

Seminar on Tree Conservation and Management

Perception of Urban Trees in Hong Kong

K.C. Chau & S.N. Tsui

Department of Geography & Resource Management,
CUHK

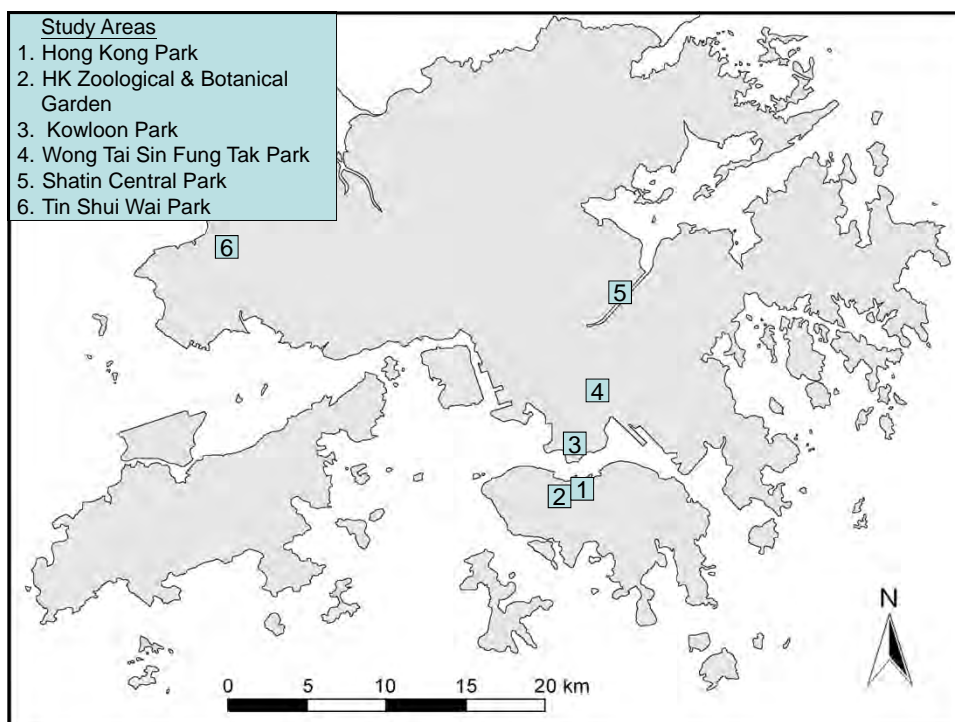
13.12.2008

The problems

1. What are people's preferences of different tree attributes, such as tree form, branching habits, flowers and color, foliage, fruits etc?
2. Is people's preference of trees based on the composite image or the summative effects of individual tree attributes?

Objectives of study

- To understand park users' perception of different tree attributes
- To investigate whether park users perceive a tree from its composite image or summative effects of the different attributes
- To identify some guidelines for the selection of tree species suitable for urban planting

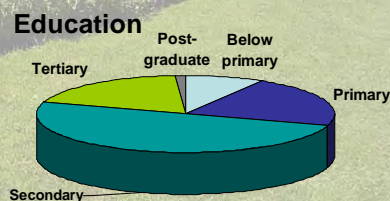
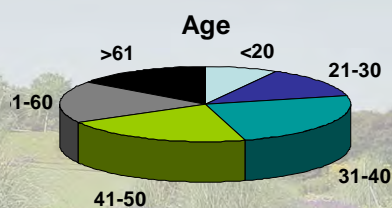


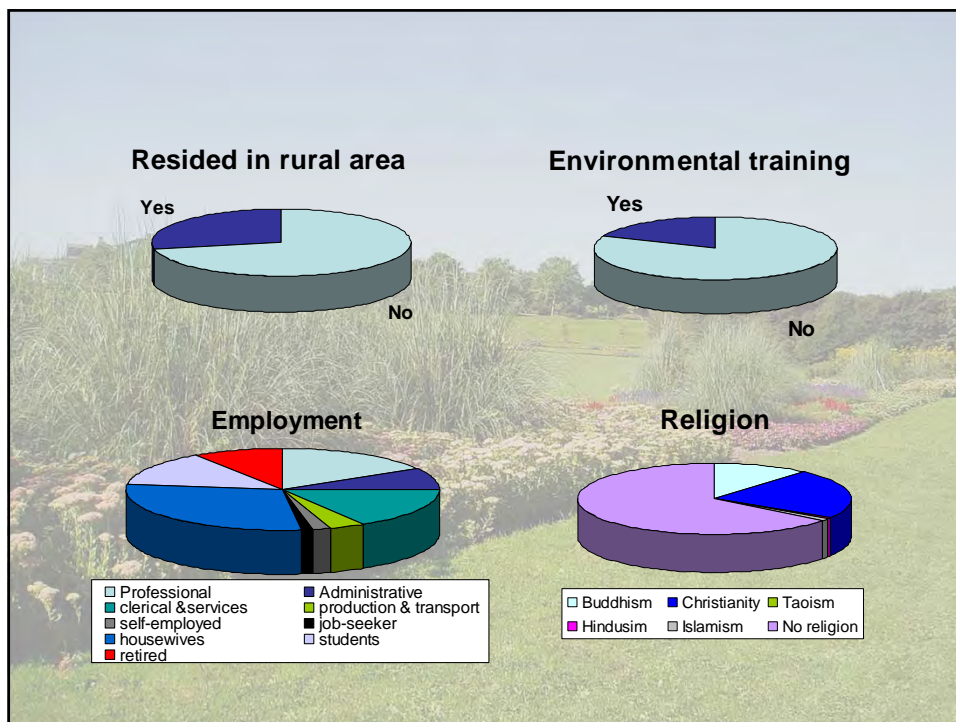
Methodology

- Questionnaire survey (n=200); **7-value scale, 1 being most preferred and 7 least preferred**
- Pilot test of questionnaire & refinement
- Statistical Package for Social Science (SPSS)
- One-Way ANOVA (group means of ranking by sex, age, education level, employment, residence in rural area, environmental training & religion)
- Chi-square test (preference between 2 attributes)
- Scheffe test (differences between age groups & education levels)

Results

- Total: 200 respondents
(Male 53; Female 147)
- 183 HK residents
17 mainlanders/Taiwanese





Tree forms

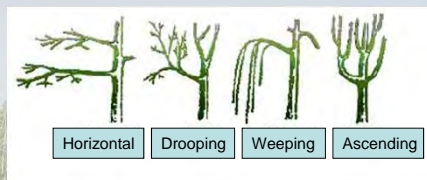
	Spreading	Columnar	Globe	Fan	Oval	Conical	Palm
Current study	2.20	5.11	2.56	3.60	3.67	4.84	6.03
Sommer & Summit (1996)	2.18	5.26	2.79	2.93	3.71	3.71	NA

- Stronger preference for spreading and globular canopy than other tree forms ($p < 0.05$)
- Preference for palm is lowest



Branching habits

Branching habits	Ranking
Weeping	2.04
Ascending	2.21
Drooping	2.55
Horizontal	3.21



- In descending order of preference Weeping > ascending > drooping > horizontal
- Yet, difference is only significant by age, education level, employment & religion

Leaf shape

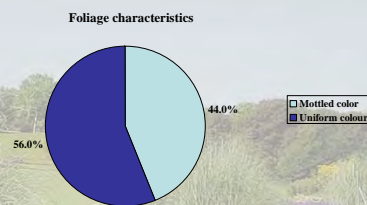
Leaf shape	Ranking
Oval	2.77
Elliptical	3.24
Heart	3.40
Cordate	3.78
Obcordate	4.69
Obovate	5.06
Linear	6.05
Needle	7.02

- Oval>elliptical>heart>cordate>obcordate>obovate>linear>needle (p<0.05)
- Linear and needle leaves are least preferred

Foliage color

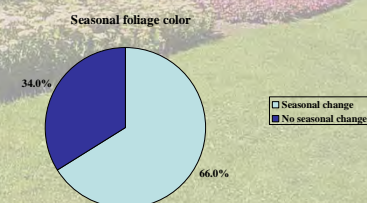
Foliage color

Preference for mottled color not different from uniform color ($p > 0.05$)



Seasonal change of color

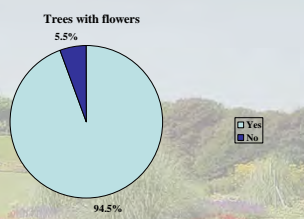
Seasonal change of color > no seasonal change of color ($p < 0.05$)



Flowering characteristics

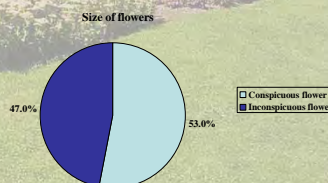
Flowering trees

Flowering trees > trees without flowers ($p < 0.05$)



Size of flowers

No significant difference in preference between trees with conspicuous flowers & inconspicuous flowers ($p > 0.05$)



Color of flowers

Color	Score
Red	2.79
Pink	3.03
Yellow	3.77
Orange	3.95
Purple	4.45
White	4.69
Blue	5.32

- Stronger preference for flowers with warm colors than cool colors
- Color preference varies significantly by sex, age, education level, employment, experience of residence in rural area & religion ($p < 0.05$)



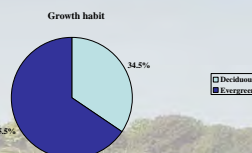
- The older respondents show a higher preference for red flowers ($p < 0.05$)
- Preference for white flowers is higher in young age groups than old age groups ($p < 0.05$)

	Red	Orange	Pink	Yellow	White	Blue	Purple
<20	4.56	5.06	1.44	4.63	2.06	4.81	5.44
21-30	4.15	5.19	3.67	3.93	2.70	4.63	3.74
31-40	2.44	3.69	3.06	2.56	4.69	6.17	5.40
41-50	2.47	3.42	3.35	4.88	5.42	4.95	3.51
51-60	1.64	2.92	3.22	4.33	5.67	5.42	4.81
>60	2.33	4.43	2.70	2.73	6.20	5.30	4.30

Growth habits and scent

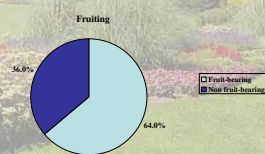
Deciduous vs. evergreen

Evergreen trees > deciduous trees ($p < 0.05$)



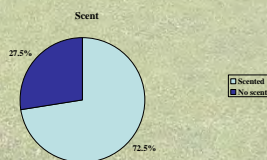
Fruit-bearing vs. non fruit-bearing

Fruit-bearing trees > non fruit-bearing trees ($p < 0.05$)



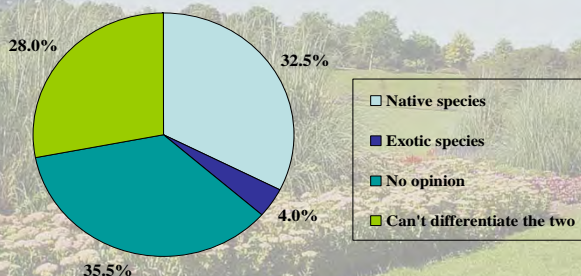
Trees with scent

Scented trees > Non-scented trees ($p < 0.05$)



Species selection (natives vs. exotics)

Species selection



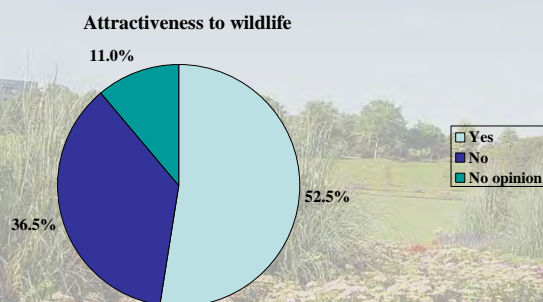
- Native species preferred to exotic species regardless of respondents' background ($p < 0.05$)

Species selection (natives vs. exotics)

	Native	Exotic	No preference	Cannot distinguish
Respondents without environmental training	36 (22.5%)	13 (8.1%)	51 (31.7%)	61 (37.9%)
Respondents with environmental training	27 (69.2%)	0 (0%)	12 (30.8%)	0 (0%)

- Respondents with environmental training show a significantly higher preference for native species than exotic species

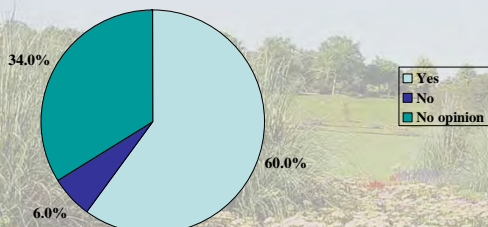
Wildlife attraction



- Attractiveness to wildlife > non-attractiveness to wildlife ($p < 0.05$)
- Preference for wildlife attraction is significantly higher among respondents with higher education levels & environmental training ($p < 0.05$)

Trees with cultural values

Planting trees with cultural value



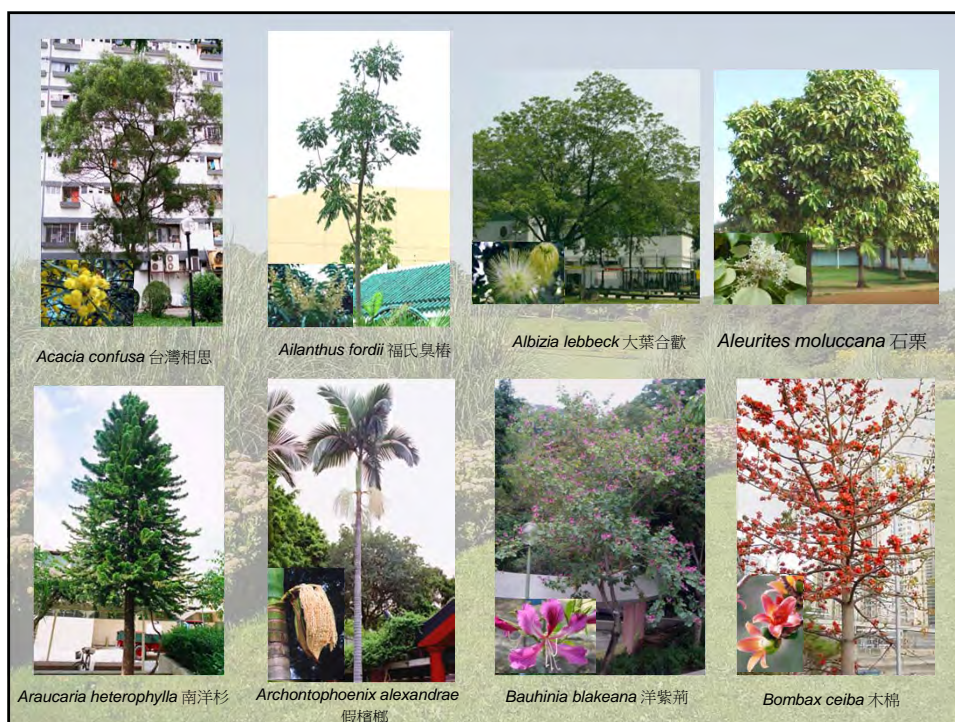
- Higher preference for trees with cultural values than without, except the sex group ($p < 0.05$)
- Respondents with higher education levels, environmental training & experience of residence in rural area are more supportive of trees with cultural values ($p < 0.05$)

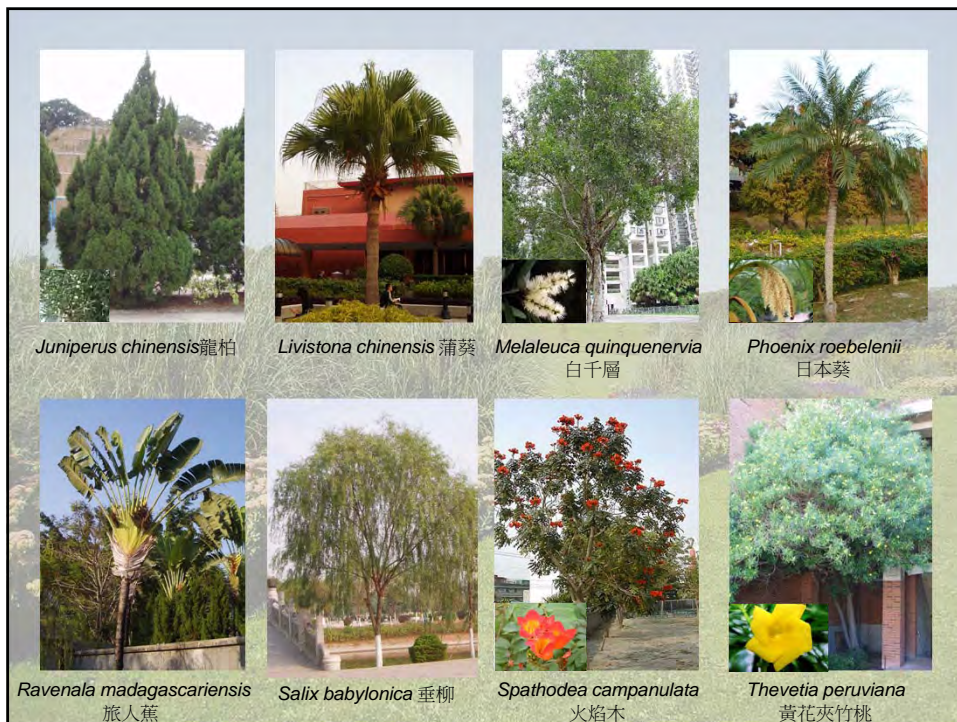
Top 5 trees with cultural values (107/200 able to name specific trees)

- *Ficus microcarpa* (34): Wishing tree, aerial root
- *Bauhinia blakeana* (31): HK's city flower
- *Bombax ceiba* (15): Hero tree, kapok, flower in "five-flower tea"
- *Cinnamomum camphora* (12): furniture making, ointment, insect repellent
- *Aquilaria sinensis* (5): incense, origin of Hong Kong's name

Composite image of 24 trees

- Respondents look at 24 tree photos (5R)
- Choose 3 most-liked trees, assign scores of 3 (1st tree), 2(2nd tree) & 1 (3rd tree) in descending order of preference
- Then choose 3 most-disliked trees, assign scores of -3 (1st tree), -2 (2nd tree) & -1 (3rd tree)
- Add up total scores of each tree
- Trees with higher scores are treated as more preferred by respondents
- Rank tree in descending order of preference





Tree preference ranking according to composite image

Rank	Tree	Score	Rank	Tree	Score
1	<i>Bombax ceiba</i>	277	13	<i>Melaleuca quinquenervia</i>	-10
2	<i>Delonix regia</i>	263	14	<i>Thevetia peruviana</i>	-13
3	<i>Bauhinia blakeana</i>	139	15	<i>Ravenala madagascariensis</i>	-30
4	<i>Ficus microcarpa</i>	118	16	<i>Grevillea robusta</i>	-42
5	<i>Salix babylonica</i>	74	17	<i>Acacia confusa</i>	-45
6	<i>Juniperus chinensis</i>	50	18	<i>Araucaria heterophylla</i>	-45
7	<i>Aleurites moluccana</i>	26	19	<i>Caryota ochlandra</i>	-51
8	<i>Spathodea campanulata</i>	15	20	<i>Archontophoenix alexandrae</i>	-68
9	<i>Hibiscus tiliaceus</i>	13	21	<i>Livistona chinensis</i>	-88
10	<i>Albizia lebeck</i>	9	22	<i>Casuarina equisetifolia</i>	-124
11	<i>Cassia surrattenis</i>	4	23	<i>Ailanthus fordii</i>	-161
12	<i>Crateva unilocularis</i>	-8	24	<i>Phoenix roebelenii</i>	-303

Summative image of 24 trees

- Based on people's preference of 11 tree attributes
- Each tree attribute was ranked (1, 2, 3...in decreasing order of preference) for all the 24 species
- Add up the total scores for each species
- The lower the total score, the more likely it is close to an "ideal" tree
- Rank "ideal" tree in descending order of preference

Summative image of 24 trees

Rank	Tree	Score	Rank	Tree	Score
8	<i>Bombax ceiba</i>	20	15	<i>Melaleuca quinquenervia</i>	24
2	<i>Delonix regia</i>	17	2	<i>Crateva unilocularis</i>	17
1	<i>Bauhinia blakeana</i>	16	8	<i>Ravenala madagascariensis</i>	20
2	<i>Ficus microcarpa</i>	17	13	<i>Acacia confusa</i>	23
18	<i>Salix babylonica</i>	25	13	<i>Grevillea robusta</i>	23
21	<i>Juniperus chinensis</i>	27	24	<i>Araucaria heterophylla</i>	34
15	<i>Aleurites moluccana</i>	24	15	<i>Caryota ochlandra</i>	24
2	<i>Spathodea campanulata</i>	17	22	<i>Archontophoenix alexandrae</i>	29
6	<i>Hibiscus tiliaceus</i>	18	19	<i>Livistona chinensis</i>	26
8	<i>Albizia lebbbeck</i>	20	19	<i>Casuarina equisetifolia</i>	26
7	<i>Cassia surrattenis</i>	19	12	<i>Ailanthus fordii</i>	29
8	<i>Thevetia peruviana</i>	20	22	<i>Phoenix roebelenii</i>	29

Composite image vs. summative image

Rank*	Tree	Rank#	Rank*	Tree	Rank#
1	<i>Bombax ceiba</i>	8	13	<i>Melaleuca quinquenervia</i>	15
2	<i>Delonix regia</i>	2	14	<i>Thevetia peruviana</i>	8
3	<i>Bauhinia blakeana</i>	1	15	<i>Ravenala madagascariensis</i>	8
4	<i>Ficus microcarpa</i>	2	16	<i>Grevillea robusta</i>	13
5	<i>Salix babylonica</i>	18	17	<i>Acacia confusa</i>	13
6	<i>Juniperus chinensis</i>	21	18	<i>Araucaria heterophylla</i>	24
7	<i>Aleurites moluccana</i>	15	19	<i>Caryota ochlandra</i>	15
8	<i>Spathodea campanulata</i>	2	20	<i>Archontophoenix alexandrae</i>	22
9	<i>Hibiscus tiliaceus</i>	6	21	<i>Livistona chinensis</i>	19
10	<i>Albizia lebbbeck</i>	8	22	<i>Casuarina equisetifolia</i>	19
11	<i>Cassia surrattenis</i>	7	23	<i>Ailanthus fordii</i>	12
12	<i>Crateva unilocularis</i>	2	24	<i>Phoenix roebelenii</i>	22

Ranking: * Composite image; # Summative image

Conclusions

1. People have different perception of tree attributes; and significant differences were found in tree form, leaf shape, foliage color, flowering habit and color, growth habit, fruiting habit, scent, and ecological and cultural values.
2. The perception of certain tree attributes is specifically affected by respondents' age (flower color); education level, rural residence experience and environmental training (native species, wildlife attraction & trees with cultural values).
3. Perception of urban trees is built on the composite effect rather than additive effect of the species.
4. People's attention seems to be captured by the dominating and conspicuous features of a tree, e.g. spreading tree canopy and showy warm-colored flowers

Implications of study

- Ideal urban trees should have/be:
 - spreading to globular canopy
 - oval to elliptical leaves
 - seasonal foliage color
 - showy flowers with warm colors
 - evergreen, fruit-bearing & scented
 - native species able to attract wildlife
 - cultural values
- Palm is least welcome by respondents; so are pioneer species (e.g. *Acacia confusa*) and species with needles & sparse crown (e.g. *Casuarina equisetifolia*)
- Trees with red & pink flowers in residential areas with elderly people; trees with white flowers are more suitable in CBD, shopping malls, children's playground, school area & sports ground etc

