



Trees in the city: understanding the Hong Kong's urban forest

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Content

1. Benefits of trees in urban environment
2. Urban forest development in Hong Kong
3. Current tree management approaches in Hong Kong
4. Challenges to urban trees in Hong Kong
5. Urban forestry

1. Benefit of trees in urban environment



Benefits of trees



Environmental benefits

- Improving air quality:
 - Intercepting particulate matter
 - “Absorbing” contaminants through stomata (e.g. reduce NO by 17%)
- Carbon uptake/ storage
 - Can be calculated
- Reducing heat island effect and cooling urban area

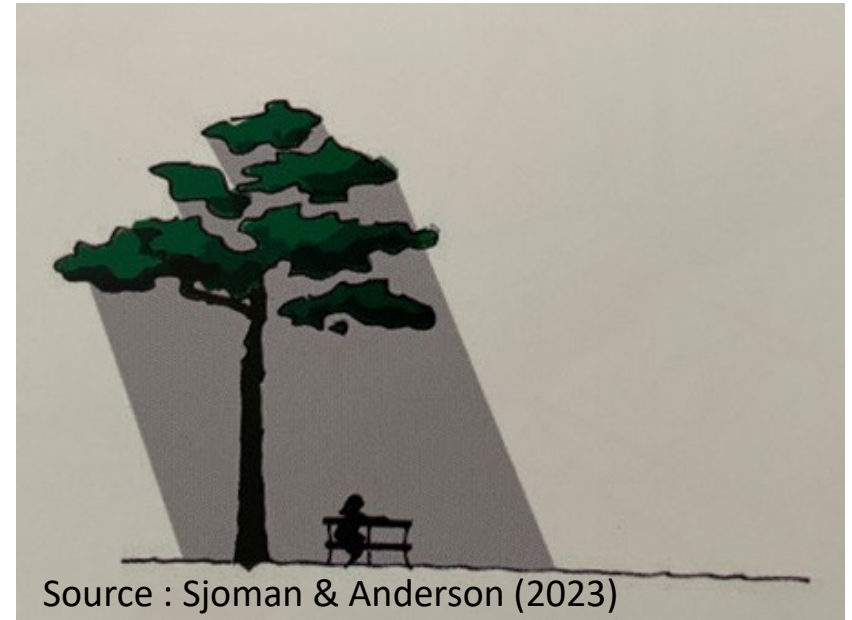


Dust attached on a leaf of Tree Cotton

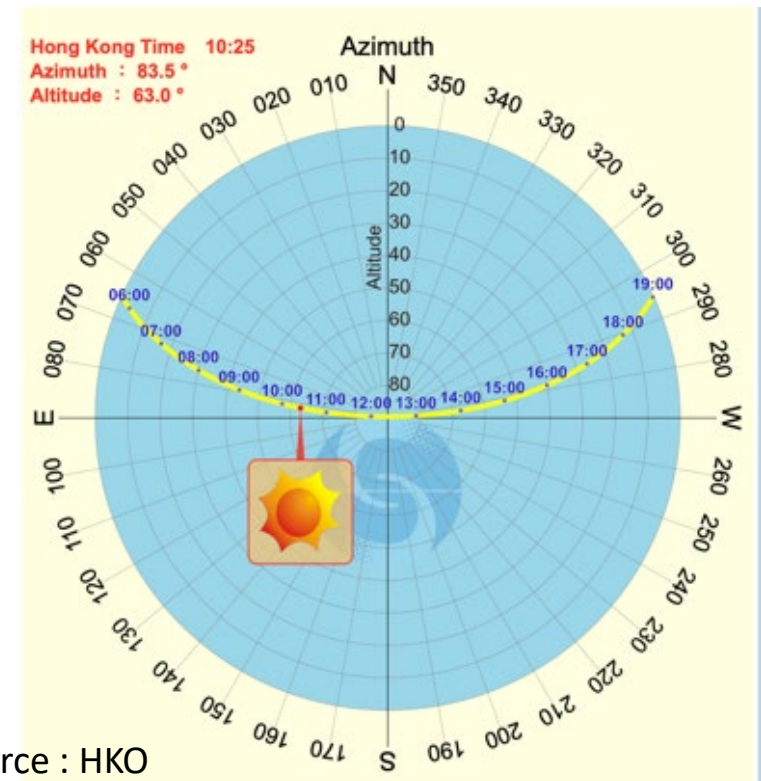


Adjusting micro-climate: Temperature

- Hottest time in Hong Kong, the sun passes overhead during day time, similar to Singapore (Nichol, et al., 2006). (*Sun angles: Jan, June, Sept = 45° , 90° , 75° | direction:125 => 075=> 080*)
- Unvegetated Sham Shui Po and Mongkok are the warmest in the study.
- Most vegetated Homantin with the lowest temperature
- Also pointed out unirrigated, grassy surface has no significant effect.
- Appropriate planning of tree planting (east and west)

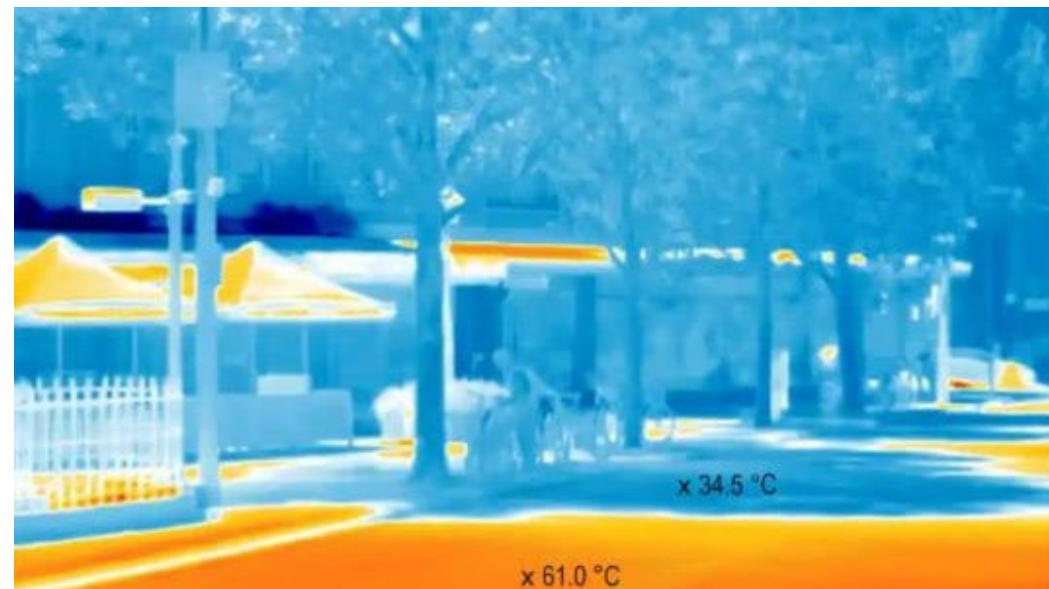
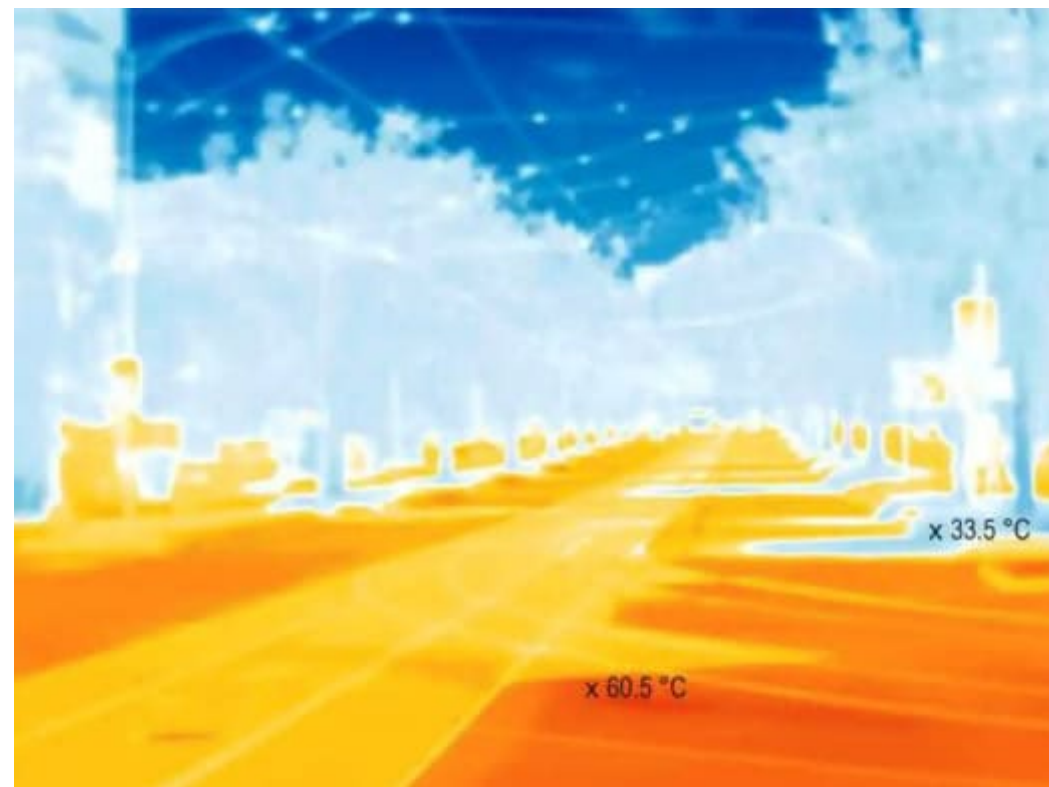


Source : Sjoman & Anderson (2023)



Source : HKO

- Energy Conservation
 - Cooling by providing shade and heat absorption
 - Air temp: - 4 °C for urban areas with more trees
- Ground surface temp:
 - - 20-30 °C



Exposed road surface temperature vs. surface shaded by trees
(source: *Supplied*)

- Energy Conservation
 - Cooling by providing shade and heat absorption
 - < 2 to $3\text{ }^{\circ}\text{C}$ under tree canopies
- Parking Space:
 - Reduce 20°C of road surface, 26°C inside a car and 4°C of fuel tank
 - Preventing the emission of reactive organic gases from parked cars (i.e. stored fuels)



Carbon storage

A very rough estimation:

- About 1 ton of CO₂ per mature tree
- Annual remove about 20-25 kg
- High wood density and large-sized tree species with outstanding performance on long-term carbon storage.
- Carbon footprint for HK people people is 4.41 tons CO₂-e

Hong Kong environmental issues *Hong Kong / Health & Environment*

Hong Kong forests can store over 7 million tonnes of carbon, study finds

Conservancy Association releases findings of three-year study on carbon storage capacity of more than 100 tree species native to Hong Kong

🕒 2-MIN READ



Aesthetic benefit

- Improving the quality of living environment
- Can become community topic



Tabebuia pentaphylla
at Kwai Fong Estate

- Roadside tree can extend the maintenance cycle of roads by providing shade (& reducing stress of driver)
- Energy saving
- Flood control
- More purchases (9 to 12%) in outdoor business districts with trees
- Social cost:
 - Faster recovery rate after surgery with tree views
 - More social interactions
- In HK, sky garden can be exempted from Gross Floor Area (GFA)



Ecological benefit

- E.g.: Old and big trees always have complicated structures, including cavities
- Preservation of old tree can provide suitable habitats to wildlife
- Tree management consideration on trees:
 - Timing (nesting)
 - Tree, defective parts removal (necessary?)



Asian Barred Owlet – Kam Tin “Tree House”

Large trees in parks can act as extension of adjacent countryside

Providing suitable habitat to wildlife



Crested Goshawk (鳳頭鷹), woodland species in GV Park

Contacting nature can ...

- Recover from tensioned physiological condition (Kaplan, 1995)
- Enhance children's comprehensive development (Ginsburg et al., 2007)
- Enhance imagination (Manuel, 2003)
- Be more disciplinary (Greenway, 1995)
- Reduce symptoms of Attention-Deficit/Hyperactivity Disorder (AD/HD) (Kuo & Taylor, 2004)



The psychological benefits of greening and nature are always being ignored by the society!

2. Urban Forest Development in Hong Kong

Definitions on Urban Forestry

- Tree management in a broader sense = urban forestry
- Matheny and Clark (2008):
Management of naturally occurring and planted trees and associated plants in urban areas.
- *Urban forest vs. tree management*: managing a group of trees in urban and urban fringe vs. individual or small group of trees.



Hillside on HK Island around 1870s

Urban forest has started with very barren hillside



Source: Dudgeon & Corlett, 2004

- **Early British Time (1871 - 1940)**

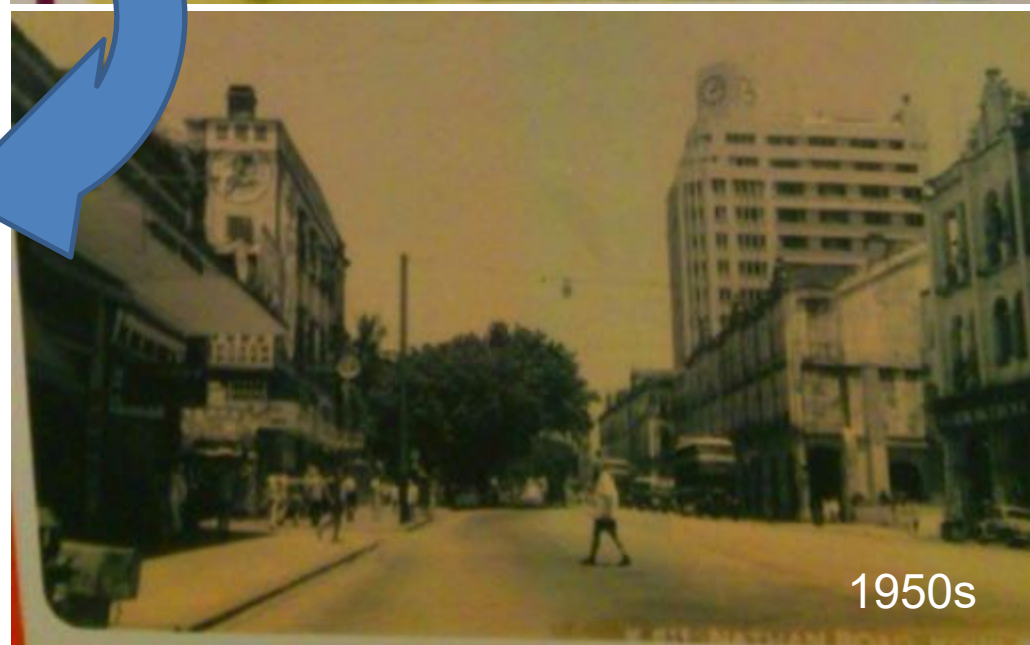
- Hills of Hong Kong was described as “Barren” (Price, 1877)
- Effort was paid to protect existing trees and woodland (prohibiting injury to trees, shrubs... HKGG, 1856)
- Major objective is environmental enhancement (the hot weather)

The movement on tree planting increased significantly, because:

- ❑ The Government Gardens and Tree Planting Department was formed in 1871 (Charles Ford)
- ❑ Set up of Botanical Garden, nursery and trial planting, etc.
- ❑ Introducing tree production, planting and maintenance knowledge mainly from British and Australia
- ❑ Linking with world class plant resources and research centres, i.e. the Kew Garden. Seed exchange programme was established.
- ❑ Supported from top level of the Government

Trees and Urban development

Road widening and development : removal/ transplant of road side trees (e.g. Nathan Road)



Richard Webb reviewed the greening strategy in HK

- Singapore started the greening campaign in 1963, the Prime Minister said **'DID NOT WANT SINGAPORE LOOK LIKE HK'**. (Webb, 1999)
- *This proven that the greening in HK is poor in 60s*
- **'Concrete Jungle'** image is well known in the world
- Major problems of urban greening in HK (Webb, 1996)
 - Lack of strong policy support
 - Lack of coordination among different governments Lack of public support and participation
 - Priority was not on greening (utility, building, etc.)
 - Lack of incentive provided from tree to public (education)

•1941 – 1980s

- Urbanization and maximum use of land (100% concrete coverage! Jim, 1998)
- Greening coverage has not increased in urban area in these several decades
- Priority on development was higher than greening
- Tree planting mainly on:
Urban fringe, reconstruction of roads, and in larger urban parks (Webb, 1996)



80s, incubating the changes in 90s

- Street trees no more than 8,000 (Jim 1987)
- Suggested to be not enough
- Major problems
 - Space
 - Pollution
 - Soil condition
 - Pest and disease
 - Human factor
 - Utility and road works
- Tree species in 1987 has no big different!

High frequency (>100 trees)	Medium frequency (30–100 trees)	Low frequency (less than 30 trees, excluding rare species)
+ <i>Acacia confusa</i> + <i>Albizia lebbek</i> + <i>Aleurites moluccana</i> <i>Bauhinia blakeana</i> <i>Bauhinia purpurea</i> + <i>Bauhinia variegata</i> <i>Bombax malabaricum</i> + <i>Cassia surattensis</i> + <i>Casuarina equisetifolia</i> + <i>Crateva religiosa</i> + <i>Delonix regia</i> * <i>Ficus microcarpa</i> + <i>Melaleuca leucadendron</i> + <i>Phoenix roebelenii</i>	<i>Bischofia trifoliata</i> + <i>Cassia siamea</i> * <i>Celtis sinensis</i> <i>Cinnamomum camphora</i> + <i>Erythrina arborescens</i> + <i>Erythrina indica</i> * <i>Eucalyptus robusta</i> * <i>Ficus virens</i> + <i>Grevillea robusta</i> <i>Hibiscus tiliaceus</i> + <i>Melia azedarach</i> + <i>Peltophorum pterocarpum</i>	<i>Ailanthus fordii</i> + <i>Archontophoenix alexandrae</i> + <i>Dracontomelon dao</i> <i>Eucalyptus tereticornis</i> + <i>Ficus elastica</i> * <i>Ficus variegata</i> + <i>Jacaranda acutifolia</i> <i>Livistona chinensis</i> + <i>Pterocarpus indicus</i> + <i>Roystonea regia</i> + <i>Syzygium jambos</i> + <i>Terminalia catappa</i> <i>Thespesia populnea</i> + <i>Thevetia peruviana</i>
*Some of these native trees are voluntary growths +Introduced species		

(Jim 1987)

Aleurites moluccana = 20% (Jim, 1990)

New Town development Since 70s

- Territory Development Department
- Staffing: landscape architects; forestry and agricultural officers (TDD, 1994)
- Adopted the New Town concepts in Britain, including high quality environment, greatly improved greening of living places. (Lai, 1997)



Lek Yuen Estate (1975)

Wanchai Greening Campaign started in 1989

- High publicity planting events
- With private sponsorship.
- Tree Warden scheme: tree care and report problems.



John Denver

Source:

www.youtube.com/watch?v=JoT0OP_Kzto



Johnston Rd. Wan Chai

Green Hong Kong Campaign

- A good demonstration on urban forestry programme.
- 1993: Greening Year of HK
 1. Clear **policy** support
 2. Update tree **inventory**
 3. Public, private, NGO involvement
 4. Set out clear **planting objectives (No.)**
 5. Improving **maintenance quality**
 6. High **publicity**
 7. **Education** prog.



Target on tree changing spp. composition

Aleurites moluccana = 10%

Bombax ceiba = 15%

Melaleuca leucadendron = 14%

Bauhinia blakeana = 10%

Latest development :
Greening Master Plan (GMP)

- Government has started GMP since 2004
- CEDD to coordinate greening works with short, mid and long term plan in district level.
- Planning, design, technical guidelines with Themes
- E.g. 680 Trees planted in TST
- After completed the works in Urban Area, the N.T. GMP started in 2011 and now is almost completed.

<http://www.cedd.gov.hk/eng/greening/>



Urban tree planting works in Hong Kong

Types of planting

- Parks
- Landscape rehabilitation (hillsides, slopes, quarry, etc.)

Year	Urban areas (no. of trees and % of plants planted in that year)	Rural areas (no. of trees and % of plants planted in that year)
2010/11	155 000 (2%)	956 000 (9%)
2011/12	58 000 (1%)	804 000 (9%)
2012/13	26 000 (0.3%)	788 000 (10.2%)
2013/14	60 000 (0.8%)	668 000 (8.6%)
2014/15	105 000 (1.7%)	545 000 (9.1%)
Total	404 000	3 761 000

Number of trees planted (2010 to 2015)

Year	No. of plants planted (thousands)			
	Trees	Shrubs	Herbaceous	Total
2020/21	291	7216	1377	8884
2021/22	310	4552	768	5630
2022/23	340	4486	1051	5877
2023/24	281	4036	1163	5480
2024/25	258	3788	1812	5857
Total	1480	24078	6171	31728

Number of plants planted (~2020 to 2025)

3. Current tree management approaches in Hong Kong

Policy on greening

- “We are striving to uplift the quality of our living environment through active planting, proper maintenance and preservation of trees together with other vegetation.”

Current tree protection measures

- *No single tree specific ordinance*
- Practical Measures :
 - ① Limiting land use: No trees are unnecessarily felled or pruned;
 - ② Banning on tree damaging activities: various ordinances, Technical Circular (TC) for Government related works, contract governance

For Government works

Examples of tree related Ordinance

- Forests and Countryside Ordinance(Cap.96): trees in forests/ plantations on urban or rural areas.
- Public Health and Municipal Services Ordinance (Cap. 132): trees on pleasure grounds, etc.
- Country Park Ordinance (Cap. 208): trees with in CP
- Crimes Ordinance (Cap.200)/ Theft Ordinance (Cap. 210): willful damage and serious cases.
- EIAO(Cap.499): Impact on tree as part of the ecosystem

Examples of Technical Circular

- **Registered Old and Valuable (OVT) Technical circular**
 - DevB TCW No.5/2020
- **Tree Preservation Technical circular**
 - DevB TCW No. 4/2020



For private or leased land

- Depending on the **“Tree preservation clause”** on the land lease.
- However, a more detailed Tree Preservation Clause has been put into the land lease **since 70s**.
- Tree cannot be felled, pruned unreasonably before the approval of LandsD (ETWB TCW No. 3/2006).
- So, tree removal application should go to LandsD first.
- Many land leases still have no TPC

Sample of Tree preservation clause

‘No tree growing on the lot or adjacent thereto shall be **interfered** without the prior written consent of the Director who may, in granting consent, impose such conditions as to transplanting, compensatory landscaping or replanting as he may deem appropriate.’

Canossa Hospital excessively pruned a tree on Government slope, fined 200K by LandsD



Management approach

- “**Integrated approach**”: trees managed by relevant Government Departments (over 10 departments)
- Tree management works integrate into the management responsibility of the user of a particular government site
- Not all departments are with the professionalism on tree management!
- Variant tree management qualities!

Which department/ section not directly involved in Tree Management?



Lands Department

Rural area and tree felling application



Leisure and Cultural Services Dept.

Roadside tree and parks



Agriculture Fisheries and Conservation Dept.

Country parks



Environmental Protection Dept.

EIA, Landfill sites



Tree Management Office (DevB)

Not directly involved in daily works but only policy and coordination

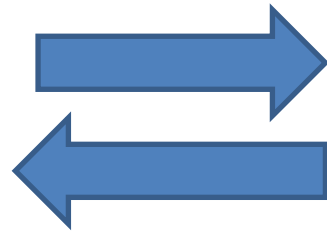
Stanley fatal tree accident: the turning point on urban tree management

- The coroner court has pointed out some key problems on tree management.
- But, the major focus was still on “tree risk assessment and management”.
- However, tree risk assessment is only part of tree management.
- Too focus on tree risk assessment would not improve overall tree management!



4. Challenges to urban trees in Hong Kong

Trees



urban environment

Impact



Tree risk management orientated

- The quick development in recent years is built on the fatal accidents
- TRAM is the key focus on tree management
- Tend to not bear any responsibility!
- Tree removal, severely cut (i.e. topping) trees the tree to reduce SHORT term risk
- The 'grace period' is short and it will develop into long term problem.



Professionalism

- Lack of training
- Tend to not bear any responsibility!
- Lack of on site monitoring and supervision
- Arborist works on documentation but not on-site supervision (in most of the cases)
- Safety practice is good indicator on professionalism and supervision



Good planting and daily caring are the foundation of good management!



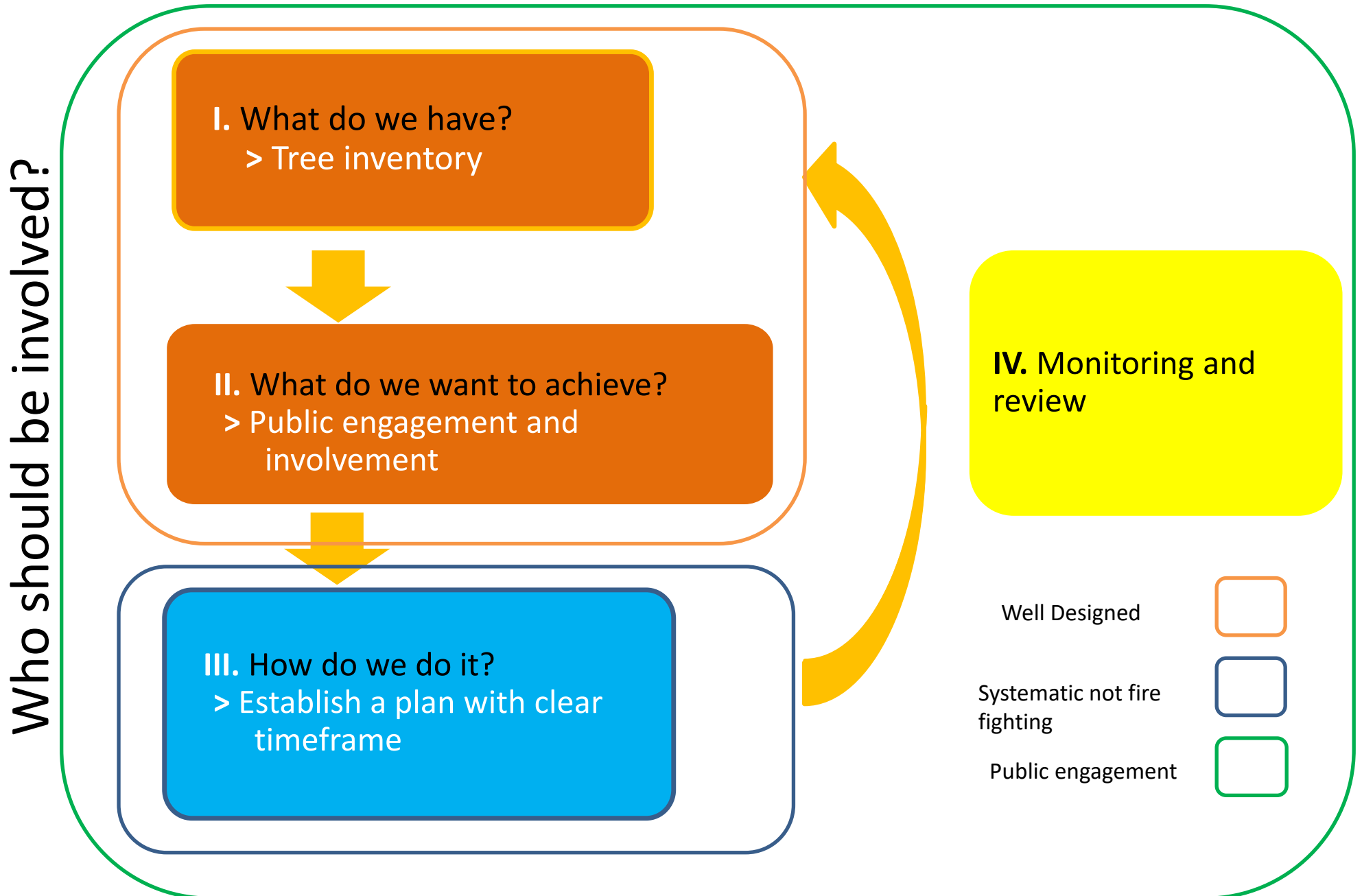
5. Urban Forestry

Urban Forestry

- Matheny and Clark (2008): Management of naturally occurring and planted trees and associated plants in urban areas.
- Objective: sustains the benefits provided by the urban forest



“Good practice” for the Urban Forest Management



What do we have? different trees require different management needs

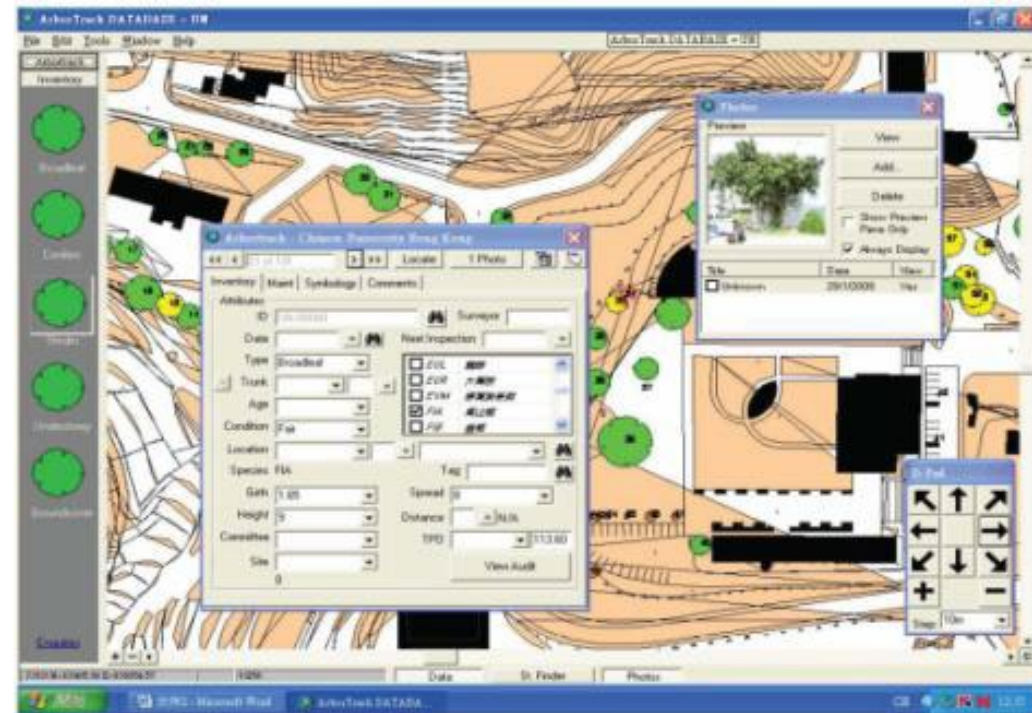


Ancient Tree



Newly planted trees

- Tree inventory can help understanding the situation of trees and reserve appropriate resources for suitable management.
- Planning for caring works
- Help to evaluate the possibility of planting more trees
- Urban forest revitalization need (i.e. *Acacia confusa*)



Arbortrack: CUHK (cuhk.edu.hk)



GIS Data capture device (www.bartlet.com)

What do we want? understand public's expectation on greening and tree planting.



Big tree species: higher community value

Small tree: easy for management, but less community value

How do we get what we want?

Sustainable Urban Forest



5. Tree Conservation



4. Tree Risk assessment and Management



3. Proper Tree Caring



2. Right Tree in the Right Place



1. Good Planning for Greening



Q & A

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