

BIOL 4907 Singapore Field Trip 2016

Topic of My Report:

Heritage trees in the Singapore Botanic Gardens

Heritage Museum
Singapore Botanic Gardens



Presenter 30

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Heritage trees in the Singapore Botanic Gardens

1) Introduction of Heritage trees

1.1) Definition

In Singapore, “Heritage trees” refers to those individual and mature trees which are specially selected for law protection under the Heritage Trees Scheme (Wikipedia 2015). The Heritage Trees Scheme was adopted on 17 August 2001 with the aim to promote conservation of mature trees to the community (NParks 2016). The scheme is special that it is open to public.



As part of Singapore’s natural heritage, Heritage trees serve as important green landmarks of “City in a Garden”, the famous description for Singapore (NParks 2016).

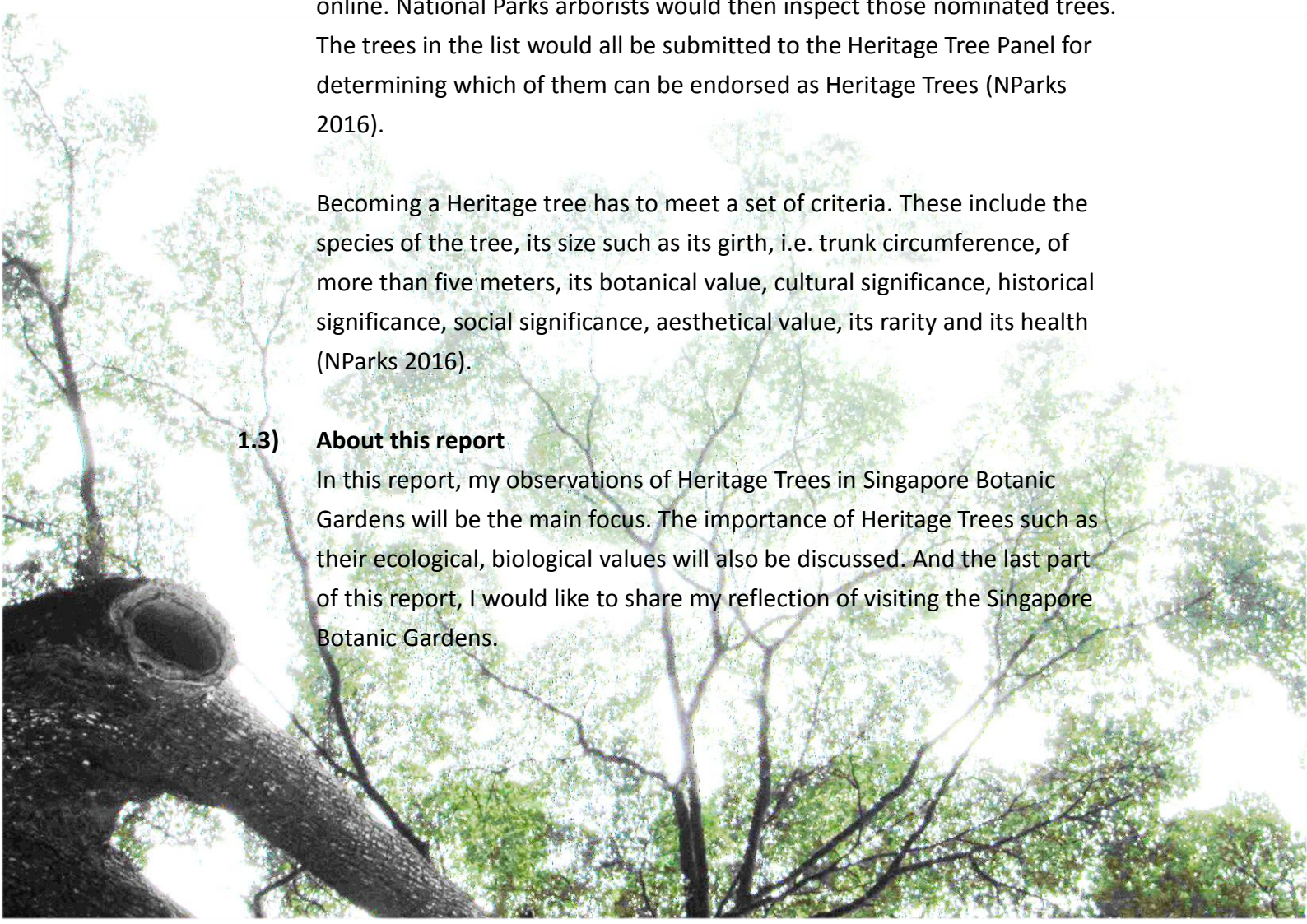
1.2) The criteria for choosing a heritage tree

As mentioned, the Heritage Tree Scheme is open to the public. Therefore, anyone can have the opportunity to nominate a Heritage tree through online. National Parks arborists would then inspect those nominated trees. The trees in the list would all be submitted to the Heritage Tree Panel for determining which of them can be endorsed as Heritage Trees (NParks 2016).

Becoming a Heritage tree has to meet a set of criteria. These include the species of the tree, its size such as its girth, i.e. trunk circumference, of more than five meters, its botanical value, cultural significance, historical significance, social significance, aesthetical value, its rarity and its health (NParks 2016).

1.3) About this report

In this report, my observations of Heritage Trees in Singapore Botanic Gardens will be the main focus. The importance of Heritage Trees such as their ecological, biological values will also be discussed. And the last part of this report, I would like to share my reflection of visiting the Singapore Botanic Gardens.



2) The Current list of Heritage trees in Singapore Botanic Gardens

Before sharing the Heritage trees I discovered in Singapore, first of all, I would like to introduce the official list of Heritage trees for a further reference.

In Singapore Botanic Gardens, many Heritage trees are stored in a well condition with excellent and sufficient maintenance as well as protection. Currently, there are in total 58 species listed as members of Heritage Tree in the botanic gardens. According to the detail information provided by Singapore Botanic Gardens official website (SBG, 2013), I have made a table to arrange these 58 Heritage Tree species in a more organized order. In the following report, the corresponding order (no.) of Heritage Tree species will be used.

No. (#)	Scientific name	Common name
1	<i>Adenanthera pavonina</i>	Saga
2	<i>Alangium ridleyi</i>	Mentulang Daun Lebar
3	<i>Albizia niopoides</i>	Tekik
4-5	<i>Alstonia angustiloba</i> x2	Common Pulai
6	<i>Alstonia pneumatophora</i>	Pulai Basong
7	<i>Antidesma bunius</i>	Buni
8	<i>Barringtonia asiatica</i>	Putat Laut
9	<i>Callerya atropurpurea</i>	Tulang Daing OR Purple Millettia
10	<i>Calophyllum inophyllum</i>	Penaga Laut
11	<i>Carapa guianensis</i>	Andiroba OR Carapa
12-13	<i>Ceiba pentandra</i> x2	Kapok OR Silk-Cotton Tree
14	<i>Cola gigantea</i>	Giant Cola Nut
15	<i>Copaifera officinalis</i>	Copaiba Balsam
16	<i>Cyathocalyx sumatranus</i>	---
17	<i>Dyera costulata</i>	---
18	<i>Dacrycarpus imbricatus</i>	Chucher Atap OR Malayan Yellow-Wood
19-21	<i>Dryobalanops aromatic</i> x3	Kapur
22-23	<i>Cyrtophyllum fragrans</i> x2	Tembusu
24	<i>Couroupita guianensis</i>	Cannonball Tree
25	<i>Ficus kerkhovenii</i>	Johore Strangler Fig
26	<i>Ficus kurzii</i>	Burmese Banyan
27	<i>Heritiera elata</i>	Mengkulang
28	<i>Hymenaea courbaril</i>	West Indian Locust Tree
29	<i>Horsfieldia irya</i>	Penarahan Pianggu

30	<i>Hopea odorata</i>	---
31	<i>Inocarpus fagifer</i>	Tahitian Chestnut
32	<i>Khaya senegalensis</i>	Senegal Mahogany
33	<i>Kigelia africana</i>	African Sausage Tree
34	<i>Koompassia malaccensis</i>	---
35-37	<i>Lecythis Pisonis</i> x3	Monkey Pot Tree
38	<i>Mangifera pentandra</i>	---
39	<i>Myristica fragrans</i>	---
40	<i>Nauclea orientalis</i>	---
41-42	<i>Palaquium obovatum</i> x2	White Gutta OR Nyatoh Puteh
43	<i>Parkia timoriana</i>	Petai Kerayong
44	<i>Pentadesma butyracea</i>	Tallow tree
45	<i>Phyllanthus pectinatus</i>	Melaka
46	<i>Podocarpus neriifolius</i>	Jati Bukit OR Mountain Teak
47	<i>Pterygota alata</i>	---
48	<i>Pangium edule</i>	Kepayang
49-50	<i>Samanea saman</i> x2	Rain Tree
51	<i>Shorea gratissima</i>	Meranti Laut
52	<i>Shorea macroptera</i>	Meranti melantai
53	<i>Shorea roxburghii</i>	Temak Nipis
54	<i>Shorea pauciflora</i>	---
55	<i>Stereospermum fimbriatum</i>	Snake Tree
56	<i>Swietenia mahogani</i>	---
57	<i>Tectona grandis</i>	Teak
58	<i>Terminalia subspathulata</i>	Jelawai Jaha

3) My observation about Heritage trees in Singapore Botanic Gardens

On day 3 of our biology field trip to Singapore, we visited Singapore Botanic Gardens. My group has discovered and learned some of the Heritage trees mentioned above. Here, 7 of them are being introduced and discussed in depth.

#1 *Adenantha pavonina* (Saga)

#13 *Ceiba pentandra* (Kapok OR Silk-Cotton Tree)

#14 *Cola gigantean* (Giant Cola Nut)

#24 *Couroupita guianensis* (Cannonball Tree)

#39 *Myristica fragrans*

#49 *Samanea saman* (Rain Tree)

#58 *Terminalia subspathulata* (Jelawai Jaha)

Extra one: #23 *Cyrtophyllum fragrans* (Tembusu)

#1 *Adenanthera pavonina* (Saga)

Saga is a common shade tree. It grew along the roadsides in Singapore during the 1970s and 1980s (SBG, 2013).



Features (information board in SBG 2013, Ria Tan 2001)

- Height: up to 25 m
- Shape: shaded-giving ornamental with a spreading crown
- Leaves: fine, feathery, compound bipinnate, green when young, yellow when old, shed annually,
- Trunk: covered with smooth greyish bark
- Flowers: small, creamy-yellow, star-shaped
- Pods: curved, hanging, green, turns dark-brown, twist and open to expel seeds
- Seeds: small, hard, bright-scarlet, red



Saga seeds are very special for their similarity in size and weight. Traditionally, the seeds were used as standard weighting unit to measure precious metals and jewellery along the Middle East and South East Asia.

- 4 seeds = 1 gram



For an interesting remark and an additional information of the Saga seeds from our tour guide, due to their attractive appearance and their popularity, they have become the iconic gifts between the lovers. In Chinese, they are called “相思豆”. They are an important “tool” for lovers to express their love.

#13 *Ceiba pentandra* (Kapok / Silk-Cotton Tree)

Obviously, the reason for the name of this tree species “silk-cotton tree” is that it is an important source of cotton, which is used for stuffing pillows. Its seeds are being surrounded by the cotton-like fibre (SBG, 2013).



Features (from my own observation and the information board in SBG, 2013)

- Height: very tall
- Trunk: massive, protected by thorn
- Seeds: surrounded by cotton-like fibre
- Age: over 100 years old
- Herbarium: located underground, positioned to protect the tree roots
- Habits: interesting, major branches change their leaves at different times, contributes to the sparse outlook of the tree during particular weeks in a year



For an extra information of the Silk-cotton tree that I have learnt during the tour, actually, the big, tough and strong tree trunk serves as an extremely essential tool for adventurers to emit urgent signals in case they are in troubles and dangers. The principles lying behind is that when people hit the tree trunk by throwing pieces of stones, a loud, sharp and bright sound will be easily produced immediately. Moreover, the sound wave produced by the hit can be transmitted to a long distance such that people far away can receive the urgent signals and help the one in needs.

Also, the one I observed has a number of outgrowths of tissue located between the tree trunk and branches. They are big, in dark colour and with round shapes. I was curious about this phenomenon, so I have asked our teacher about this.

He told me that by preliminary estimation, the outgrowths might be caused by fungal or archaeobacterial infections. These infections could lead to the formation of “tumors”, which refers to the uncontrollable cell growth and division in that particular infected regions. These outgrowths are abnormal and related to plant pathology, therefore, this tree may be sick.



#14 *Cola gigantean* (Giant Cola Nut)

Cola gigantean is a famous tree species. It is very huge and tall. The common name “Giant cola nut” suggested this tree seems to have some connections with the popular drinks, Coca Cola. Actually, this is the species used to produce Coca cola. It is a large tree that can be found in the dry semi-deciduous forests in West Africa and the West Indies. Full sun favors its growth but it can also tolerate the condition of partial shade. It is able to grow on a variety of soil types. Moreover, it can be propagated by seeds. It also performs well in plantations (SBG, 2013).



Features (information board in SBG, 2013)

Girth: 3.4 m, can grow to approximately 5m

Height: can grow to about 50m high

Nuts: contain high caffeine content, with bitter flavor, are related to the Cola nut. Being used in different way:

- ➔ Treating malaria, asthma, whooping cough, fever
- ➔ Increasing the physical exertion capacity
- ➔ Enduring fatigue without food
- ➔ Stimulating a weakened heart
- ➔ Treating physical illness such as diarrhea, brooding, weakness, sea sickness
- ➔ Treating mental illness such as depression, nervous debility, anxiety, despondency, lack of emotion

#24 *Couroupita guianensis* (Cannonball Tree)

The Cannonball trees are located in the Ginger garden of the Botanic Gardens. They are some of the most noticeable trees there (SBG, 2013). One of the reasons why they are grown in the Gardens is related to their interesting botanical features. They have beautiful and remarkable morphology that they act as an ornamental tree (NParks 2016). They are really unique that they look like no other tree one is familiar with.



Features (SBG 2013, NParks 2016)

- Girth:** 2.9 m
- Trunk:** massive, the lower parts are intertwined and covered by a tangled mass of thick tendrils that bear flowers
- Flowers:** bisexual, large, about 12cm (X.S), fleshy, waxy, showy, fragrant, yellow outside and pink inside, 6 sepals, 6 petals, numerous stamens
- Fruits:** greyish brown, hard, large, spherical, up to 25 cm (X.S), look like cannonballs, develop in 18 months, stay on the tree trunk for more than 1 year before they fall, filled with a smelly and soft red pulp.
- Seeds:** numerous, liberated by slow disintegration of old fruits



The Cannonball tree is special. It is not usual and unlike majority of trees, with its flowers and fruits bearing along the trunk not on the branches. Moreover, it was remarkable because it seems to be self-sterile when being isolated, i.e. they would not fruit (NParks 2016).

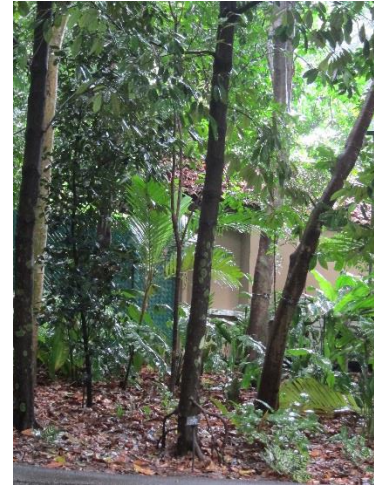
(The fruits with cannonball of the species in the Gardens seem not very easy to discover.)

For a story told by our tour guide behind this species, people in Indonesia have a tradition in offering this as sacrifices to their God.



#39 *Myristica fragrans*

Myristica fragrans is a small evergreen tree. It serves as an economical crop which is cultivated for its popular fruit. Spices nutmeg is derived from its seeds while mace are derived from its fleshy aril which surrounds its seeds.



Features (Orwa, C. 2009)

- Height: 5–13 m tall, may reaches 20 m occasionally
- Leaves: evergreen, alternate arrangement, dark green, 5–15 cm long, 2–7 cm wide with petioles about 1 cm long
- Sex: dioecious, though individuals might produce both kinds of flower occasionally.
- Flowers: bell-shaped, pale yellow, waxy and fleshy.
Male: arranged in groups of 1–10, each 5–7 mm long
Female: in smaller groups, 1–3, longer, up to 10 mm long
- Fruits: smooth, yellow, ovoid or pear-shaped, with a fleshy husk, 6–9 cm long, diameter = 3.5–5 cm,

#49 *Samanea saman* (Rain Tree)

Samanea saman is a large tropical tree. It is located at the visitor Centre, Nassim Gate of the Botanic Gardens (SBG, 2013). It is attractive to many visitors due to its symmetrical and broad umbrella-shaped crown (Duke, James A. 1983). This also makes it an amazing choice for a shade tree and an excellent spot for photo shooting especially for wedding photos. The Heritage Rain Tree in the Gardens is very old already, which was being first successfully introduced to Singapore via the Gardens in 1882 (SBG, 2013).



Features (Duke, James A. 1983)

Height:	60 m tall,
Bark:	rough, wrinkled
Morphology:	a symmetrical and broad umbrella-shaped crown, about 80 m wide
Leaves:	evergreen, alternate, bipinnate, 25–40 cm long, 2–6 pairs pinnae, each contains 6–16 pairs stalkless leaflets, a glandular dot appears between each pair.
Flowers:	small, tubular, pinkish-green, near the end of twigs in clusters on a green hairy stalk
Fruits:	flat seed pods, black, 20–30 cm long,
Seeds:	oblong, reddish-brown, about 1 cm long.

The Bandstand and the Rain Trees

The ring of yellow Rain Trees surrounding the Bandstand is one of the remarkable and notable landscape characteristics. As mentioned, this is a popular photo shooting spot. Due to a particular mutation occurred in about 1/1000 of seeds, the originally light green leaves have become yellow after propagations. The yellow Rain Tree seedlings were reproduced and then grew around this Bandstand.



#58 *Terminalia subspatulata* (Jelawai Jaha)

Jelawai can be also called *Malayan Terminalia*. Jelawai is a native of the rainforest of Singapore Botanic Gardens, which has been already standing for more than 150 years. It is a type of hardwood timber tree. It is one of the tallest trees in the Gardens. It is an uncommon species in the wild. About 30 years ago, this tree was hit and damaged by lightning, but fortunately recovered subsequently (SBG 2013).



Features (SBG 2013, NParks 2016)

- Height: more than 50 m tall
- Leaves: being periodically sheds, almost the entire tree bare is left alone
- Fruits: flat, two-winged, facilitates the scattering by wind, thus the dispersal of the seeds
- Crown: wide, flat-topped, especially in those mature individuals
- Trunk: heavily buttressed
- Bark: narrowly cracked, pale brown



Some information about its growth

Being a Heritage Tree, its girth increased from 6.5 m in 2001 to 11 m in 2013, measured at 1.3 m height including the buttresses. The buttresses are up to 5 m high (NParks 2016).

#23 *Cyrtophyllum fragrans* (Tembusu)

Tembusu tree is a well-known evergreen Heritage Tree in Singapore. As we all know, tembusu tree is the most iconic species to represent Singapore. This is why tembusu figure is even being printed on the paper money of Singapore.



In these 5 days, the hostel we stayed at nights is the Tembusu College in the NUS. There is a huge tembusu tree planted in front of the college. We saw it every day when we came out of the hostel. Therefore, the special shape of its bent branch from the main trunk was already clearly remembered in my mind. It is the reason why even though we had not observed Tembusu Heritage tree in detail, I still want to mention this species here.



Let us come back to the Tembusu Heritage Trees in Singapore Botanic Gardens. There are 2 Tembusu trees in the Gardens listed as Heritage tree. One is 170 years old while the other one is 270 years old. For the latter one, it is the largest among its kind in the Botanic Gardens and probably the finest specimen in Singapore.

Features (SBG 2013)

Bark:	deeply fissured
Wood:	durable, hard
Trunk:	was used to make chopping boards long time ago
Flowering pattern:	relatively regular, blooming in May/June and October/November, with sweet fragrance
Flowers:	turn from creamy white colour to yellow colour as the flowers age, the sweet fragrance deteriorates
Fruits:	small, red fruits

4) Defining Heritage trees based on their Importance in several perspectives

4.1 Size

To define a special status tree, components and measuring criteria of tree size such as trunk diameter is frequently and commonly used. Diameter at breast height, DBH in short form, is used for setting up a size-standardized threshold diameter around 4.5 feet (Phytosphere).

Other than tree trunk diameter, maximum canopy spread and height are two common parameters for tree size measurement. They are also being considered independently or together with the trunk diameter (Phytosphere).

4.2 Species

Special status may be conferred only to certain tree species. Most of the time, these trees are essential local native species or associated with a community character. Certain rare species, either native or not, may also be defined as special status tree (Phytosphere).

4.3 Historic significance

There might be some association between a tree and a notable and remarkable historical event, famous person such as a celebrity and scientist, landscape and structure. Every tree should have some historical significance, no matter it is recognized or not. Therefore, determining if the historical significance of a particular tree is notable sufficiently is a relatively subjective stuff (Phytosphere).

Historic tree status is typically offered by a governing or some parties such as tree commission, although the Heritage Trees Scheme is open to public nomination. Ordinances may automatically confer the historic status on those trees which have been designated as “historical landmarks” by specific historical organizations and societies. Moreover, some ordinances may offer special status to those trees that are dedicated or planted as public memorials (Phytosphere). It is not difficult to find a board with the dedicated event written near those Heritage Tree in the Singapore Botanic Gardens.



4.4 Ecological value

All trees contribute to a degree of ecological values, positions and functions to the environment. Certain individual or cluster of trees may have especially high ecological value due to their size, location or condition. Take a brief example, a tree may be an important nesting site, mating ground, source of food, important shelter for certain animal species. So, the tree ecological value should be qualified by expert likes trained biologist and ecologists (Phytosphere).

To conclude, a set of criteria is need to be considered before defining a Heritage tree. Other factors like the aesthetic value can also be an important parameter.

5) My reflection about the exploration

In the 5-day field trip to Singapore, the Singapore Botanic Gardens is one of my favorite and most unforgettable places I have visited. I admire this place not just because of the knowledge I have gained and plants with historical value I have learnt such as the Heritage Trees, but also its aesthetic value.



As a huge theme garden which hold plenty of flowers and trees, the Singapore Botanic Gardens is quite successful to attract visitors and provide an excellent platform for the public to learn and travel simultaneously. I can really see the marvelous and brilliant ideas behind the designers and landscape architect of the Gardens. This wonderland allow biological students like us to learn and explore the beauty of nature and the creations of the world in a much more enjoyable way, not just solely looking at the information boards. I love this way of studying biology. It is a really valuable experience in my life.

Emily Yeung
Summer, 2016

This is the end of
my report 😊

Thank you for
your attention to
this report! 😊

Reference

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Photo credited to

The Heritage Trees icon: www.nparks.gov.sg

Tembusu Tree on the \$5 note: <https://mbaexplore.wordpress.com>

Besides these two pictures, all other photos in this report are taken by myself and my group.