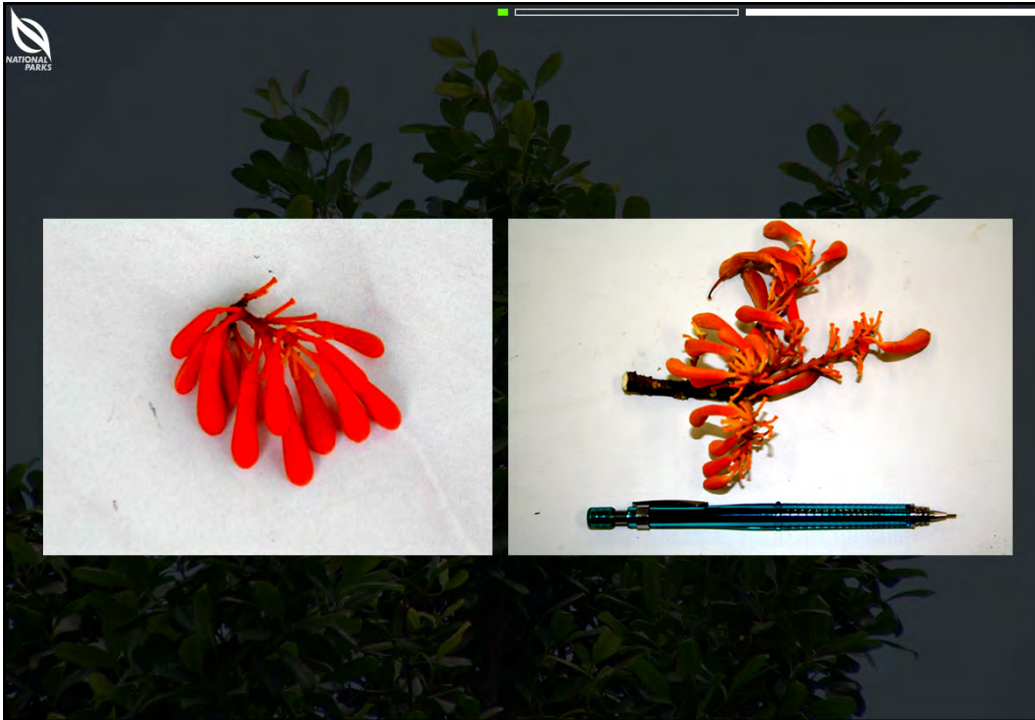
THE BIODIVERSITY AND TAXONOMY OF *FIRMIANA MARSILI*

STERCULIODEAE
MALVACEAE / STERCULIACEAE

S K GANESAN FLS



ROYAL
BOTANIC
GARDEN
EDINBURGH



UPGRADING OF ARBORICULTURAL WORK PRACTICES

Because of the sheer scale of biodiversity
E.g. Malesia c. 45,000 species of seed plants.

Arborists in the tropics have to have greater training
in tree diversity.

In NParks we are increasing the tree vocabulary of
our staff.



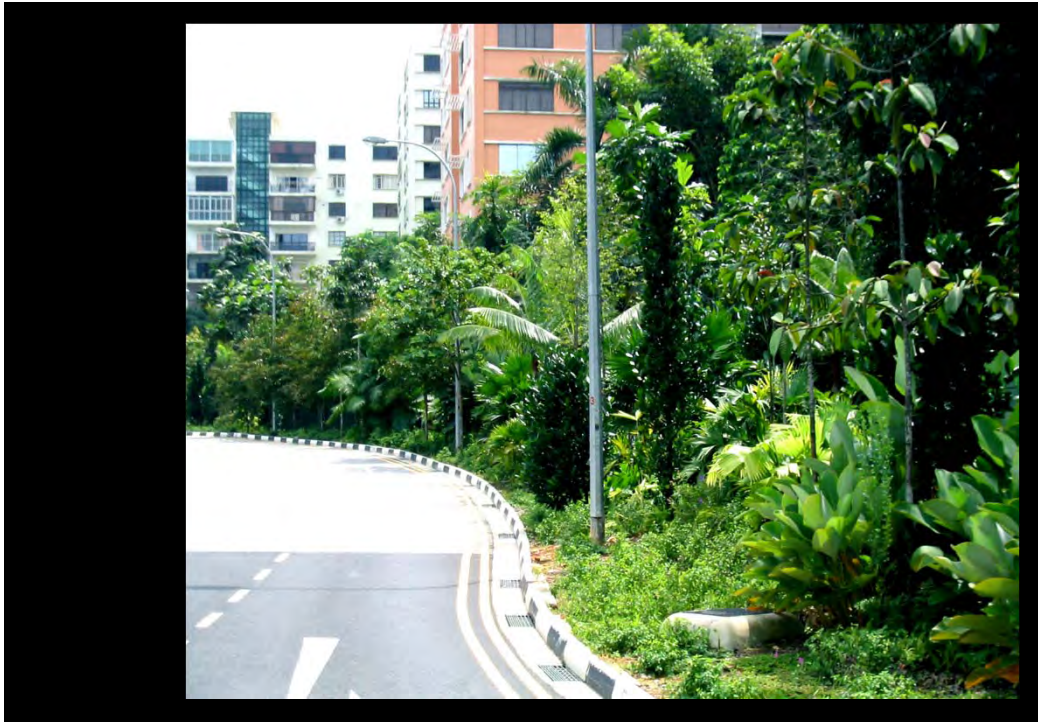
 **UPGRADING OF ARBORICULTURAL WORK PRACTICES**

- The Streetscape Greenery Masterplan (SGMP)
 - Planting trees in a more naturalistic manner in appropriate locations in addition to regular “soldier like” planting.

Thematic landscape treatments give identity







UPGRADING OF ARBORICULTURAL WORK PRACTICES – ARBORICULTURAL SAFETY

Risk Assessment and management will be made mandatory for all arboriculture operations.

Risk assessment components are now incorporated into our arboriculture contracts.

The contractor will have to develop, implement and keep a written description of safe work procedures.



CONCLUDING REMARKS

Management of Maturing Trees in the Tropics is Knowledge Intensive

Requires different a different skill set than say establishing trees

Well worth the Effort : Makes Cities Distinctive